



777-200LR and 777F Freighter

For FSX, published by PMDG

Reviewed by Brian Cowell

October 2013

Introduction

Simmers are a pretty mixed bunch. Some are hooked on VFR and GA flying; others are skilled repainters; others again go in for Virtual Airlines or online ATC — it takes all sorts, as the saying goes. But for those of us who are in love with the whole experience of “the Big Iron” (if you want to talk it up), or “Tubeliners” (if you want to talk it down), nothing beats the pleasure of firing up a complex airliner and taking her, via a carefully-prepared flight plan and using real world weather, from a gate at one international airport to another which is hundreds, or even thousands, of miles away. So when PMDG produces another of their beautifully-built and painstakingly-crafted airliners, for us this is a time of joy, as we explore the intricacies and even the personality of the new aircraft.

Therefore this review is aimed especially at my fellow airliner *aficionados* as I try to recreate for you my own voyage of discovery with the new Boeing Officially Licensed Product (not an accolade that can be claimed by too many simulated aircraft!) that is the PMDG 777. I won't be including a blow-by-blow description of how to install it; neither will I weary you with long simplistic lists of features or available liveries: this review is about the simulated aircraft itself, how it handles, a look at some of its new and/or surprising features, and, of course, its implementation in FSX.

I bought the aircraft within hours of its release, which means I have been flying it for less than four weeks as this review is being written. Which, believe me, is not nearly long enough to explore all the intricate details of such a complex and multi-faceted simulation! Nonetheless, I will do my best to cover the most important aspects which need to be considered by potential purchasers.



Robert Randazzo and PMDG

For the benefit of those who are relatively new to this obsession which masquerades as a hobby, the first complete home computer simulation of an airliner — by which I mean one that modelled all the interdependent systems including hydraulics and pneumatics and the rest — was Precision Simulator 1 (a.k.a. PS1), and in the box was a beautifully-produced glossy Operations Manual covering all the systems. But as with many aircraft manuals it didn't explain why you might want to operate any given control, or when it would be appropriate to do so, let alone what will happen as a result. Therefore two other manuals became available: one was "The Big Tutorial" (a somewhat lengthy work as its title indicates, not least since it had to include 17 explanatory appendices in view of the fact that in those days there was much less available information about flying airliners). Written by me, this was a free download from the Aerowinx site: however the other additional manual was the only available FCOM equivalent, the "747-400 PS1 User's Guide" — which you paid for, and which was written by someone called Robert S. Randazzo of the (then) newly-formed Precision **Manuals** Development Group. Fast forward 15 years or so and that same Robert Randazzo is still running PMDG, only now he has moved away from merely providing manuals and is selling simulated aircraft — for which the manuals are, it might appear, secondary. But in fact they are absolutely essential if you are to explore this 777 simulation to any worthwhile depth of enjoyment and immersion, so let's first of all consider —

Deliverables 1 — the documentation

After installing your new 777 the first thing which you may — and arguably should — notice is that it arrives with a *ton* of documentation (or rather, the equivalent in pdf form). Newbies may want to rush straight in and start playing with their new toy, but old hands will sagaciously take the time to have a good hard look at the documentation first. (There's nothing more terrifying than looking at a control in an airliner cockpit and thinking "Hmm, I wonder what *that* does?", because by the time you find out the hard way it's usually too late).

 PMDG-777-Tutorial-1.pdf	6.35 MB
 PMDG-777-Introduction.pdf	5.89 MB
 PMDG-777-QRH.pdf	7.64 MB
 PMDG-777-FCTM.pdf	4.27 MB
 PMDG-777-FCOMv2.pdf	22.5 MB
 PMDG-777-FCOMv1.pdf	12.8 MB

Here (left) is the list of documentation which is included with your 777. The first two in the list are by PMDG, and I'll return to those in a moment.

The last four are Boeing's own documentation: this aircraft is so true to the original that there's no need to write dumbed-down docs for it, the ones that the pilots get work just fine.

But the two manuals by PMDG are just as essential. *Tutorial-1* is obviously helpful for those new to airliners in general and PMDG's depth of authenticity to the real 777 in particular. (Please note that Tutorial-2, in traditional PMDG fashion, is scheduled to arrive with the forthcoming SP1 to fix the issues that have been found by thousands of hard-core simmers following the release — see this link for details: <http://forum.avsim.net/topic/418750-pmdg-777-issue-tracking-thread/>).

But please, whatever you do **don't skip the Introduction manual!** It's seriously worth reading every page with close attention, since it covers so many things that you really will want to know about the 777 before you try and get her into the air, as well as containing tips for stabilising your FSX experience, a discussion of quirks present on the real aircraft which are also modelled in the sim, and a whole section on the differences between the NGX and the 777. (As this review proceeds I will inevitably be returning, from time to time, to items covered in the *Introduction*).

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At this point I do have to make mention of the NGX (which, for the benefit of those new to this area of endeavour, was PMDG's previous airliner — see Jess's review here at Mutley's Forum — <http://www.mutleyshangar.com/reviews/jess/737ngx/737ngx.htm>).

If there is a PMDG *leit-motif* which recurs frequently with reference to the 777 it is this one: —

“This is not the NGX on steroids. This is a completely new and different airplane.”

In fact I can fully appreciate why PMDG want us to understand that: just like the section in the Introduction manual about quirks of the real-world aircraft that are lovingly modelled in the simulation, the statement is clearly aimed at trying to reduce the number of naïve (OK, dim, if you insist) questions posted on the PMDG forum from people who imagine that the 777 is merely a very heavy 737 NG — which it certainly isn't for reasons which I will be discussing soon — and from those who clearly just can't be bothered to read the manuals. Inured as I am to some of the biting comments on the PMDG forums, even I was a little startled by the vehemence of some of the replies to such questions, asked as they were in all innocence — albeit, admittedly, by people who had failed to read the supplied carefully-prepared manuals in which the answers were already given.

