The Bloody Beginner's Guide to Realistic Flight Simulation

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THIS DOCUMENT IS UPDATED PERIODICALLY. CHECK AVSIM FOR THE LATEST VERSION.

I WOULD LIKE TO THANK WAYNE KNOWLES FOR PROOF-READING AND JOHN WATANABE FOR INFORMATION ON TECHNICAL DETAILS.

Images illustrating flight simulation on http://s141.photobucket.com/albums/r45/abulaafia/ and in the screenshot forum of www.world-of-ai.com.

HYPERLINKS IN THE TEXT ARE NOT SPECIALLY MARKED

Here's what's in it:

Cover image shows FSX shot of the Level-D 767 with ASX weather.

Post SP1

Microsoft has released the Service Pack 1 for FSX and shown either its commitment to the flightsim community (marketing babble) or the extent of their panic in the face of measly sales figures (truth). Even with SP1, FSX doesn't run to the full satisfaction of many users. But people have unrealistic expectations: many want the latest software to run smoothly on their old computers. That doesn't happen in any software category, especially not with demanding games.

A few general rules if you are still undecided whether to run FS9 or FSX:

- If you bought your PC before November 2005 (when Intel's 65nm dual cores came on the market), forget about FSX. If you are thinking of buying a new computer, wait for DX10 – the patch, the hardware, the works. It will change everything.

- If you value detailed and accurate airport scenery and thus rely on 3rd party add-ons, don't get FSX. There are still only very few add-on sceneries available.

- If you have invested a lot of time and money into making FS9 look the way you want, stick with it. FSX doesn't offer that much new. It will, in the future, with better hardware and DX10.

A More Realistic Flying Experience

FS9 and FSX are games built for a mass market, to run on thousands of different PCs, and they generally do. Most people do not attempt to recreate a realistic flying environment. Most users can't be bothered reading through hundreds of pages of technical manuals to learn how to fly a Boeing 747.

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 experience is not very immersive. 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**.

A fully tweaked, good-as-it-gets realistic setup may involve several PCs and monitors, extra hardware, hundreds of add-on packages, and a hundred 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, 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 four elements:

> Scenery
> Weather
> Aircraft
> Traffic

Scenery

That's were most beginners start, being unhappy with the way their 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 Hawaii, all you need is a photo scenery of the islands; 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? Half-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 avsim and other fs sites. FsGenesis (www.fsgenesis.net) now offers mesh for simulators in a variety of configurations. Many commercial scenery packages 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.

If you are using FSX, you do not really need to buy add-on mesh. FSX default mesh is good enough for casual simmers who fly the globe. Only if you are focussing on a particular area of the world you are familiar with does a more detailed mesh really pay off. Also note that add-on mesh will create inconsistencies in the landscape where it meets scenery objects (e.g. problems with elevation of airports.)

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.

The Mesh data shipping with FSX is a potpourri of resolutions from a variety of sources. In typical unprofessional Microsoft fashion, the developers have also included a switch for terrain resolution specifically to confuse users and obscure the issue.

The default FSX installation offers a good mesh for most areas of the world.

Landclass

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.

Both FS9 and FSX ship with terrible landclass data. 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 FS9 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. There are improvements available for the FSX land class, such as "Xclass" by Cloud9, and a range of landclass options for fsgenesis.

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. FS9 textures are terrible, and one of the main reasons you may want to try FSX as soon as possible.

If you are using FS9 and 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. The 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

FSX textures are so much better than FS9, most users will not want to replace them.

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 will 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.

A very smart individual has come up with a way of using satellite images in FSX. Look for "Tileproxy" in the online forums. It's a fantastic way of flying and probably the future of simming altogether.

FSX textures are a big step forward. The higher resolution allows for more realistic depiction of terrain (which of course is one reason why the sim doesn't perform so well). FSX default textures look best in the US, while the rest of the world suffers (what else is new), in particular from arid and desert-like appearance in much of Europe, and lack of tropical forests around the equator. As always, the community is coming to the rescue with innovative add-ons, and we can expect

many of those to be free, at least the simpler ones. The makers of Ground Environment are also working on a new version with allegedly revolutionary technology.

