

The Bloody Beginner's Guide to Realistic Flight Simulation

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FSX vs. FS9

FSX is upon us and the war is raging. If you take a look at the online forums right now, you'll be shocked by the level of stupidity, pride and prejudice in the fs community. FSX has been attacked fiercely for not delivering what it promised. Much of the discussion is a repeat from the last major launch, that of FS9, and entirely futile. If your goal is realism in flight simulation (otherwise you wouldn't be reading this guide, I guess, you need to know a few things:

- FSX (like all its predecessors) was released as gaming software to make money for Microsoft. With the possible exception of the flying model, all of its improvements over FS9 were designed to appeal to a large customer base of non-professional gamers, not flight simulation enthusiasts or hobby aviators. By itself it is not, (and no previous version was), a professional, realistic flight simulator. It is not and it cannot be. Professional flight simulators incorporate multiple computers, sophisticated ancillary systems and cost a lot more than 70 USD. To expect FSX to be technically perfect is simply ludicrous.
- FSX seems to have improved on FS9 in two areas: a) gimmicks and gadgets, from ground traffic to animals and flying birds, improved textures (the look of things b) the flying model itself, improving the "sensation of flying" (the way the simulator feels). The latter improvement is very important if you are into VFR flying in small aircraft.
- FSX, with all its new widgets is a 'killer application' for today's hardware. The naked simulator without any add-ons brings down frame rates to about 50% of FS9 (tested at several medium size and large airports without extra scenery or weather on a high-end system).
- The increased level of realism achieved by the basic FSX installation is a welcome development. Unfortunately it is not enough: default airport sceneries are still bad,

weather simulation is still very basic, the online flying options are rudimentary etc. To make it 'professional' you will need add-ons. At this point, I cannot see FSX – already choking my high-end system as of September 2006 - running smoothly with the add-ons I want to run on it.

- Even if it the hardware were available today, most of the add-ons necessary for realistic flying, like a professional aircraft (e.g. PMDG 747), and well-designed sceneries, are not yet available for FSX. It will take at least a year before even the basic tools for realistic flying will be available for FSX.
- That said, if you are happy with default sceneries and aircraft, if you are into VFR flying in your Beechcraft, then FSX is for you, and you should switch today. But if that level of realism was enough for you, then, well, most likely, you wouldn't be reading this guide ☺

Thus most of what follows still refers to FS9. I am continuously updating individual sections as FSX becomes more usable and better hardware and add-ons available.

A More Realistic Flying Experience

The purpose of this document is to help you improve your flight simulation experience by making it more realistic. MS Flight Simulator is an excellent product, but without add-ons and a bit of tweaking, the views generated are far from realistic. So here is rule number 1 of the game: if you want more realism, you will have to add additional programs, some of them pay-ware, but many of them free. You will also have to invest time and effort to learn to customize your FS installation. Thus first question you have to ask yourself: HOW MUCH REALISM DO I WANT?

This is an important question, probably the most important question of your simmer life. The reason is simple: **the degree of realism achieved is directly proportional to the amount of computing power, time and money you need to invest in your hobby.** FS9 and FSX were built for a mass market, to run on millions of different PCs, and they generally do. A fully tweaked, good-as-it-get realistic setup may involve several PCs and monitors, extra hardware, hundreds of add-on packages, and a thousand days and nights to get things working properly. I am not going to tell you what's cool and what's right, just what's possible. Flight simulators offer the basics; everything else is up to you. So what do you want?

The most basic decision is between low VFR flight in limited geography (bush flying as we call it) versus simulation of commercial jet operations at 35000 feet from KEWR to EGKK, including realistic flight plans, LNAV and VNAV, cabin pressure and all the rest of it. Whatever your cup of tea, you will have to consider these five elements:

- Scenery
- Weather
- Aircraft
- AI Traffic
- ATC

Scenery

That's were most beginners start, being unhappy with the way there hometown or home airport looks in the simulator. Which scenery and how much of it to get mostly depends on what sort of flying you like: if you like small planes flying low over short distances (VFR) you will need scenery for a preferred area. If you love VFR flying in the mountains around Vancouver, all you need is a

package like "Vancouver+" or some freeware scenery, you don't need mesh files for the entire globe, or sceneries for every airport on it. If on the other hand you like commanding 747s from Heathrow to Hong Kong, you don't need detailed scenery over Russia – you probably want a handful of mesh files and good airport scenery at LHR and HKG. So before you go on to buy every scenery package available, ask yourself what sort of captain you want to be: Cessna or Jumbo? Bush or jet stream? Short or long haul? ½ hour flights in your lunch break or red-eyes on the weekend?