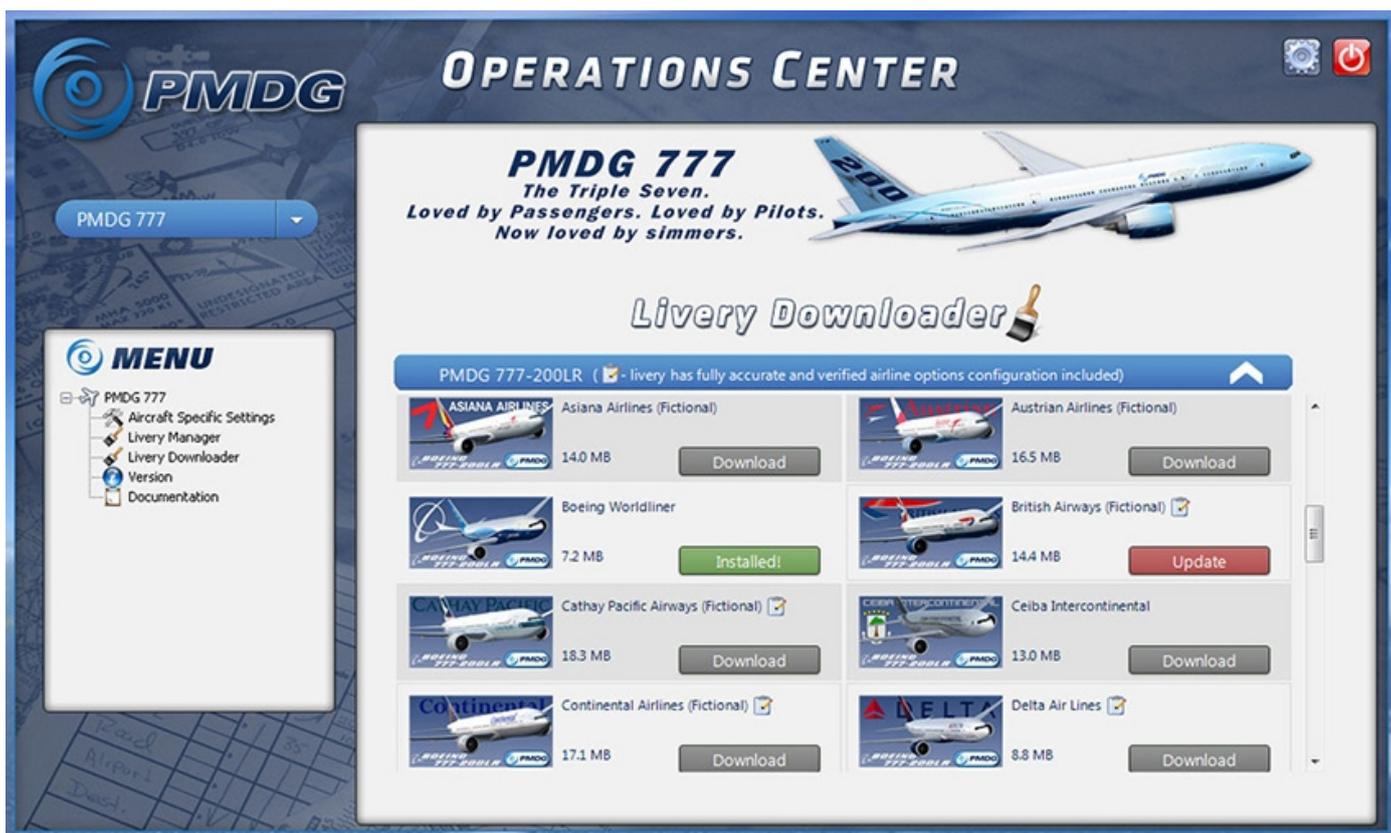
Nonetheless, it also has to be admitted that just as the NGX in its day was a new and breath-taking experience for simmers, the 777 is even more refreshingly sparkling and innovative. In that respect, therefore (and that respect **only**) then yes, OK, it could be said to be a sort of NGX on steroids. Otherwise.... how can I explain? Well, as seen from a flying perspective all I can suggest is this: imagine a 747, completely revamp and update its flight deck, nav aids, and systems, and then stir in a good dollop of fly-by-wire for good measure — perhaps that will help you to understand what an amazing bird this is, and just how distinctive a flying experience she will provide for your enjoyment.

She's also much more than just another Boeing. If you think you've seen it all having mastered PMDG's 747X and MD-11, then if you don't do some reading you're about to undergo some “interesting” and embarrassing experiences in the air. Me? Well, I promise you, in spite of having exhaustively explored all the PMDG big Boeings to date I nevertheless read the Introduction, and also the supplied *Flight Crew Training Manual* (FCTM) from Boeing with considerable care before I even installed the beast. But then, I take my vlying (virtual flying) somewhat seriously. Your Mileage May Vary and all that jazz, but believe me — you're certain to have to do some 777 reading eventually, so why not do it now, before you get into bad habits? You don't vly airliners successfully if your simming tastes are of the climb-into-the-cockpit-and-go variety anyway, so you might as well get it over with: I assure you that the time you spend reading will be time well spent!

OK, climbing down from my soap box, let me now start to describe the initial experience which you get when you finally install the 777.

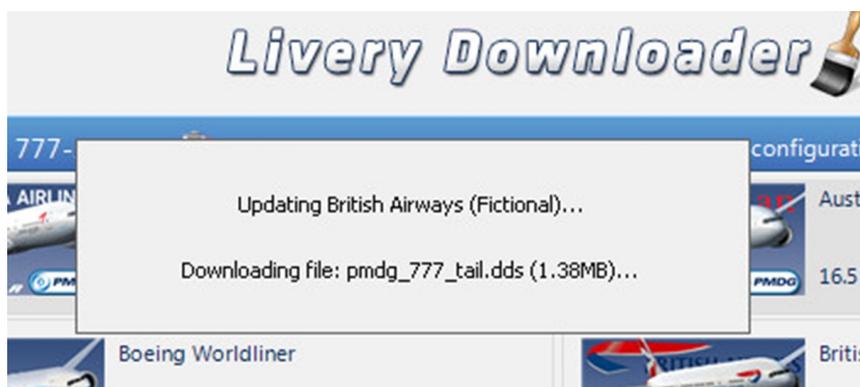
Deliverables 2 — the “Operations Center” and liveries

The biggest surprise awaiting you is the new “PMDG Operations Center” (American spelling is allowed here, since in this context “Center” is a technical term). For some reason, it didn't seem to create a shortcut on my desktop, but that was easily remedied by accessing “All Programs/PMDG Simulations/ PMDG Operations Center” and dragging one from the exe file found there.



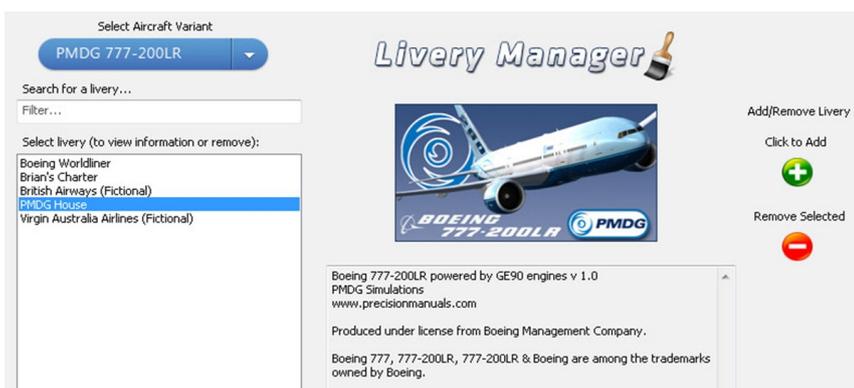
If you have any PMDG aircraft from the J41 onwards, the *Operations Center* will now handle your updates (to both aircraft and liveries) —

You will note in the picture above that the BA livery has an update available, and this can be installed simply by clicking on the Update button (see right).