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 AFCAD 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 Avsim 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.

An early morning departure from Manchester, featuring models from WoAI packages
and the excellent scenery from UK2000.

There are a few FS9 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. For the UK, see UK2000 and their sceneries for almost every British airport. But leave it to Japan to deliver the absolute best scenery packages: the company Overland produces scenery for Japanese airports. 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 scaffolds at Haneda Airport. 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 suggested for short VFR flights in your favourite Cessna. If you are a jet pilot on your way from Paris to Dubai, there is no point in installing large photo sceneries. They need a horrendous amount of space on your hard disk and slow down your computer. 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.

Many developers include dlls in their package offering access to upgrades or the developer's website from the FS menu bar. You can delete this clutter by removing the respective dll file from the Modules folder. These menu bar editions are of little use to you (and mostly for the benefit of the developer); instead they only eat up resources. (Does not apply to menu options added by aircraft models – those you will need to configure your vessel.)

There are currently very few sceneries available for FSX. Cloud9 has released Orlando and Bergen, UK2000 Stansted and Glasgow and some freeware packages have been uploaded to Avsim. It appears that in relative terms, complex scenery has less impact on performance in FSX than in FS9.

FS9 scenery is only partially compatible with FSX, despite the assurances from Microsoft. Some major 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 which effectively preclude the development of sceneries with the same tools as in FS9. The new round earth (yes, it was flat in FS9) seems to trouble a lot of developers also. It will take time for developers to come up with alternative solutions and really good FSX sceneries.

AFCAD vs. Scenery

AFCAD files are an integral part of airport sceneries in FS9. AFCAD files define the layout of airports, including buildings, taxiways, 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. AFCAD development was made possible through third party tools. The "native format" for airport layouts is bgl, just like for any other scenery. There is currently no easy-to-use AFCAD tool for FSX.

Whether to install scenery for airports or just an AFCAD is not just a question of performance, but one of realism. It is not a simple one to answer. Your first reaction would be: well, scenery of course. It is likely to include proper buildings, gates, ground vehicles and lots more, and it will look more or less like the real thing. An AFCAD on the other hand just describes the airport's layout and assigns airlines to gates, whilst using the default textures.

However, simple AFCADs can be more realistic than sceneries. Although they don't show the airport's buildings as they really are, they are much more up-to-date and thus, in a way, more realistic. Sceneries depict the airport on a specific date, in a particular condition. Construction cranes seen in many sceneries are temporary at best. Aerosoft's Madrid-Barajas was outdated the day it was released. Terminals open and close, gate assignment changes, while your scenery is stuck in whichever year it was created. AFCADs on the other hand are easy to edit. (A programme with the inventive name "AFCAD", currently version 2.21 does the trick.) They are also frequently updated by authors, and there are usually 2-3 different versions available for the larger airports. Soon a solution for FSX will be available. In the meantime, try out a FS9 to FSX conversion tool recently posted on avsim.com.

Weather

A look out the window of the Level-D 767 in FSX, weather by ASX.

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. Weather has a pronounced impact on performance: the more clouds the graphics engine has to depict, the slower the frame rate. Dissatisfaction with performance after installing weather add-ons is probably the single most important reason why simmers end up buying new hardware.

Nevertheless, you can have realistic weather even on an older machine. Here is the formula:

- With standard graphic cards (around EUR/USD 150), you will see a significant performance hit when installing real weather software and flying through heavy weather. More clouds = worse performance.

- With high-end graphic cards (EUR/USD 300 and more), you will see almost no impact, as these cards have processors that take the load of weather creation off the CPU.

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.

For FSX, the best solution currently available is ASX, from the makers of 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 as much of your scenery. Once you use a weather package, however, you will amazed how, on your next real-life flight, the actual sky looks so much like your virtual one!

One useful add-on tool to use with real weather is 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 is doesn't make sense to use a gauge at all; after testing both gauges above for a long time, I tend to agree.

There are no gauges for FSX at this point, and I do not know if depiction will be any more accurate than in FS9.