Scenery in flight simulation consists of four things: mesh, landclass, terrain textures and scenery objects.

Mesh

MESH (sometimes called "elevation data" or "elevation mesh") is responsible for the correct shape of the terrain, i.e. called ground elevation. Installing a mesh is probably the cheapest and best way to improve the appearance of the FS landscape. You can get mesh files for the entire worlds for a membership fee at the map server on www.fsproject.com, but be aware that these are huge files made from satellite images: the entire worlds takes about 20 GB or thereabouts. There are free mesh files for particular areas available on www.avsim.com and other fs sites, and there are commercial terrain packages (etc. FS Scene, Birdseye View) available for around EUR/USD30 per region which include mesh, landclass and textures. Be aware that a lot of add-ons out there simply package free stuff and sell it to the uninitiated.

Mesh comes in different levels of detail (LOD), you'll probably see things like 76m, 38m, 19m – the smaller the number the higher the detail and the larger the files needed to cover the same area. I found 38 a reasonable compromise for any area of the globe. You can mix different LODs without problems, even in the same directory. The finer the mesh, the longer it takes to load, albeit mesh in general is not a big drain on resources.

FSX uses a new type of terrain files with higher resolution, which is partly responsible for the higher demand on your computer's CPU. At the time of writing, there are already improved elevation data sets available for limited regions. The default mesh shipping with FSX is not good enough for realistic simulation.

Landclass

Once you have installed mesh files, the scenery will improve greatly, but not necessarily look realistic. MESH controls the ground elevation and outlines of land masses, but not the actual type of terrain– for that you need what's called LANDCLASS files. They tell the simulator where to place fields, grasslands, deserts, and built-up areas. This is important: land class files do not change how fields, grass and deserts look like, just WHERE they are positioned.

Microsoft Flight Simulator comes with a set of reasonably good landclass data. Unless you find fault with it in general, you do not have to get extra landclass files. Many scenery packages (discussed below) do include their own landclass files. You will find landclass files on www.fsproject.com, or you can browse the commercial websites for scenery software. Avsim has hundreds of landclass packages for smaller regions – these are generally more accurate than global landclass packages.

FSX default landclass is a great improvement over FS9, albeit only for limited regions like the US and Western Europe.

Be aware that many commercial packages deliberately don't mention the type of files they contain, but most that offer "scenery" do contain some kind of landclass information (e.g. the

Ultimate Terrain series from Flight1). As with mesh files, reasonable realism is available for free or close to free. Land class files are considerably smaller than mesh files.¹

Textures

With mesh and land class installed, the simulator uses the default terrain bitmaps to cover the surface according to the shape of the mesh and the type of landclass installed. If you want the ground to look even more realistic, you need terrain textures. Again, these come in a confusing combination of free files, commercial packages, colours and shapes. FSScene is one of the oldest out there: they offer textures for different continents and seasons, which comes quite expensive if you want to cover the world. At the time of writing, the newest, best and cheapest solution is a package called "Ground Environment 2006" (also available in Pro version) offered by Flight1. It covers the entire world with fairly appealing textures and thus eliminates the need for regional solutions. It also includes all four seasons, since uses different files to portray winter, spring, summer, and fall landscapes.



Approaching EGCC on FS9 with mesh and land class from fsproject and terrain from Ground Environment.
Aircraft is a PMDG 737-800 in BA colours

The three basic ingredients above – mesh, landclass and terrain should give you great and reasonably realistic flying experience in FS9 anywhere in the world, without having to buy a new computer to boost performance. Unfortunately, global mesh files and terrain scenery are not good enough for people who crave local precision. Do check the fs libraries – especially in your country. Almost every country has a few web sites with local scenery solutions. A few examples: for Nordic simmers there are some terrain textures available that simulate the look of Scandinavian countries. In Australia, "Vista Australis", known as VOZ, currently version 1.21, will

¹ Landclass is installed like add-on sceneries, but their subfolders must not have a "texture" folder, but only a single "scenery" folder.

give you the nice red colours of the outback. There are some textures packages out there for Asian countries which have different house shapes and rice paddies instead of wheat fields. Due to the limitations of the simulation engine in both FS9 and FSX, terrain textures cannot be changed 'in flight'. The simulator must be restarted after changing textures.