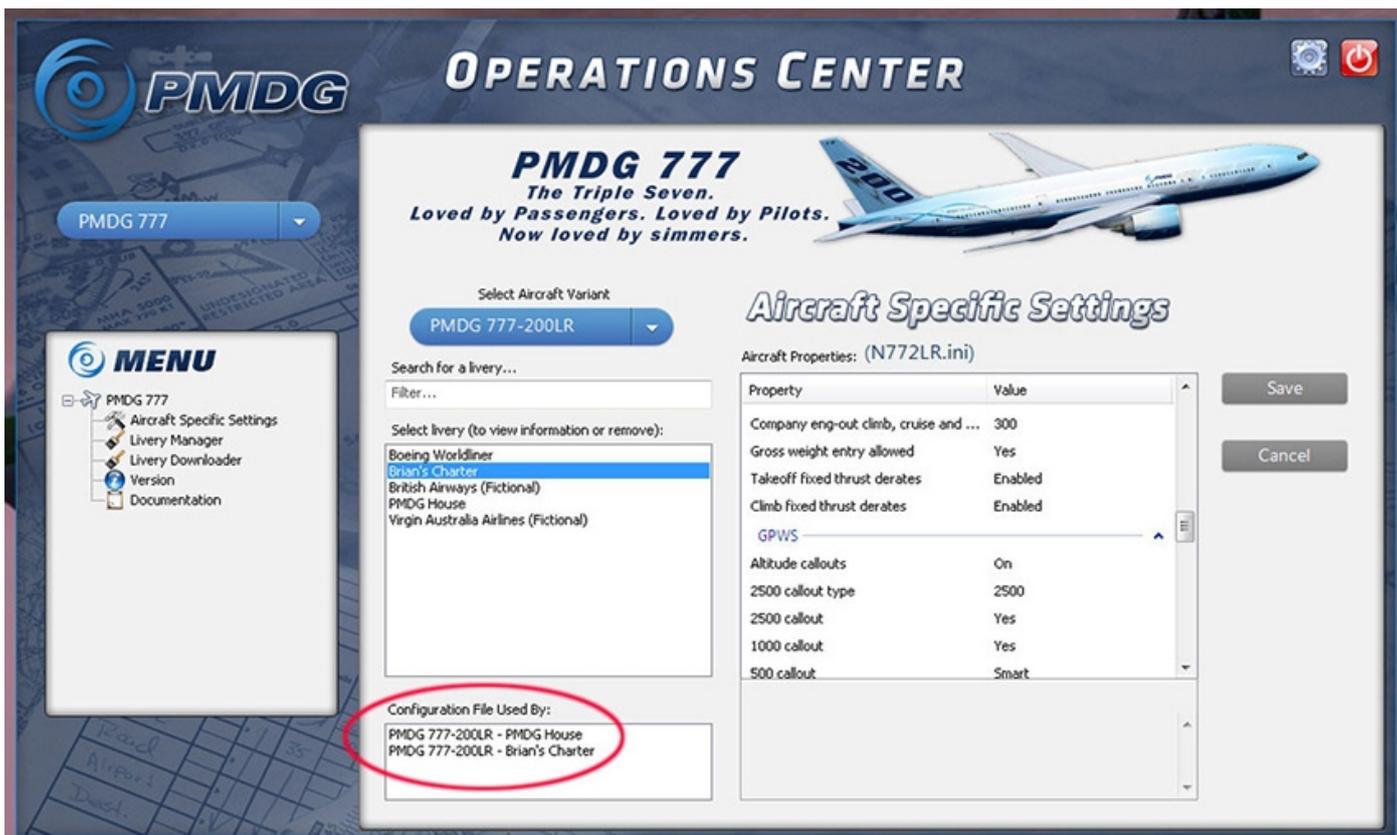
But the *Operations Center* also has many more goodies in store. Each time you open it, it checks online for any applicable updates to your software — including to itself — and flags up a Notification message if so. (If you don't want it to do this for some reason, you can override its behaviour in Settings). It also has provision to create a package of information about your system that can be sent to PMDG Support to assist them in determining a problem, as well as receiving support or replacement files from them, via a ptp file.

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There is provision to search for specific liveries, and add them with a single mouse click (left).

You can even adjust the configuration of each aircraft without the need to do so via the PMDG menu in the CDU; and also see exactly which aircraft will be affected by the configuration file you are changing (below).



Naturally, you can access and view the documentation pdf files from here, too. All in all, the Operations Center is a commendable improvement to the user interface for the PMDG aircraft, supporting “all PMDG products from the Jetstream 4100 and on into the future” (a quote from the documentation, which starts on p.141 of the *Introduction*). A paint kit is also available from the PMDG site for those like me who prefer to fly their own livery — and that, too, is beautifully done.

But I really can't keep you in suspense any longer: having loaded the liveries you require (and performed any updates for which you receive notifications), it's time to look at the aircraft itself.

Deliverables 3 — the aircraft

The “base pack”, which is the preliminary release, brings you two models: the ultra-long range 777-200LR and the 777F freighter, powered by GE90-110B1 engines. Using the *Operations Center* you can freely download a range of liveries for both, including both real world and also fictional variants. This contrasts well with certain developers who

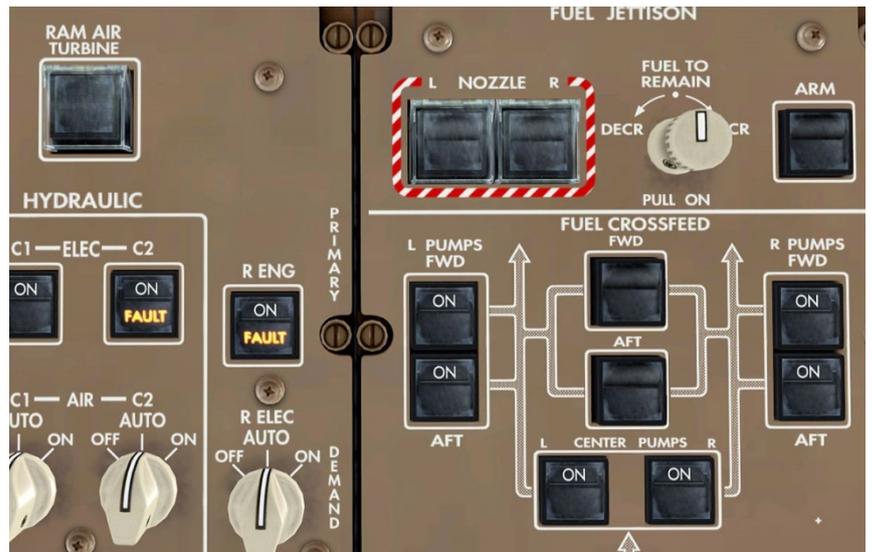
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charge for additional liveries — and, as previously mentioned, you can create your own, too, using the paint kit (which is also free).



Now I am no expert when it comes to painting aircraft (as an examination of my house livery clearly shows), but on taking a really close look at the 777 I was amazed at the exquisite detail which has been modelled. It's hard to convey this in a review — with my setup I see the aircraft in 5760x1200 resolution but sadly the pics have to be much reduced in size, and therefore quality, in order to reproduce them here. But hopefully these will give you some idea.....





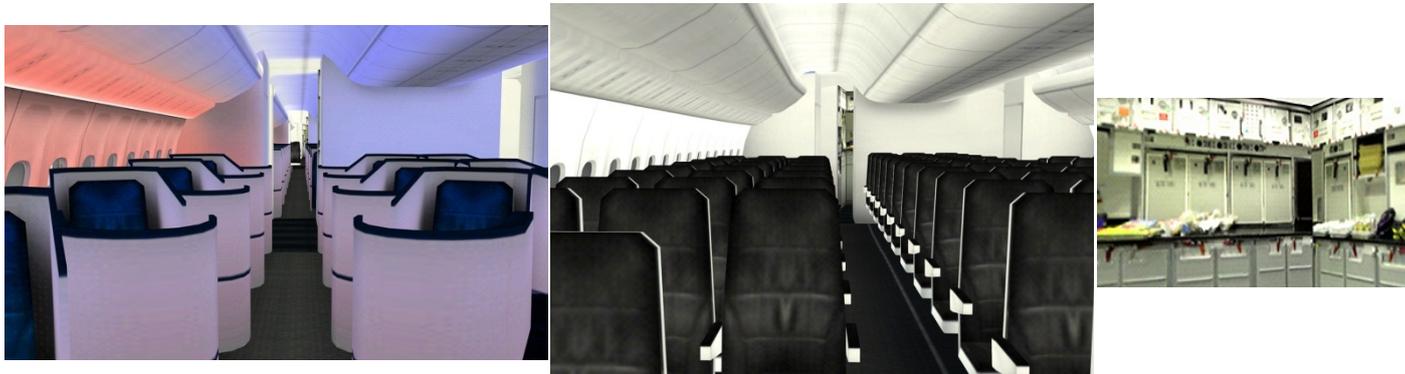
Consider, if you will, the details in the hydraulic lines on the main gear, the sheer gorgeousness of the Virtual Cockpit (VC), or the way in which the guarded switches are represented. But PMDG's attention to detail doesn't stop there: those switches which have mechanical shutters mimic the action perfectly when you operate them, whilst every switch on the panel is associated with a whole range of different sounds, depending on where you click them and how fast, so that the result feels exceptionally natural and true to life.