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 the simulator – albeit highly simplified and unrealistic, not to mention full of errors – should teach you everything you need to know. However, you should be aware that in case of a real-life mid-air emergency, you should definitely not raise your hand when they ask "is there anyone on board who can fly this plane?"

Even though the default aircraft are acceptable for gamers, they are technically so inaccurate that they do give a wrong impression of how things work. If you use them, and many of the free models available, you are not learning real-life operations of an aircraft. FSX default planes are better than FS9, but they are still a far cry from reality. And it's not just the control elements and procedures - the entire way the aircraft behave in flight is unrealistic. FSX flight decks come in 2D and 3D flavours. The 2D version are almost the same as in FS9, and perfectly useless for realistic simulation. The 3D decks are better, but still lack basic aircraft systems and FMS – flight management system, also called "CDU"- the basic tool of the modern jet. But major flaws exist even in the small prop models.

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

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 to learn how to use these models, including reading hundreds of pages of documentation. 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, I suggest you start with PMDG's 737 (a FSX version is in the making). 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.

In FS9, some other popular choices are the PSS 777 and their 757 and the LEVEL-D 767. All of these try to achieve some degree of realism, and most of them do an acceptable job. Some, like the CLS airbus or PSS' 777 sacrifice authenticity for ease of use. There is something to be said for "light" models, but if you decide to buy one, don't expect too much. Try to stay away from companies and individuals that make false and fraudulent claims about their products. Abacus

and Wilco for example have repeatedly disappointed users in that regard. Read the online forums to find out which products are for you (see "Before you Buy" below)

One of my favourite models is the Super 80 (MD-80) by Coolsky, which incorporates remarkable training features and excellent graphics. For GA aircraft, look out for Carenado, the absolute leader in the field, and to some extent Dreamfleet models. Real Air Simulations make technically sound aircraft and have already published their first FSX model. Whichever model you buy, DO READ THE MANUAL!!

Haven't got the money? Project Opensky and Meljet are among the better free-ware packages, but please be aware that even the most ambitions of their products don't come close to good pay-ware. A group of Chinese developers called iFly have released a free 747, which received favourable reviews. What you prefer is probably a matter of taste more than anything else. A plethora of vessels is available from many different sources, including more "exotic" stuff like gliders, seaplanes, fighters, helicopters, and even zeppelins.

The Level-D 767 in FSX. Weather by ASX

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 respective 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.

If you have switched to FSX already, you will have to wait a little longer for professional models. Sky Simulations have launched an unimpressive MD-11, and CLS have updated their rickety A350/360 and released a rather enjoyable DC-10.

The Level-D 767 has been updated for FSX and is indeed as much a high-quality package as it was for FS9.

I suggest you try some of the historic airliners already available, like the deHavilland DH91, or the DC3, the Constellation or the amazing Sandringham. Historic airliners from the early days don't need to model so many systems, and are generally easier to learn – but not necessarily easier to fly. Look on Avsim for the models by Jens B. Kristensen, they are fantastically accurate and fun to fly.

Historic Fokker Trimotor by Jens B. Kristensen climbing out from LOWI with the Austrian Alps (FSGenesis Mesh) as a backdrop. Shot in FSX. For more shots like these, visit www.world-of-ai.com.

Besides the MD-11, PMDG have announced a brand new version of the 737NG for FSX, and an update to their 747 Queen of the Skies.

Do stay away from "patches for FSX" by all means. These often only facilitate basic operations of the model in the new simulator without optimizing performance. In some patches already released, features have been disabled, and a long list of problems remains. As long as they are offered for free, the patches are OK to use, but don't pay for developers' failure to offer a proper FSX-based product. Read reviews and the forums before buying.

A Word on Sound

Aircraft make terrible noise, especially at the airport and during landing. Realism in sound can be achieved through special sound packages, often called "realistic sound", "the real thing" etc. The Avsim library has quite a few of these. Professional models like those by PMDG, Level-D, PSS etc., often include good sound files.

You should be aware that sound doesn't just travel from the hard disk to your speakers. It needs to be processed, and highly realistic sound files actually need quite a lot of processing. Since the simulator is already a big load to swallow for your CPU and motherboard, it is best to add a dedicated, high-quality sound board to your computer. Even if you don't put too much emphasis on engine noise in your simulation experience, this will leave more time for the CPU to deal with display data, such as scenery and weather.