Scenery Objects

All of the above items affect the landscape or macro scenery. The next step is micro scenery, that is to say localized "objects" such as buildings, bridges, etc. Most scenery packages are made for airports and include the layout of the airport in so-called AFCAD² files, ground textures, buildings on and around the premises. More advanced scenery packages include whole cities with buildings, sights, vegetation, etc. Some include moving objects. Much is available for free; check www.avsim.com or any of the other simmer libraries. There are also some fabulous commercial packages, like Mega Airport Frankfurt, which is one of the best examples of what is possible in airport scenery simulation. You should always try to find free airport scenery first before shelling out between EUR/USD 10-30 for a commercial package – too many pay-ware packages are really disappointing. Many free airport sceneries are made by local aficionados, with great love and attention to detail.

The main difference between free sceneries and pay-ware add-ons is mostly the amount of detail offered. Developers tend to add a few "extras", like moving gangways, parking gauges, etc., or lots of buildings around the airport. The last bit is quite important when it comes to adding realism. Samssoft's Taipei and Kaohsiung sceneries are a good example, adding excellent surround views from the airfield, even though the airports themselves are not top quality.

There are a few sceneries worth mentioning for their precision and artistic detail. Aerosoft's Manhattan scenery is a stunning example of a whole city – well at least one borough – modelled to a reasonable degree. Cloud Nine have released a number of American airports in excellent detail. But leave it to Japan to deliver the absolute best scenery packages: the company Overland produces scenery for Japanese airports (packs 1-6 are available now; a new issue including the new Nagoya Centrair Airport is in the making). Without doubt, the airports in that collection are the best-designed, best-looking, most frame rate-friendly sceneries I have come across so far. Many airports feature vehicles, people, signs etc. and Overland manages to make every detail look absolutely realistic, from the advertisement boards at Fukuoka to the aircraft washing hangars at Haneda Airport. The technical quality is amazing: there is no shimmering, flickering, and no objects out of place. This is what add-on scenery should be like. You can find any of the commercial packages mentioned above on sites like www.simmarket.com, or directly on the maker's web sites.

Also available are photorealistic scenery packs and VFR scenery. Photorealistic terrain around scenery will only cover small portions of the landscape and the transition points aren't always pretty, therefore photorealism is only suggest for short VFR flights in your favourite Cessna. If you are jet pilot on your way from Paris to Dubai, stay away from them. They need a horrendous amount of space on your hard disk and slow down your computer (impact on FRAME RATES or FPS – search the web for that issue). I have also found most "photorealistic" scenery to be more "photo" than "realistic". (One of the better examples is "Wonderful Rio", a great add-on for Rio de Janeiro. It constitutes an excellent compromise between photo-real and usable, frame-rate friendly.)

² AFCAD files are an integral part of airport sceneries. AFCAD files define the layout of airports, including buildings, taxiways, and runways and so on. Sometimes a good AFCAD file does more to improve an airport than a complex scenery package. Conflicting AFCAD files can be a source of malfunctions and crashes. More about AFCAD under the heading "AI traffic".

There are currently no sceneries available that make use of all the new features of FSX. Some sceneries are being updated, and you should expect a lot of FS9 sceneries to be repackaged as FSX compatible versions, with minor changes only, or worse, limited compatibility. As always, caveat emptor. There are also some technical glitches in the scenery model of FSX with effectively preclude the development of sceneries with the same tools as in FS9. It will take time for developers to come up with alternative solutions and really good FSX sceneries. There is also the performance issue. Looking at the meagre frame rates FSX produces with default scenery; it is hard to imagine sceneries of large airports like EGLL, KEWR, LFPG or the famed EDDF to run smoothly. My advice: if you are using FSX, save your money and stick with the default sceneries or free add-ons for now.

Weather

The weather machine incorporated in FS9 and FSX is not bad: You can select a predefined weather scheme or download real weather data from Jeppesen. It is my opinion that most users with weaker PCs should leave it at that. The reason is simple: weather has the most pronounced impact on performance (especially frame rates). Dissatisfaction with the weather is probably the single most important reason why simmers end up buying new hardware. The realistic depiction of skies takes more computing power than anything else in your fs environment including scenery. That said, if you do have a state-of-the art setup (fast processor, top-end graphics card), adding worthwhile weather software can have an enormous impact on the level of realism you achieve. In fact, a high-end graphic card can take the load off your CPU and generate even the most complicated weather pattern without significantly reducing overall performance.