Those retro souls who were begging for 2D popups — in spite of PMDG's original statement that they would be sticking with a VC from now on — will find that some are provided, with the associated click-spots being carefully documented in the *Introduction* manual. (I assume that this concession was really for cockpit builders — surely no one else would want to go back to 2D, given the joy that is the VC — especially when combined with EZCA and/or TrackIR? But I digress.....).



PMDG's 777 package – a *Mutley's Hangar* review, October 2013

And for those who feel that an aircraft is incomplete without a virtual interior for the virtual passengers, well I can assure you that this, too has been lovingly detailed — you can even see the galley space when the adjacent doors are open.



So how does she fly?

The handling of this aircraft (I'm going to assume from now on that we all know it's a virtual aircraft, and omit the v-word) is, to me, utterly convincing. But having said that, in real life I've never had my hands on the controls of anything of that size, so I can't know for sure how faithful the handling is when compared to a real 777. But the many Real World pilots and engineers who beta-tested the aircraft for PMDG *can* vouch for that, and I am fully prepared to take their word for it. For me, the bottom line is that it handles like a large and heavy aircraft — my favourite kind!



Thinking again of the differences to the NGX, these start to show as soon as you taxi away from the gate. This aircraft is seriously long, so that cornering becomes a challenge — and if you haven't configured a steering tiller, I suspect you'll wish you had! (Incidentally, the supplied Flight Crew Training Manual (FCTM) has an excellent chapter on taxiing the aircraft: more reading for you.....).

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Similarly, when you are lined up for takeoff and ease the throttles forward to 55% you become aware that those huge engines are taking a significant amount of time to wind themselves up; and on pressing the TO/GA button, once again you can't fail to sense that a huge amount of energy is in the process of being committed (and the engine sounds are amazing, too). As the above picture demonstrates, the sheer power of the engines is also sufficient to provide you with some rather startling climb performance in the (rare) event that you are lightly loaded. (Just as with the 747, of course). However, please rotate *gently* at V_R : although the tail strike protection automation will reduce elevator deflection if you rotate too aggressively, you can (and will!) get a tail strike if you rotate much faster than around 2° per second. For details of how to do it properly, please refer to the FCTM. Bear in mind that, by design, during a *correct* rotation the clearance between this aircraft's tail and the runway is only two feet (or 60 cm)! So do try not to overcook it: you're too far forward to hear any tearing metal, but you will get an ominous amber message in the cockpit....



PMDG's 777 package – a *Mutley's Hangar* review, October 2013

Incidentally, if you are using hardware throttles in your simming setup, PMDG recommend that after pushing TO/GA you should wait until you see THR REF annunciated and then push your throttles fully forward: leave them in that position until IDLE and then HOLD are annunciated at the start of the descent, at which point you should return your hardware throttles to idle. (It works for me).

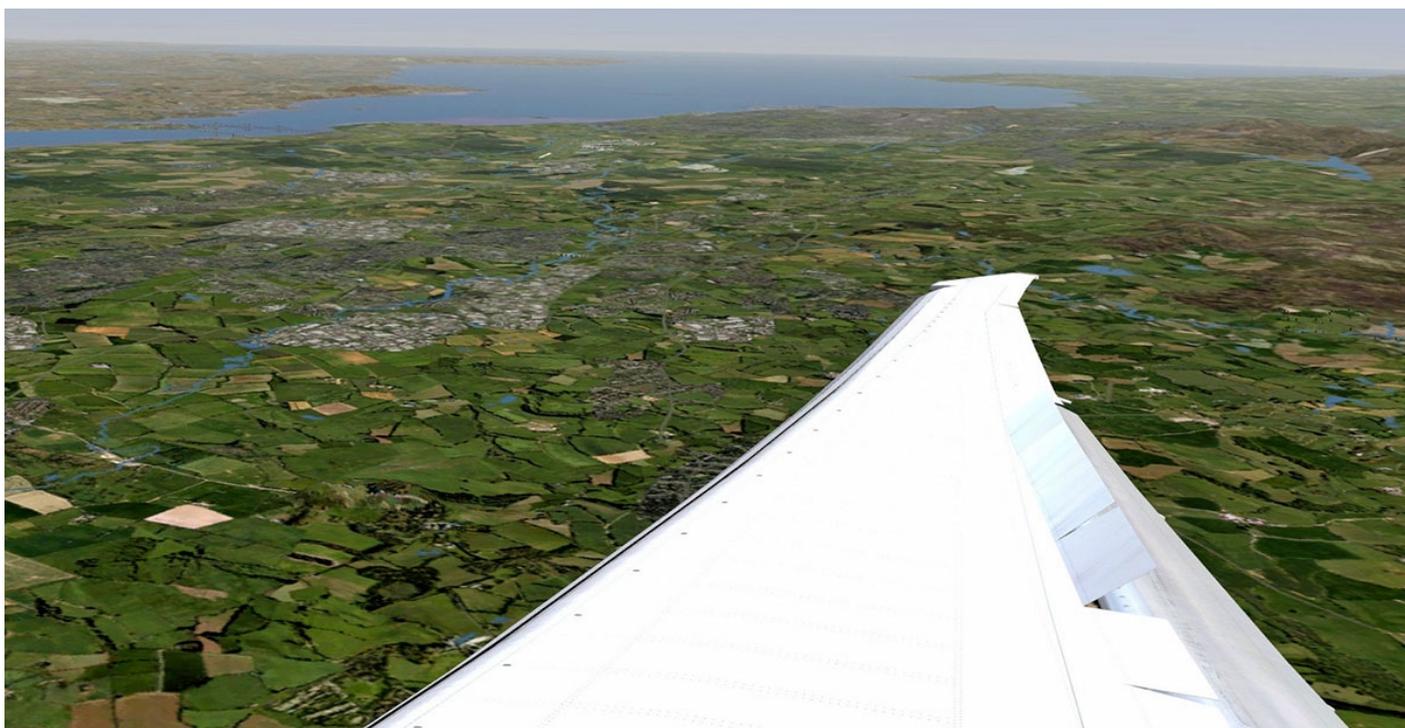
Whilst I'm on this topic, notice also that PMDG's TO/GA 'clickspot screw' on the MCP has some enhanced functionality with this aircraft: left-click it to engage TO/GA, but also middle/mousewheel-click it to disconnect the autothrottle (although that is very rarely needed), and right-click it twice, slowly, to disconnect the autopilot (don't use the disconnect bar for this). But enough FSX-isms for the moment — I promise that I'll return to the practicalities in a later section of the review.



All I can say is that once in the air, she handles like a dream. Now at this point I won't weary you with the somewhat technical debate that has been raging on the PMDG forum concerning the finer points of the fly-by-wire autotrim implementation (though I will very briefly summarise it for you, later); instead allow me to gently suggest that you must turn off the autopilot and hand fly her from time to time: she's a delight. (As referred to above, Boeing recommend that you only turn off the autothrottles in specific (and rare) circumstances).

I must mention also that such is the efficiency of the aerodynamic performance of this aircraft — she has often been described as "slippery", in the nicest possible way — that you will find the CDU regularly suggesting that you need speedbrakes during the descent, and it's often very good advice.

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(Most of the pics included here are with the benefit of FTX Global and Orbx England, incidentally, for those who are interested in such things).