A much improved sound environment is one argument to switch to FSX. The difference is really startling, especially as most AI for FS9 doesn't have proper sound installed.

Traffic! 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. However, we find that none of the packages for sale are worth their money.

AI Traffic

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 Ultimate Traffic. The advantage of the latter approach (e.g. Traffic 200x, 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. I strongly recommend that you ditch those all-in-one commercial packages. 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. Unfortunately such a tool is not available for FSX yet.

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.

ProjectAI was one of the first endeavours to create free AI traffic. It has recently come back to life through the sponsorship of Flight1 Software. Unfortunately, many of the models used by PAI are really bad quality, even those in their newest "frame-rate friendly" packages.

Dissatisfied with the status quo, a new group of enthusiasts called World of AI (WoAI) 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.

World of AI has implemented rigorous quality controls. They are in contact with model developers and painters and routinely ask them to correct even minor mistakes in existing repaints, complete a fleet in matching colours, fix technical problems with models and so on. In any case, they offer the best quality currently available while making AI easy to install. Because of their quality focus, they release only one or two airlines a week and many are still missing. But believe me, it's worth the wait. And even though there are as yet no AI aircraft models available that make use of FSX-specific features, WoAI packages can be installed in FSX.

I am publishing screenshots of the best WoAI packages in their forum on www.world-of-ai.com. Do sign up and have a look at the postings by user "abulaafia".

AI aircraft from WoAI at the default WSSS airport of FSX.

In the US, you have the option to depict live AI by using a system to be found here http://www.airnavsystems.com/anfs/

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. Contrary to popular belief, it is not that difficult or time consuming. It took me about one month to find, compile and install 230 airlines, which is plenty traffic in my book. Avsim is always a place to start, and for general aviation try www.ultimatega.com. Also, country simming web sites sometimes have packages of local interest, like the RAAF AI package on aussim.com.au, SKJ's fantastic Russian AI packages and Russian AI Traffic System, 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.

While Radar Contact is more professional than default ATC, to say it politely, it is still very basic artificial intelligence, and does become a bit repetitive after a while. Also, the voices available so far – with the exception of a one or two – 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 controller screen. The demo available on their web site is annoyingly misleading and really bad marketing. If you want a moving map or radar-like display, get FSCommander or a similar tool.

VATSIM and other online flying systems have a drawback over artificial intelligence ATC, in that it is almost impossible to use them together with 'realistic' AI traffic. Computer-directed planes flying around in a controller-directed airspace are a bit too much I guess. Therefore, VATSIM and consorts will be better choices for those focussing on their own flying. It is, after all, a preferred hangout for ex- and wannabe real-life pilots.

FSX includes its own tools to access an online community. As it is still in its infancy and little used, there is no point in reviewing it here. Most likely it will turn out to be less professional and/or realistic than existing systems like VATSIM, which are often run by real-life aviators.

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. 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, and despite of its dodgy interface, it is very popular in particularly in the US.