Realism in weather has two components: weather data and weather graphics. In previous editions of this document, I have presented a list of packages and different combinations. Over the past year, the situation has changed as Activesky announced their cooperation with Flight 1's Ground Environment Pro to produce the absolute best solution ever to weather simulation in FS9. I will thus dwell on other products no longer as I have banned them once and for all from my hard disk.

At the time of writing, there is no satisfactory solution for FSX, even though AV6 has been made partly compatible with the new simulator.

If you want realistic weather in FS9, get Activesky and GE Pro. The latter program offers stunning ground and sky textures to adapt the FS environment to weather conditions directed by Activesky.

You should also be aware that as soon as you start using real weather data, the flight environment will resemble real sky conditions, which means much reduced visibility at the best of times, and often thick cloud covers of large regions. That in turn means you won't see much of your scenery. Complicated scenery + real weather often means considerable computing power, in other words low frame rates, but that's the price you pay for realism. Only high-end graphic cards can depict complicated weather while not increasing processor load significantly. One you use a weather package, however, you will be amazed how, on your next real-life flight, the actual sky looks so much like your virtual one!

Weather Gauges

One useful add-on tool to use with real weather are gauges. There are two great products that I am aware of, the FSWXR2100 from Add-on Gauges being the more realistic and the Reality XP Wx500 Weather Radar being the smaller, handier tool. Note that due to limitations in the flight simulator, it is currently not possible to have accurate depiction of weather in a weather gauge. Some aircraft developers like PMDG think that the depiction is in fact so inaccurate that it doesn't

make sense to use a gauge at all; after testing both gauges above for a long time, I tend to agree.

Aircraft

The aircraft included in FS9 and FSX and most of the aircraft available for free today are OK for the casual simmer. If you like the missions in FSX, and treat flight simulation as a 'game', the default aircraft are more than enough for you. Default aircraft require knowledge of flying so basic that the tutorial that comes with FS2004 should teach you everything you need to know. However, you should be aware that in case of a real-life emergency, you should definitely not raise your hand when they ask "is there anyone on board who can fly this plane?"

I have tested and flown over 300 aircraft, freeware and pay-ware, and my verdict is simple: a) there are no realistic aircraft available for free and b) so far nobody comes close to the level of realism and professionalism attained by PMDG – Precision Manuals Development Group when it comes to jets (737, 747, soon MD-11).

Before you make that purchase, one BIG CAVEAT: some of these packages are so professional they are used to train real pilots. I had a 747 captain at my house using the PMDG 747 and he just couldn't believe how close to life it handled. That's cool, you say, but it also means that you have to invest a considerable amount of time in learning how to use these models, reading the manuals, looking up those abbreviations. After all, real pilots train for years, why should you be able to learn it in an hour?

If you are ready to invest that kind of money and a few sleepless weekends, and you feel that the average free model doesn't do it for you, I suggest you start with PMDG's 737. Without any doubt, this is the best compromise between steep learning curve and real-life experience. The manuals are well-written, the software stable, it comes in scalable packages so you can control your budget, and it offers hundreds of free liveries. PMDG also offers the 747 – Queen of the Skies, but if you have never bought a professional aircraft model before, you should start with the smaller plane, because the 747 even though it has similar systems can feel a bit overwhelming for the first-time flyer. Watch out for the MD-11 to be released soon.

PMDG have announced a brand new version of the 737NG for FSX, and an update to their 747 Queen of the Skies.

Some other popular choices are the PSS (Phoenix Simulation Software) Airbus series, the 777 (service pack 2 is available now), and their 757, as well as Airbus models from CLS, or the LEVEL-D 767. All of these try to achieve some degree realism, and most of them do an acceptable job. Some, like the CLS airbus sacrifice authenticity for ease of use. Others, like PSS 777 and 757, try to be realistic, but are full of technical glitches. For GA aircraft, look out for Carenado for and Dreamfleet models.

Project Opensky and Meljet are among the better free-ware packages, but even the most ambitions of their products (like the Swiss A340 from Project Opensky) don't come close to good pay-ware. What you prefer is probably a matter of taste more than anything else. Of course there are also smaller airliners available – recently released for example a new Kingair B200 which got raving reviews – and more exotic stuff like gliders, seaplanes, fighters, helicopters, and even zeppelins.