On landing, although ground effect and so on are beautifully modelled there is a possibility that you may find the flare and touchdown process a little more difficult to control than you expected. There is a slight issue in this area, and PMDG have said that SP1 will include the ability to override the autothrottle in the flare, to assist. But do aim for a firm landing — I generally get somewhere around -100 fpm — this is a heavy airliner and not some little puddle-jumper, and you need to be firmly on the concrete right at the aiming point to deploy the speedbrakes and get some serious braking going from the main gear to make certain that you don't run off the end of the runway, as well as getting the nosewheel held down so that you can steer when the rudder loses its authority at low speeds. Doubly so on a wet runway, of course. Those VAs who hold what they laughingly call "landing competitions" for greased-on touchdowns have a lot to answer for. Grrr....

So there are, as you have seen, a few minor problems with the initial release of the aircraft, but all the ones that I found are now listed on the PMDG forum (the link was given above) as being already solved and awaiting the release of Service Pack 1, so there is no point in telling you about them here in view of the fact that they will soon become irrelevant. I will briefly mention the other aircraft handling minor issue later in this review.

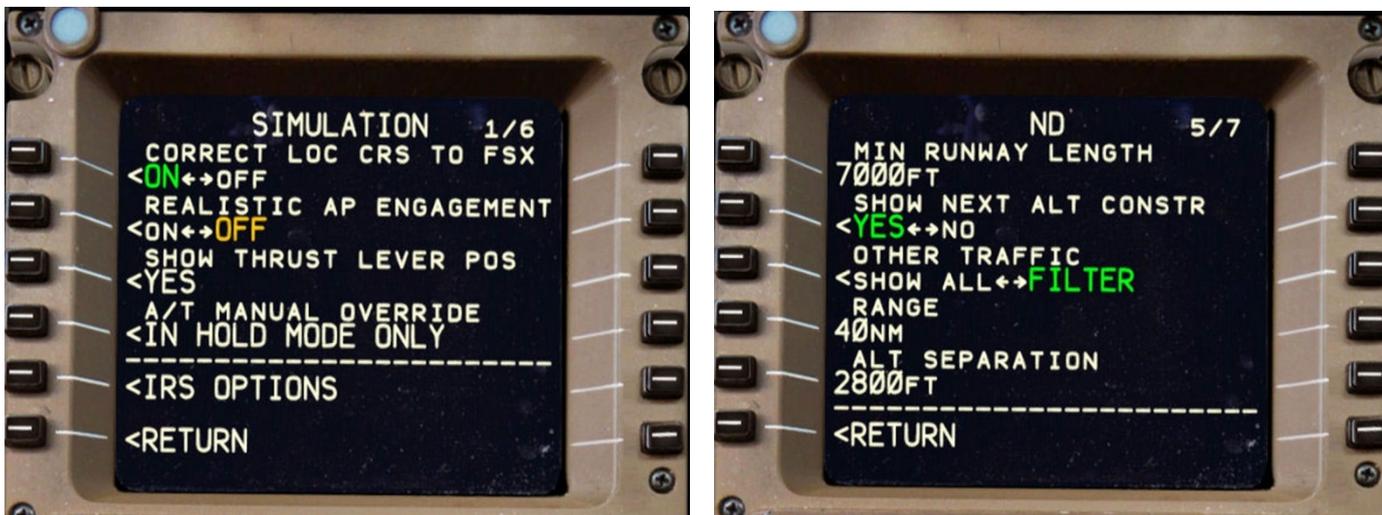
New and improved features

Moving away with reluctance from a consideration of how beautifully the aircraft flies, I will now try to summarise a few of the important new features which you will find on your 777. It will have to be a fairly brief summary in each case, I'm afraid: there are many exciting features, but for space reasons I can only say something useful about a small selection of them in order to avoid this section becoming merely a list. So I won't even attempt to discuss every option in each case: not only would this rapidly become tedious, but I'd like to leave you with some pleasant surprises, too.

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

PMDG Options (accessed from the CDU).

In the NGX, PMDG introduced the splendid idea whereby you could make all the significant configuration changes you needed (opening doors, loading fuel, configuring ground equipment, initiating pushback, etc.) from the CDU, without having to dive into the FSX menu system. This has been further extended with the 777, and I'll illustrate just a few of the options available.



From here you can configure many aspects of your aircraft's behaviour, and then save them as a default for the particular aircraft (tail number) involved. These items cover a wide range, and it should be possible to configure your 777 to have exactly the options which are installed in your favourite airline (providing you know them all, of course).

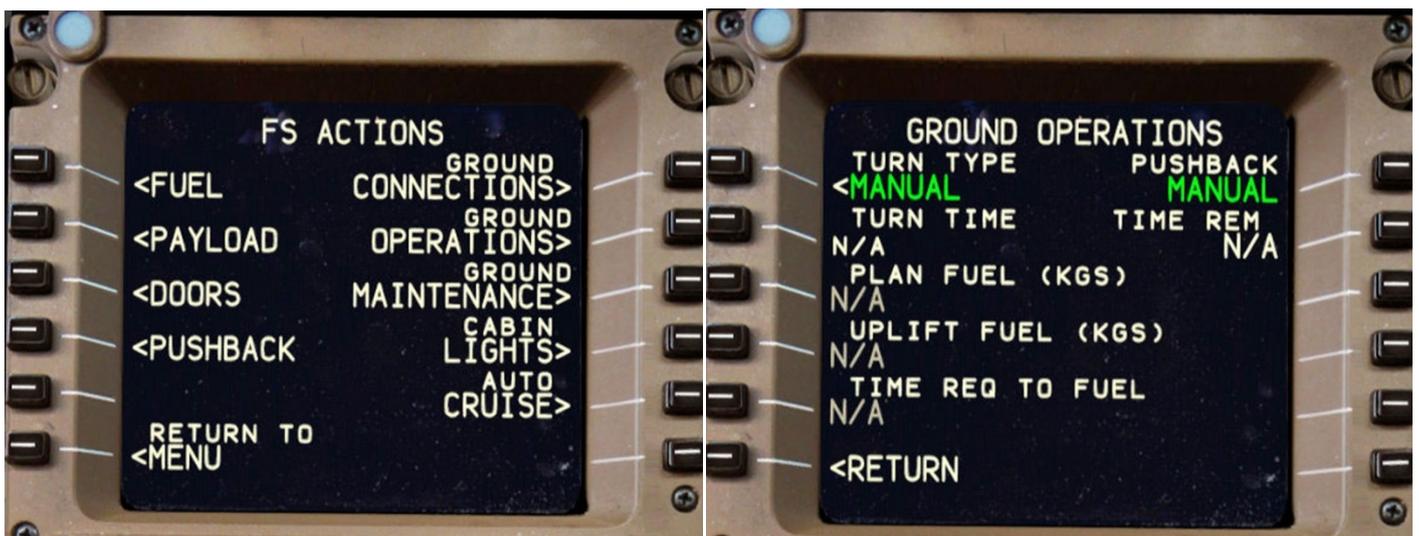
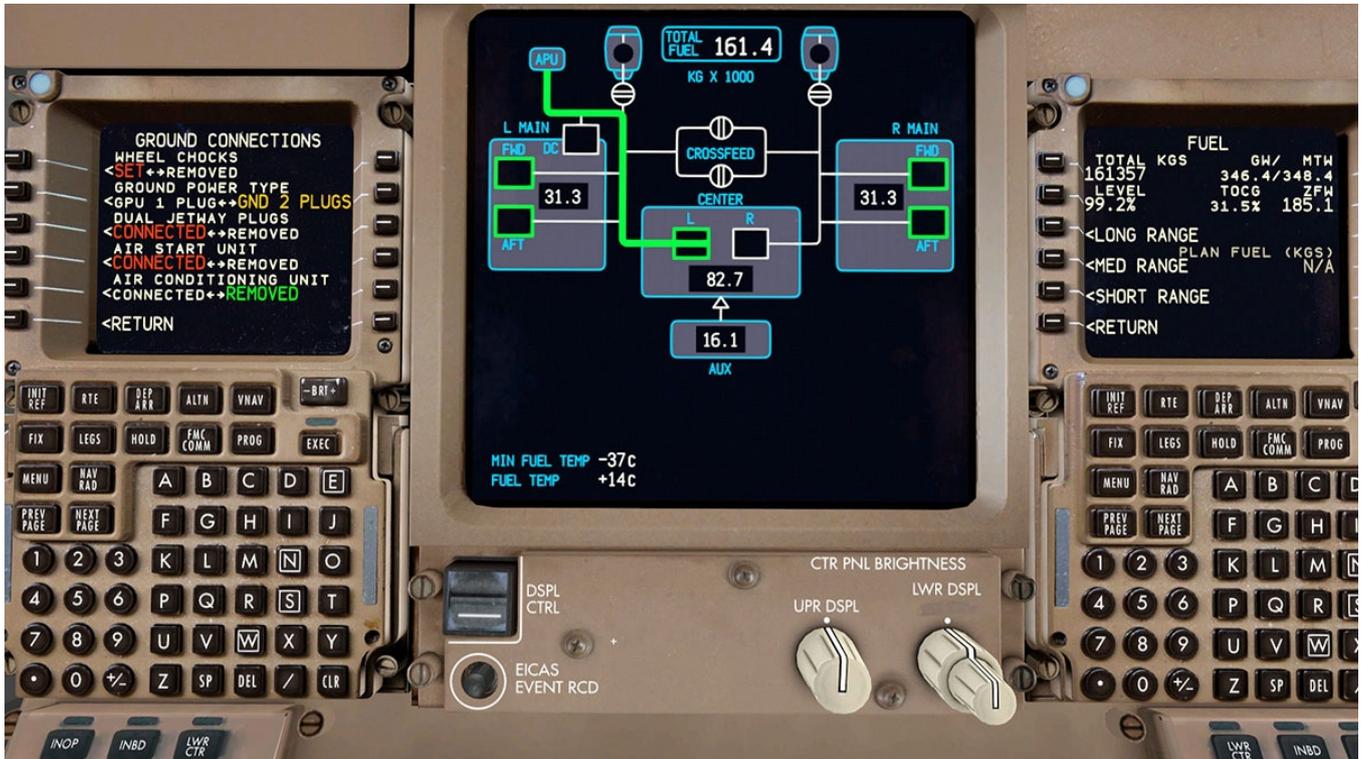
Items such as keyboard shortcuts and sound (and even colour) options are also to be found here, and you can also set up failures and perform maintenance tasks.... This whole area could justify a review of its own, but I will leave you to discover these delights for yourself — and all of them are documented in the *Introduction* manual. (I would mention also that, IMHO, vlying a complex aircraft like this without random failures enabled is rather like playing Backgammon without using the doubling cube: it's a quite different — and much tamer — affair. The QRH should be on hand for use whenever needed, and the 777 has ways to help you if you need to divert. But I digress again....).