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 below). 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!
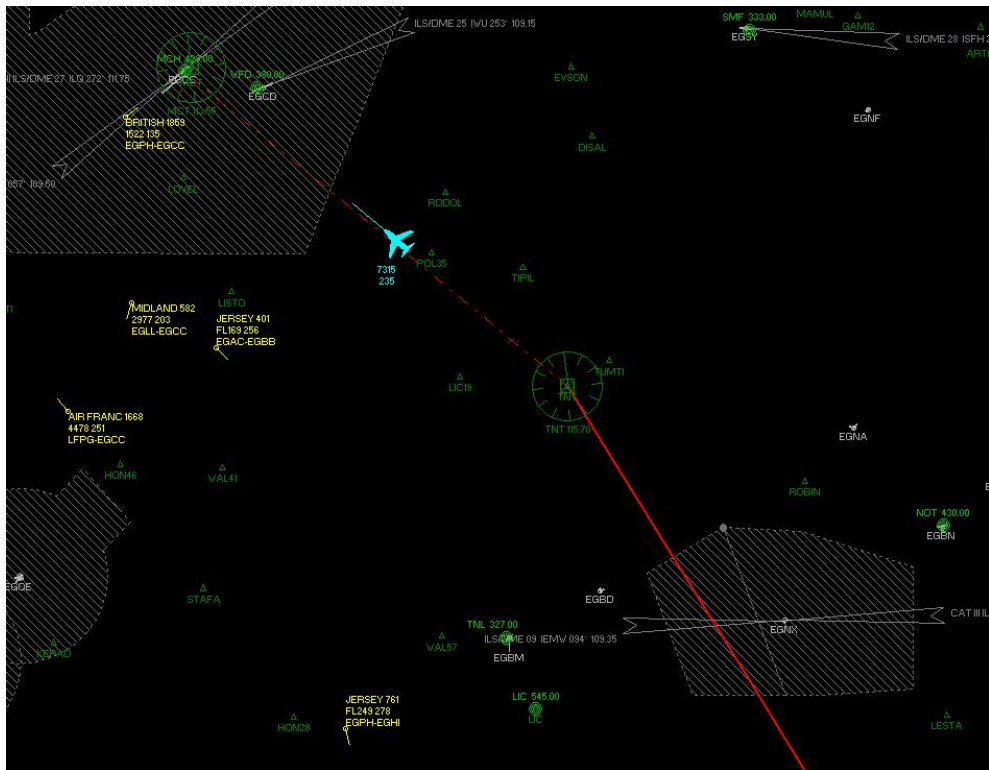

Moving map display of FSCommander, plane on approach to EGCC. AI traffic shown in yellow, aircraft flying a STAR not included in the original flight plan (red line). The map display can be run on a second monitor.

Alternatively, you can get your flight plans from other sources. PMDG-compatible flight plans are regularly uploaded in some form or another on Avsim and other forums. You can also use available online tools and enter the flight plan in the Flight Management Computer of your aircraft by hand (just like most real-life pilots still do). It's not that time-consuming, once you get the hang of the 'airways', and often a good deal more accurate. Try Route Finder or, for Europe, the EU Route Database.

Navigation Data

Since you will be flying very "realistically", you will need all the tools of a professional pilot, including charts and up-to-date navigation aids. In the past, many of the updates for navigation data such as AIRACs and SID/STARs were available for free on a site called navdata.at. This has changed in autumn 2006, and there is now a fee-based (albeit inexpensive) service offered by www.navigraph.com – see their website for payment options and fees. I have been using their service since day one and can only recommend it. Although many of the charts included can be found for free, their software puts everything in a convenient "electronic flightbag" – and what can be more professional than that.
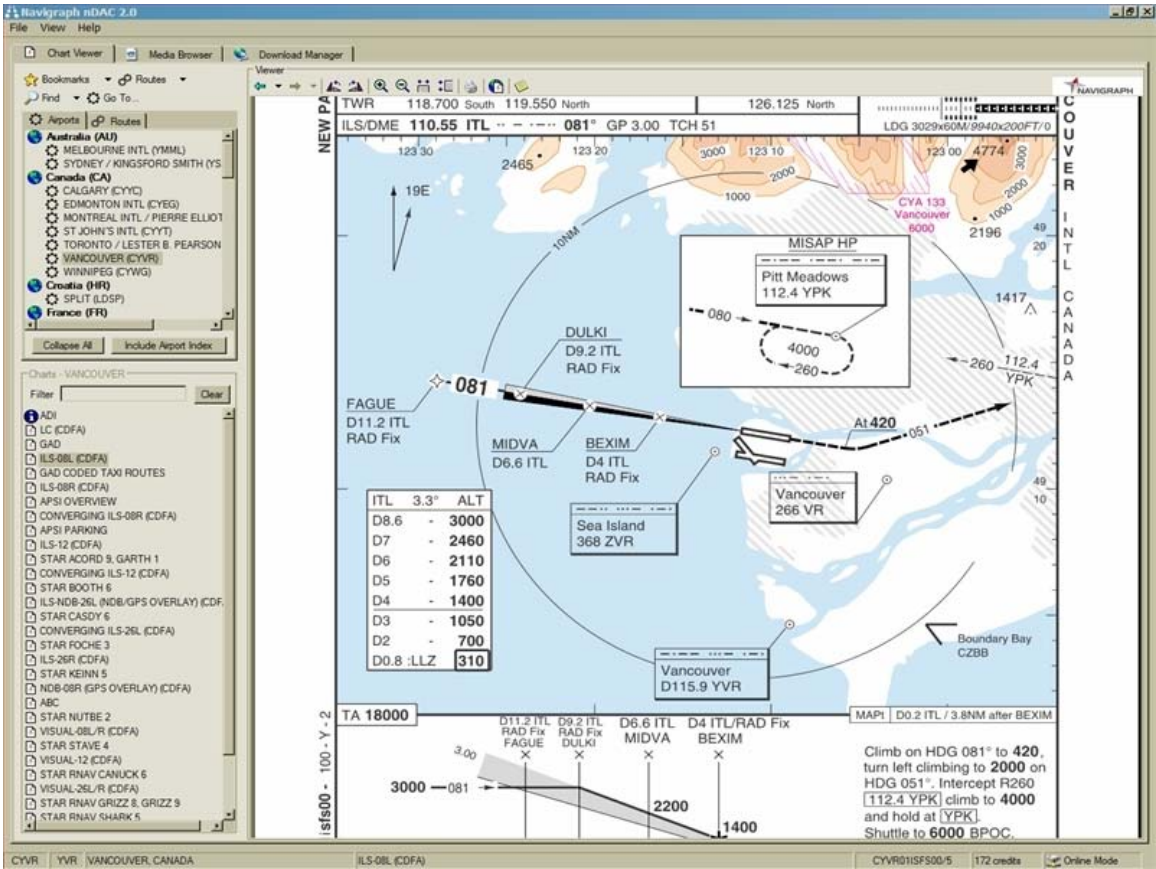
Screenshot from Navigraph's navdata software – an essential tool for serious flyers.