Most aircraft – freeware and pay-ware – come in two parts: the base package, often with the designers 'own' livery – and individual liveries (of airlines, air force regiments, you name it). The key to make any vessel work is a file called aircraft.cfg in the main folder of each aircraft. It contains two elements: basic definition of the aircraft's technical specs, and definitions of the versions (mostly different liveries) associated with an aircraft. Those version models are

numbered. For a better understanding study the files of the default 737. You don't have to install a new aircraft for every livery you want – just get the livery and register it in the aircraft.cfg file.

AI Traffic

The last piece of the puzzle is other aircraft around you. AI Traffic is the first add-on many simmers buy after finding their home airport deserted on a Monday morning.

AI Traffic comes in two flavours: there is software that emulates real aviation traffic as closely as possible, and software that simply loads the components like aircraft in different liveries and then assigns them to airports and certain routes more or less at random, without duplicating real-life flight plans (even though the makers claim there is some sort of 'intelligence' behind it). An example for the first kind is PAI, or Ultimate Traffic. The advantage of the latter approach (e.g. Traffic 2005, MyTraffic 200x) is supposed to be that you don't need constant updates as the flight plans aren't realistic anyway.

Both solutions in pay-ware have left me wanting. None of the available packages offer good quality aircraft, some of them are so badly designed, the AI traffic eats up most of your FPS. The advantage the pay-ware packages have is that you don't have to fuss with individual flight plans, liveries, etc. Making custom AI traffic with high resolution liveries and realistic flight plans involves downloading every single aircraft model, livery and the flight plans of an airline and compiling them. If you want to get into designing your own AI traffic, you need to learn about AI tools such as "Traffic Tools" (TTools) by Lee Swordy and AFCAD – a program to design airport layouts.

The key to AI aircraft development is LOD – level of detail and the number of polygons used to model the aircraft. Check AI Aardvark (now defunct) or Evolve AI's website for a full discussion. Aardvark is a group of people that has revolutionized the design of AI aircraft, proving that it is possible to have good looking AI aircraft without performance deterioration. Their mission has recently been taken over by EvolveAI, and together with FS Painter, a Japanese AI enthusiast, these three now offer the AI solution with the best quality. You will find most of their work in the "AI" section of the avsim library.

Dissatisfied with the status quo, a new group of enthusiasts called World of AI has come online in 2005, offering a great service: they combine premium aircraft models from the aforementioned designers with liveries and flight plans in proprietary but free "AI packages", to be installed with their own, easy-to-use installation tool. This is absolutely fantastic, because the individual packages tend to be very accurate, the quality of the liveries superb, and installation a breeze. If there's a secret to it, and World of AI aren't talking about it. In any case, they offer the best quality currently available while making AI easy to install. They release, on average, one airline a week, and are unfortunately still missing most of the major carriers. But believe me, it's worth the wait. And it also works in FSX.

Of course, if you need more exotic airlines, liveries, military aircraft and general aviation in your fs world, you will have to find the flight plans, AI models and repaints yourself. Avsim is always a place to start, and for general aviation try www.ultimatega.com. Also, local country simming web sites sometimes have packages of local interest, like the RAAF AI package on aussim.com.au, or SKJ's fantastic Russian AI packages, just to name two examples.

ATC

That's about it. You got your vessel, plenty of aircraft around you, weather, and scenery. But then there is that crappy ATC (in both FS9 and FSX!), which is so unrealistic and annoying you probably will end up turning it off and flying on your own. This is especially true if you started using professional aircraft models like the ones mentioned above – they don't work at all with the

default ATC. ATC is a difficult subject, but if you are lonely up there, again you have two basic choices: fly with virtual ATC or interact with others on virtual ATC networks like VATSIM.

My preference is for Radar Contact – the first realistic ATC package that works, and works well. It is fantastic, technically sound, and reasonably realistic. Check out the well-written review on www.avsim.com which also explains the disadvantages of online flight networks like VATSIM.