PMDG's 777 package – a Mutley's Hangar review, October 2013

FS Actions (accessed from the CDU).

As well as the PMDG Actions section, there is also a Flight Sim Actions section. From here you can configure such important matters as the amount of fuel loaded (never load fuel into your 777 other than by using the FUEL page, as this automatically distributes the fuel into the various tanks as would be the case on the real aircraft). You can configure the passenger and cargo load, as well as the ground connections for providing external power to save on expensive fuel during turnarounds.



The Ground Ops screen (above right) contains the turnaround options, which you can set to suit your wishes so that turnaround activities (up to and including PMDG's pushback) take place automatically. You can even configure your

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

next turnaround whilst still *en route* to your destination! But do be sure to remember that setting chocks on the wheels is essential before any of the ground services can be used, though — I have to confess that <blush> that rather obvious requirement eluded me, the first time.

Also included on the Ground Operations page is Auto Cruise. Much as I love long-range airliners, I have never regarded the time in cruise to be the most interesting part of the flight, rather the reverse. But now I can configure the aircraft to automatically and intelligently make use of FSX's time acceleration feature. From this page you can stipulate a maximum of 2, 4, 8, or 16 times acceleration. Once the rate is set here, auto cruise can then controlled by right-clicking on the top left-hand knob of the chronometer to start it and left-clicking to stop it, and the clock's digits change colour to indicate that auto cruise is enabled.

Have you ever been in time acceleration and watched in disbelief as the aircraft overshoots a waypoint course change like a wild thing and then tries to get back on track, often achieving huge and unacceptable bank angles in the process, and perhaps being unable to recover in consequence? Not pretty. But happily, as I mentioned, PMDG's



Auto Cruise controls FSX time acceleration *intelligently*, in that it slows back to normal (1x) time when it needs to do turns, or step climbs, or indeed if it encounters any situation which might cause an upset when flying in accelerated mode. This is a feature that I appreciate very much indeed, and one which makes it possible to vly long-range flights safely even when you have Real World time constraints on your vlying.

I should add, however, that if I turn on auto cruise and I'm not intending to remain in front of my screens to monitor fuel usage at each waypoint against my PFPX plan, then I also turn off all failures until I return and get back into

normal time. (I'd quite like to see an automatic option for that, come to think of it....). Oh, and you'd better turn the crew alerting system off, too, if you have it switched on. There's already an option to pause when approaching the ToD, so you can use that as an opportunity to turn Auto Cruise off — I don't really believe it should be on during the climb or descent phases, but that's probably just me.

As well as Auto Cruise, PMDG have provided the ability to do Auto Step Climbs, too. So if you are someone whose VA allows you to start a transatlantic flight at bed time and then wake up in the morning in time to fly the descent, then this one's for you. Even though it's accessed from the Auto Cruise page (see above) it is nonetheless a separate function — you don't have to be in Auto Cruise mode to make use of it. What happens is that when you approach a calculated (or pilot input S-suffix) step climb waypoint, it will automatically increase the MCP altitude window to the new figure for you and initiate the climb. Very civilised indeed.

The Electronic CheckList system (ECL)

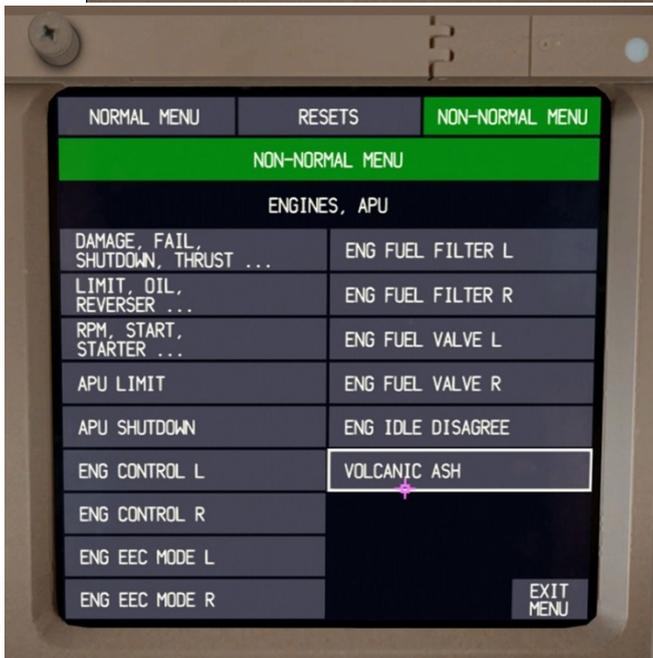
Wouldn't it be great if instead of having to reach for a laminated card or some other document you could simply read the current checklist items within the cockpit of the aircraft itself? And wouldn't it be even greater if the aircraft would intelligently tick off for you any items which have already been accomplished? Well dream no longer, for the

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

777's ECL system will do all that for you: in the first example (below), it is aware that the speedbrake is already armed, and so that item is already checked.