Other Expansion Options

Crew Simulators

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, e.g. the popular FS2Crew, your own virtual co-pilot, cargo and passenger simulation, etc. Check under "Reviews" on the Avsim website to learn about how FS2Crew works. 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.)

Multiple monitors and/or PCs

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. The core of multiple device simming is a piece of software called WideView, which synchronises the individual components in the background.

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. Good hardware is available in the form of Saitek X-52 Flight Control System and the CH Product Line.

An interesting control tool for virtual cockpits is Track IR4 Pro from NaturalPoint Technologies.

Joysticks, Yokes and Pedals

Most beginners will be using a joystick, but as your understanding of the flying machines grows, you will realise that a yoke and rudder pedals are essential for that realistic simulation feeling. The undisputed top place to find these is http://www.chproducts.com. Even if you use a joystick – which is more realistic when flying Airbus anyway – you can opt for "force feedback" models, if you have the right software, such as FS Force (http://www.fs-force.com/)

http://www.fscockpit.com/

Before you Buy Add-ons

Some general recommendations before you buy add-ons for your flight simulator, including hard ware:

1. Look at the developer's website and note the minimum requirements for hardware. Add 50% to that (roughly speaking), and that's the minimum performance needed.

2. Do not believe the marketing hype on developers' websites. Most add-on makers are individuals or groups of amateurs with little marketing experience and legal knowledge. They often make claims about their products for which a bigger firm would end up in court.

3. Don't trust the product reviews on sites that sell add-ons. www.simmarket.com for example removes all negative comments on their "review" pages, which makes the whole idea of a review forum for users pointless. They also have a rather insulting "no refunds" policy.

4. Don't trust blindly the reviews on Avsim. What started out as an exercise in objective third-party evaluation has deteriorated greatly in the past two years. Many reviews are biased, unbalanced, and written by inexperienced reviewers.

5. Don't rush to buy new products. Wait for others to take the jump and then whine in one of the online forums.

6. The add-on industry is very immature, and most market participants are not professionals. They don't get paid for developing the products until you buy them. They therefore have a strong incentive to lie about their product's features. And many of these outfits aren't around long enough to establish reputation.