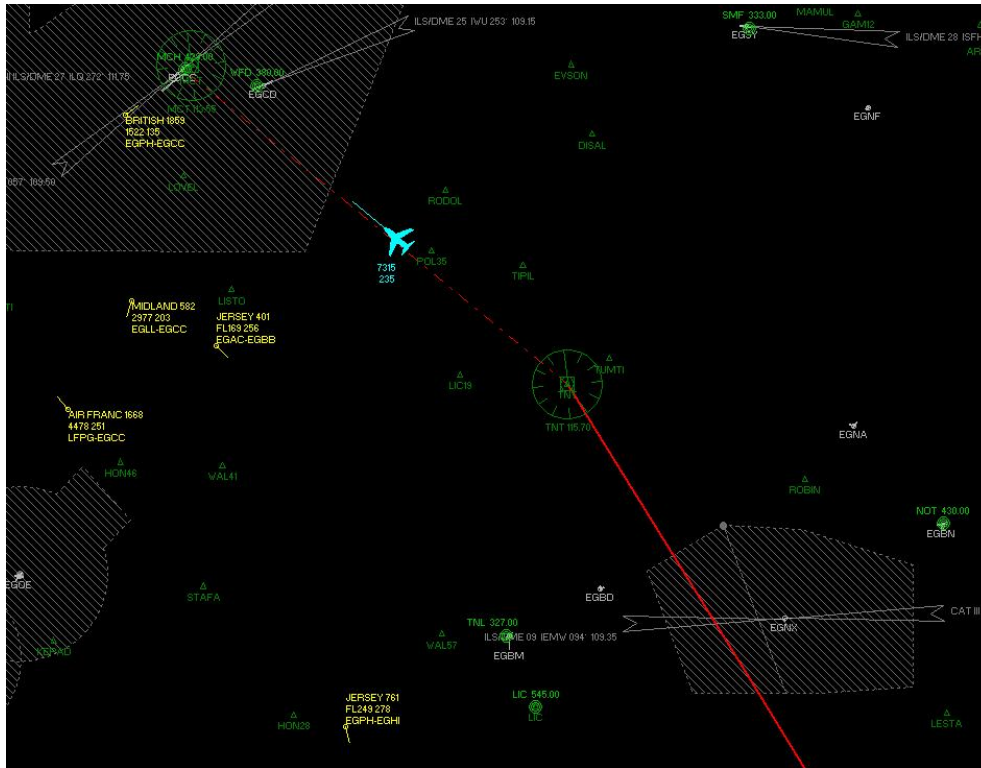
One caveat though: while Radar Contact is more professional to say the least, it is still very basic artificial intelligence, and does become a bit repetitive after a while. Also, the pilot and control voices available so far have a tendency to mispronounce every single place name not located in the US. It is asking a bit much, I know, but the fact that many places are not even recognizable by sound means that this “realistic” ATC experience becomes highly unrealistic: when departing Hong Kong to the North, you do after all expect a Chinese accent and not a housewife from Arkansas. But its early days, and I suspect more choices will be added.

WARNING: Do not confuse Radar Contact with a “visual” ATC package – i.e. a radar screen. The demo available on their web site is terribly misleading and really bad marketing. If you want a moving map or radar-like display, get FSCommander or a similar tool.

Flight Planning

Flight Simulator comes with rudimentary and highly unrealistic flight planning tools. You will want to use pay-ware flight planners (there are no free ones worth mentioning) to increase realism; if you use pay-ware aircraft like those from PMDG you **MUST** use flight planning tools, as those aircraft will not accept default FS flight plans. (That is if you don't want to enter every flight plan into the FMS/CDU by hand.)

The basic concept of flight planning tools such as FSBuild, FSNavigator, FSCommander and Courseplanner is simple: they offer a map of the world on which you “draw” your flight plan.



Moving map display of FSCommander, plane on approach to EGCC. AI traffic shown in yellow, aircraft flying a STAR not included in the original flight plan (red line). The map display can be run on a second monitor.

Of the four top contenders, FSBuild has the worst interface and FSCommander the best; Courseplanner and FSNavigator are somewhere in between. FSCommander also makes the most realistic flight plans (judging by actual plans available on the net), although it has some problems with low altitude flight paths. FSNavigator runs as a convenient plug-in, while FS-Commander is a bit cumbersome in that respect, running as an entirely separate application. Most packages offer automatic modes where you simply select a departure and an arrival airport and the software creates a flight plan for you. The best automatic tool is FSCommander, the most error-prone FSBuild. FSCommander has a cumbersome SID/STAR selection process; FSBuild is very fast once you know the basics. Note that some planners offer extras such as moving maps (FSCommander), for which a registered version of FSUIPC is necessary. If you have two monitors, you can run FS on one and FSCommander on the other, allowing you to fly the aircraft AND watch its movement on a map, including all the AI traffic around it, a bit like being pilot and controller at the same time (image above). There is one problem with flight planning tools for the novice user: most use proprietary approaches that have a sometimes steep learning curve, and without investing some time into learning you will get a wrong impression of the program or never come to exploit its full potential. If you do decide to try any of these programs, do read the manuals!