The checklist system covers non-normal items, too, as the following examples illustrate.



LNAV and VNAV

“What?”, I hear you cry, “But LNAV and VNAV have been simulated for a long time, and on the NGX they were superb”.

That's absolutely true, but the reason why I have included the autoflight system in these examples of new and improved features is that on this aircraft the smoothness and accuracy of the system (yes, even when compared to the NGX) took me by surprise, and gave me considerable delight, I have to say. Let's face it, taking the simming scene as a whole the VNAV and LNAV aspects of simulated aircraft have often been poorly implemented over the years, but the opposite is the case here — thrust changes, for example, are handled smoothly and gracefully, while altitude restrictions are achieved with awe-inspiring accuracy.

It's difficult to explain this, since it's the sheer smoothness and precision of the autoflight system as a whole which is so impressive, and gives you a reassuringly confident feeling that it will achieve exactly what it sets out to do.

All I can suggest is that you try selecting an approach which you know to be challenging for the NGX autoflight system and let the 777 fly it for you — then you will understand what I'm talking about. It's simply the most sophisticated autoflight system of any home simulation I have experienced over the years.



Furthermore, on this aircraft there are various advanced aspects of the FMC/CDU operation that I have never seen modelled before, either, such as PRED ETA-ALT on the fix page, which allows you to enter an altitude (e.g. FL140 in the above example, with the response — i.e. how far along the flight path you will achieve that altitude — ringed in yellow), and it even places a marker on your ND track for you, too (above, also ringed).

Issues

However, I must now reluctantly cease describing some of the delights of this aircraft to discuss a few of its alleged issues. But since PMDG have published their own list (link given above), and the majority of things on that list are

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

already solved and merely awaiting release with SP1, it seems pointless to include those items — with the result that this section might have been the shortest in the review. I will, however, briefly mention just two of the issues on the list, since they affect the handling of the aircraft. There is a slight issue with the flare on landing (but I referred to that earlier, and so won't repeat myself here) — and the other is that there is a slight question mark over one aspect of the fly-by-wire trim system. However, it's a very minor issue; it is actively being investigated at the time of writing; and, once again, it will be fixed in SP1.

But that's it! Given the amazing complexity of this aircraft and the simulation, the fact that those are pretty much the only handling imperfections present on the day of initial release is, to me, nothing short of miraculous, and a tribute to PMDG's testing and professionalism. But then, I've spent a lifetime in the software industry and hence have a lot of scar tissue in that area. So, moving on...



The Boeing 777-200LR is designed and built for ultra-long-haul operations (its range is roughly up to 10,500 miles, compared to the 9,000 mile range of the 777-300ER). So whilst you obviously could use it for the Edinburgh – London shuttle (if you must) its natural element is long trips — such that ETOPs, step climbs, Adequate Airports, and the rest all need to be taken into account. Happily, the release of PFPX (watch out for the *Mutley's Hangar* review, coming soon) has given simmers the tool that they need to do the required planning for long haul; also, PMDG's Auto Cruise and Auto Step Climb abilities bring such operations comfortably within the reach of simmers whose Real World commitments mean that they only have an hour or two at a time for simming. (Come to think of it, these facilities will also save on electricity costs — a bonus in these energy-saving times).

Perhaps, tongue in cheek, I should add here that there may be one long haul so-called “problem” which might constitute a possible downside, from some points of view — with this aircraft there's a real danger that you may need to buy some of those tasty remote destination airports. (I'm already thinking Vancouver, San Francisco, Bangkok (Suvarnabhumi), Dubai, Singapore, Melbourne, Tokyo, Johannesburg, the list goes on....). But I regard each

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

purchase as a one-time landing fee, so I know that I'm going to enjoy my subsequent arrivals and departures even more. We're fortunate to have so many excellent airport developers for FSX, and they need (and deserve) our support.

Inevitably, there are a lot of non-issues that have been raised, too, of course. Leaving aside the failed-to-read-the-manual brigade, I think my favourite was from someone who complained that there were no animations for opening the windows or moving the armrests of the pilots' seats, for pity's sake. To PMDG's credit, their admirably restrained reply was: "We'd do it but we're already super close to going over the edge for animations". Oh dear, what a shame. But you know, I haven't found that the lack of animated armrests detracts from my huge enjoyment of this bird one iota!

There are also, however, a few associated matters that have emerged during the few weeks (at the time of writing) of the 777's time among us that could, and indeed should, be laid at the door of the ageing simulation platform that we call FSX, and they may be of relevance to people reading this.

FSX-related and hardware issues

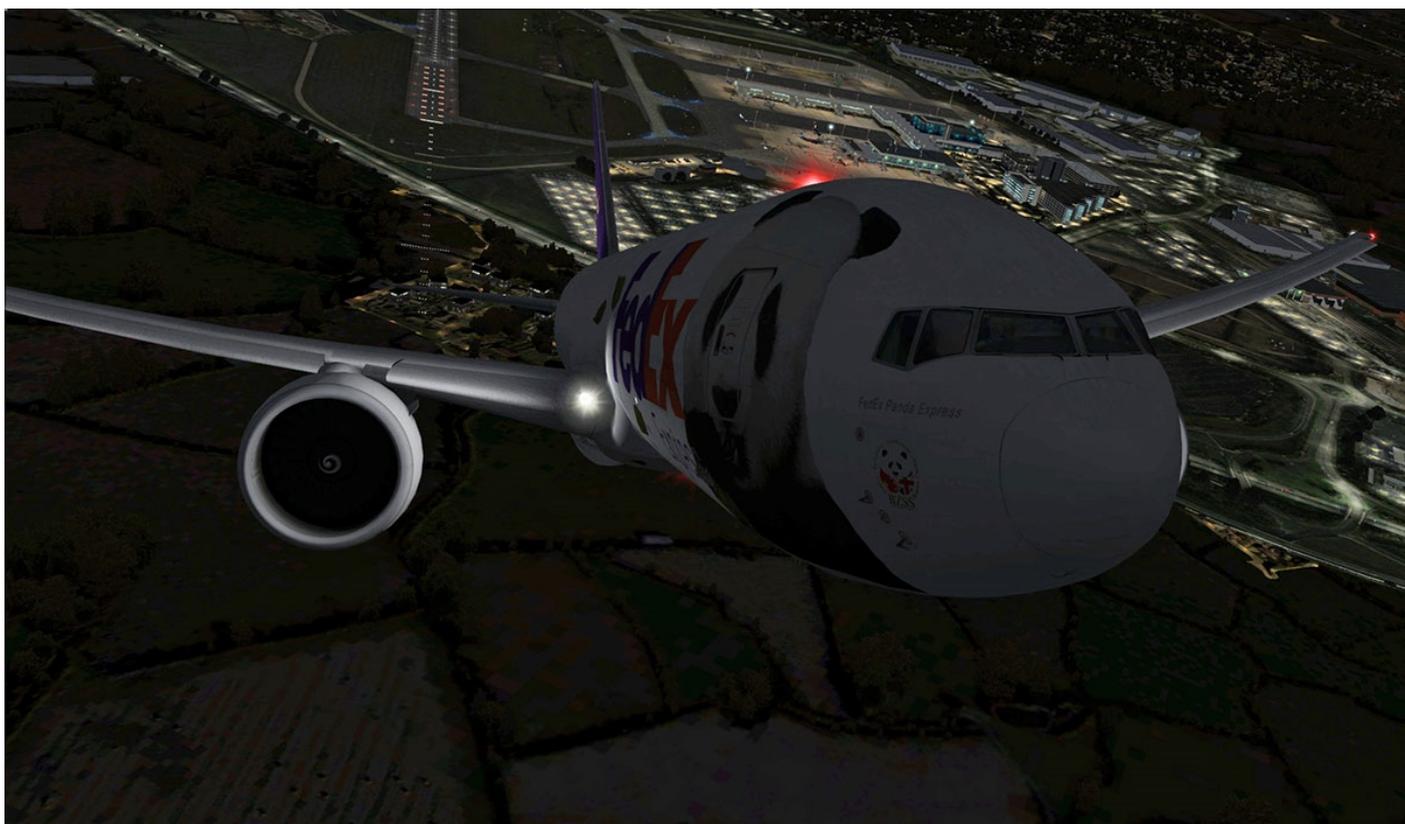
Getting the most trivial one out of the way first: given the complexity of the modelling on this aircraft, there may be a slight but noticeable delay when switching to an outside view, so that while all those lovely textures load you do get a brief glimpse of the interior. There is nothing PMDG can do about that, of course, and after a while you don't even notice it. So on to more significant issues.....