7. Read the forums. If there is no thread on the product you want to buy, start one. Although 9 out of 10 posts are juvenile babble, product bashing or more or less discreet hidden ads placed by the developers themselves, there are usually one or two individuals who post balanced reviews. Also remember: people tend to write more to complain, so the more threads and replies about a certain product, the worse it usually is. ☺

Hardware Issues

I won't get into the hardware debate too much, because it is a never-ending subject of contention. Everybody seems to have their favourite processor, amount of RAM, graphic card, etc. The unifying mantra is "every system is different", which is just about as useful as Microsoft customer support. A few facts, however, are indisputable. Once you start adding software to your FS, you are bound to be confronted with hardware issues.

- **Don't obsess with FPS (Frames Per Second)** – Do not compare FPS in flight simulation to FPS in other games. Do not compare your FPS to someone else's. Do not believe the FPS display built into Flight Simulator. Like most things in this world, FPS is an oversimplification and does by itself not represent "smoothness" or "playability" of the game. A movie has 24 frames per second, and anything above 10 fps is undetectable by the human eye. So people tell you your setup should least run 24 fps in very situation. That's nonsense. With good scenery and bad weather, you sometimes fly with 8 or 9 fps without noticing, even in FS9, not to mention FSX. 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. Far too many people obsess about FPS, and some of the statements out there on the net are just ludicrous. You have to be happy with your flying experience, that's what counts. As for FSX, the right hardware to fully explore and enjoy the new sim will probably take a while. In the meantime, it still offers a very good experience if you limit yourself to what your PC can handle. FSX is very CPU-intensive, so if you are buying a new system it makes sense to splash out on the very latest and the very best.

- **Dual core and quad core processors**: Processor speed is currently the single most important bottleneck flight simulation. Only FSX SP1 will make use of multiple cores. If you are building a PC for flight simulation specifically, you want the fastest processor available – which is not always the fastest and most expensive in the shop! Many mid-range double-cores can be safely overclocked by 20 or 30%. According to some reports online, well-clocked dual cores run FSX better than quad-cores.

- **Graphic cards do make a difference**. 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 mid-range 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, 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). So far, this experience is impossible to achieve with FSX without pulling your hair out.

- **Graphics Settings** in the simulator: 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. Maximum autogen for example doesn't look nearly as realistic as a lower setting. And nobody can tell honestly a difference between terrain complexity at 70 or 100. I recommend starting with all settings maxed and then reducing one by one until you can notice any difference you dislike, or performance is satisfactory. Check out the forums online for endless tips on the correct settings. Settings in FS9 and FSX are largely identical.

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 are 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. You 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. Crashes in the simulator come in two flavours: CTD (Crash To Desktop) – the simulator simply disappears without an error message and you end up on the desktop or with the PC restarting, and crashes with an error message generated by the flight Simulator (CTM – Crash to Message). CTD usually is related to faulty installation of graphic drivers, faulty memory chips, or double scratch files (virtual memory settings – make sure you have one AND ONLY ONE pagefile.sys on your computer). CTMs 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.)

3. Always make a full backup of the simulator before installing add-ons. There are an awful number of packages out there that indiscriminately overwrite files which are part of the basic simulator or even part of other add-ons, causing more trouble than they are worth.

4. Anti-virus: With its high demand on your computer's resources, it is easy to understand that Flight Simulator should have the hardware mostly for itself. Try to stop unnecessary services and background programmes. There are a number of guides available on the Internet detailing which background stuff is essential and which is not. In Windows XP, there are numerous 'processes' which can be safely disabled (indexing for example). If your simming PC is connected to the Internet, you will want to run an Antivirus programme, but most interfere with performance. In particular, Symantec and McAfee

products have a significant impact, as does the full version of Zonealarm. All of these can be configured to improve performance, e.g. by turning off "On-access scanning". I have found one antivirus package that has absolutely no impact on FS performance. It is made by a Czech company and has been repeatedly voted best anti-virus package: www.avast.com. Oh, and its free.

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!

If you want to get into add-on, scenery and aircraft design yourself, here's the place to start: http://www.fsdeveloper.com/.

Happy Flying!

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