Other Add-ons and Expansion Options

Available add-ons are too numerous to mention. With the items we covered so far, you should have a reasonably realistic flying experience, but there is a lot more out there, like virtual crew simulators, your own virtual co-pilot, cargo and passenger simulation, etc. Always make sure you have a working fs installation, and then back it up properly before installing new add-ons. See Problems and Tips below.

Of course, realism can be achieved not just with software add-ons, but also with hardware. If you want get a full "rig" with multiple PCs and monitors, there are a number of websites out there explaining how to do that. Some people spend thousands of dollars adding not just more PCs and monitors, but replicas of the actual components you find in an aircraft. One place to start if you are good with the soldering iron is www.simkits.com.

Hardware Issues

I won't get into the hardware debate too much, because it's a never-ending subject. Everybody seems to have their favourite processor, amount of RAM, graphic card, etc. But once you start adding software to your fs, you are bound to be confronted with hardware issues. Note that there are many hardware-related FAQs available on the Internet that go into much more detail. Here are the basics you need to know:

- **The more add-ons, the more computing power you need;** but weather is by far the biggest drain on FPS. So if you have an older system and no money to upgrade, try the clear skies. Flying in thunderstorms is overrated anyway. Again, the VFR vs. IFR debate plays a role: if you fly low, you need more weather to make it realistic, if you fly LAX-LHR over night, you don't need clouds or rain, obviously. Having said that, please note that a good 3d graphics setup will allow you to run any weather scenario you want (see below)
- **The concept of FPS is misleading** – the FPS number displayed by FS internally is nonsense. Like most things in this world it is an oversimplification. A movie has 24 frames per second, and 25 fps is about the most a human eye can detect. So people tell you your setup should at least have 25 fps. That's nonsense. With good scenery and bad weather, you sometimes fly with 8 or 9 fps without noticing. My recommendation: turn off that FPS display, and if you don't know how to display FPS on your screen, I won't tell you, because far too many people obsess about FPS. You have to be happy with your flying experience, that's what counts. Fighting over FPS higher than 25 is childish. Nobody can tell the difference. Having said that, FPS is a good indicator of how much "slack" you have on your machine. If you can get up to 60 FPS in clear weather, you have a good setup. If your machine shows 20 fps or less without any scenery or weather install, you might want to skip that dinner and save up for a major upgrade.
- **Graphic cards do make a difference.** Before you upgrade your processor, you may want to look at graphic cards. Here's why: a popular website out there "benchmarked" the Athlon 64 as the best processor for FS2004 averaging 70 FPS. That is with standard FS2004 setting. My friend managed to install so much weather and scenery it now runs at 13 FPS in bad weather over KSEA. I recently took his old Pentium IV and installed a new graphic card (high end I admit) – the same scenery and weather now runs at 35 FPS on the OLD machine. Also, if you buy a lot of independent add-on programs (not passive scenery, but programs like AI traffic, ATC packages, or weather engines, you will achieve better performance on a dual-core processor than on those highly-rated Athlons gamers cherish so much. If you want realism in flight simulation, it is important to invest in a good graphic card. I have found that the entire range of best-selling gaming cards, be it with nVidia or ATI chip, leaves much to be desired. Many crashes seem to be caused by cards not being able to handle the simulation properly. Insufficient card memory seems to matter a lot more with flight simulation than with other high-powered games. Also, in shoot 'em and kill 'em games, the attention of the player is hardly ever on the finer details of the scenery, while the avid simmer may find flaw with every tree, house or shoreline; or runway and hangar as it happens. Because of this, it makes a lot of sense to get the best graphic card you can afford. This it even more true if you fancy

flying in real weather and thus use a real weather generator. You won't enjoy the simulation if you have to compromise every time the weather is bad. By the way the litmus test for any flight simulation is landing a PMDG 747 or 737 at EGLL (London Heathrow), in bad weather with maximum cloud cover, max 3d clouds, anisotropic filtering, and 4x anti-aliasing, full AI traffic. The only graphic cards I found that can handle this are the top end models costing around EUR 400 (or USD 500).

- Some experts claim that one of the tweaks with the biggest impact is the **latency setting** for the graphic card in your PC's BIOS. Search the simmer web for more information – but be careful: wrong BIOS settings can seriously mess up your PC.
- Graphics Settings: experiment, but systematically! It's not easy to find the right setting for graphics. The "all sliders to the right" if you have a good graphics card I often read on the net is pure nonsense. I recommend starting with all settings maxed and then reducing one by one until you can notice any difference.
- **Dual core and quad core processors:** FS9 and FSX don't take advantage of the second, third or fourth processor in your PC. Use them, but the game performance doesn't improve noticeably. This has less to do with the flight simulator than with a software coding problem called "threading". Effective threading procedures are now being developed, but it will take 2-3 years before multiple-core processors will deliver on their promise; at least in the gaming world.

Troubleshooting

If you install any of the products mentioned above, or even without any additional software, you may run into problems. This is not a troubleshooting FAQ so you won't find the answer to your particular problem here, but from many years of experience on different machines and installations, here a few truths:

1. Most problems are graphics related. Make sure you have the latest driver for your card, and even then – surf the forums to see if others have reported problems with that driver version. Your graphic card must be tuned for 3D gaming. Spend a day or two on 3Dguru and websites like it – you'll learn a lot there!
2. In FS9, leave your fs.cfg file alone for now. There are hundreds of sites and documents out there teaching you how to optimize your settings. There are indeed a few tweaks worthwhile, but don't fix it if it ain't broken. FSX however only seems to run only with a few tweaks. Check the avsim FSX forums for an ongoing discussion on FSX tweaking.
3. Crashes to desktop (CTD, black screen) are almost always related to one of two things: a badly written add-on (remove it and see if the crashes persist) or a bad texture on the ground (again, remove the scenery you installed and see if you can land now). There are also some valuable tools out there to check for duplicate AFCAD files, bad aircraft installations, errors in the scenery configuration etc. Always back up your system before installing new textures (like GE, VOZ, etc.)
4. Install the flight simulator not in the suggested C:\Program Files\Microsoft Games\ folder, but make a separate partition or even use a separate hard disk for it. Before you install ANY NEW SOFTWARE, that includes weather generators, scenery, aircraft, ANYTHING, simply copy the entire content of your fs drive to another hard disk. (I use an external USB-connected 210 GB hard disk. It includes a basic copy of FS with a few aircraft and sceneries that work 100%, and next to it the latest backup made before installing new software). With this method you will save yourself countless hours of locating the source of a problem and reinstalling everything.

5. As you install add-ons, you'll find that the basic settings of your fs software may have to be adjusted. In FS2004, much of that is done via the fs.cfg file. Check for tutorials on the net, and always make a backup of the file before you play around with it. There are also professional service providers that charge for optimizing your FS installation, but I haven't found them worthwhile except if you have really outdated hardware or are a total computer novice.
6. One of the most common problems, so called "blurries", i.e. textures not loading fast enough, is most easily solved by setting visibility options in the (registered) version of the FSUIPC or installing ActiveSky + Ground Environment Pro. FSX does not solve the "blurries" problem. In fact, some users have reported the problem to be worse in FSX than FS9.

A Final Word

Achieving realism is what it is all about, but there are still trade-offs to make with the current state of technology. The most important point to realize is that you have to set priorities. Just like in every aspect of life, if you go for the best of everything, you'll find yourself forever dissatisfied even with the latest and most expensive hardware and software. Upgrading your PC is not always the best solution; many people simply have false expectations of what simulation can and should do. The more add-ons you get, the more complicated your system becomes, the more chances there are for conflicts and crashes. Unlike most PC games, every flight simulation setup is essentially unique. Think carefully about what you want, and it's not just about money: you can buy every add-on out there and still be unhappy with your fs experience!

For more information, check one of the many fs websites. There are too many to list. Some further reading in English courtesy of www.simviation.com/fshelp.htm. Searching the net for "fs2004 FAQ" or "FSX FAQ" also yields a lot. For professional reviews of the add-ons mentioned above, you may start at avsim.com.

Happy Flying!

Do write in with suggestions and corrections: abulaafia@gmail.com