A throttle issue associated with the use of FSUIPC

Now this is also not a PMDG problem as such (in fact they do their utmost to help you avoid it): but I will describe it here in the hope of assisting anyone else who might experience it (as I did). But in order to explain how it came about I need to return to the NGX's *Introduction* manual, which said words to the effect that the throttles should not be calibrated via FSUIPC. I raised an eyebrow at that time and made a mental note, but otherwise ignored it pending any problems — which in fact didn't arise. So when the *Introduction* manual for the 777 said the same thing I took the same action (or lack of it). However, this time, I did experience a problem.

When the engines unaccountably returned to idle in spite of the fact that my hardware throttle levers were demanding far more — which made trying to taxi or take off an unnerving experience, as you can imagine — I remembered that PMDG comment and wondered whether I ought to try disabling my FSUIPC calibration. Just to be clear, within FSX's "Settings – Controls" (the Calibration tab) I have the "Enable Controllers" box **unchecked**: I process all my axes via FSUIPC (and all my buttons via LINDA, but that's not relevant in this context). I therefore went to my FSUIPC settings and ensured that each throttle was indeed assigned to the appropriate throttle lever axis (it was), but then went to the Calibration tab (pages 1 of 11 and also 3 of 11) and clicked the Reset button for both axes on both pages to stop any FSUIPC action there, and be certain that neither of my throttle axes were being calibrated by FSUIPC. So I now had my throttles assigned by FSUIPC but (in compliance with PMDG's recommendation) **not calibrated** there. Whereupon my throttle problems disappeared, and the aircraft became a delight to both taxi and vly.

(Contd. overleaf)



YMMV, of course, and given the huge number of possible hardware configurations multiplied by the vast number of possible software combinations operated by the world's simmers, it is probable that very few of us have exactly the same configuration as each other, so comparisons become almost impossible (and one size will never fit all). But there you go — I hope that the above account might help someone who reads this.

“Memory” problems

<sigh> This whole area is a morass of superstition, lack of understanding, and even outright misinformation amongst non-technical simmers. Just to clarify, then, I am **not** talking here about a BSOD a.k.a. Blue Screen Of Death (which is easy to recognise, not least owing to its colouration); nor am I talking about a CTD (Crash To Desktop) which, as it says on the tin, abruptly crashes you out of FSX and straight back to the desktop, usually without pausing for breath on the way, even to give you an error message. This section concerns the dreaded OOM (Out Of “Memory”) error, which some people are now thinking has arisen since installing the 777 — which I reckon simply means that they were right on the edge previously and that the complexity of the 777 has finally tipped them over — but I do therefore need to say something about it here.

The big problem with the term “OOM” is the use of the M-word — “Memory”: in reality, this error concerns running out of space in a very specific section of memory called VAS, Virtual Address Space, which in the case of a 32-bit application like FSX on a 64-bit O/S is a finite resource of exactly 4Gb *regardless of how much RAM you may have installed*.

SYSTEM REQUIREMENTS

Minimum

OS: Windows 7 64-bit (older OSes such as Windows XP, 32-bit OSes, and Windows 8 may work, but we cannot guarantee compatibility or support)

Processor: Core 2 Duo or greater

RAM: 4GB

Video Card: 1GB DirectX 9 compatible Nvidia or ATI card. Onboard motherboard or CPU video is not supported. Some of the newer Intel designs may work but we cannot guarantee compatibility.

Monitor: Widescreen 16:9 or 16:10 aspect ratio highly recommended

Recommended

OS: Windows 7 64-bit

Processor: Intel Core i5/i7 Sandy Bridge/IvyBridge/Haswell series

RAM: 8GB+

Video Card: 2GB+ latest generation Nvidia. (example: GeForce GTX 760, 770, 780)

Monitor: Widescreen with 16:10 aspect ratio

PMDG *highly* recommends that you choose a 64-bit operating system to avoid problems with FSX running out of memory due to a 32-bit environment.

When you come to buy the PMDG 777 there is a message in red letters on the Product Description page (which I have surrounded with a yellow box in the screen capture, above) warning you, effectively, to use a 64-bit version of Windows 7 or else PMDG probably won't be able to help you.

But even with a 64-bit version of Windows, some people claim they are running out of "memory" (or rather, VAS) with the 777.

Just to re-emphasise — the way that you know you are dealing with an OOM error is when you get an error box from FSX saying:—

**Your computer has run out of available memory.
Please restart Flight Simulator and select different
graphics, scenery or traffic settings".**

Without that notification, it's probably not an OOM error unless there are other, fairly obvious, indications. But the use of the word "memory" in there is so vague....

(If you want to know more about VAS, including information about how to monitor it, then please read (guess what?) the *Introduction* manual, which contains an admirably clear explanation, including a link from whence you can obtain the free utility for monitoring purposes).



Unfortunately, I can't remember having experienced an OOM error — but then I keep my FSX installation tweaked to within an inch of its life. But I felt that I must investigate the alleged 777/OOM phenomenon for this review.

I therefore made some unlikely adjustments to my FSX configuration in an attempt to try and induce the error — a VAS-unfriendly combination of implementing a TEXTURE_MAX_LOAD of 4096, doubling the LOD radius, setting massive AI aircraft levels, whacking the autogen, road vehicles, and scenery sliders up to unreasonable lengths, and so on. And just to make sure, because VAS problems will tend to manifest themselves near to touchdown when FSX is under maximum stress, I set up a flight into a very large airport (Heathrow) — whilst monitoring VAS throughout the trip. The result was interesting: here's my log of events (remember that 4Gb is the absolute limit, so once you get to the point of having around 3.9Gb of VAS used then you're definitely bordering on OOM territory) —

```
Start FSX: was originally using 535 Mb VAS until I loaded the 777 - then 1052Mb.
Stipulate EGCC gate 23 - no change yet, so Fly Now.
Loaded and initialised - 2605Mb VAS in use.
Switched to outside views: now 2751Mb. Many more outside views: 2968Mb.
Lots of views around the VC: usage rose to over 3 Gb then dropped back to 2841Mb.
Taxi to the active runway - still around 2850Mb-ish.
Took off for EGLL: VAS got briefly above 3Gb, but again dropped back (to 2863Mb).
In the climb, VAS maxed out at 3049Mb.
Short cruise at FL250 - 3191Mb. Messed around with the CDU for a while: 3277Mb.
Start of descent: 3189Mb. At FL150, 3164Mb.
Approaching BNN 3211Mb, rising to 3289Mb.
Heading towards the approach 3427Mb.
Turning onto the approach, LOC armed: 3714Mb.
Finals: 3655Mb.
Touchdown: 3937Mb (<gulp!>)
At the gate: 3872Mb.
But when I started GSX deboarding: 3946Mb, and FSX has ceased to respond.
```

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

When I checked my FSUIPC log, sure enough I had multiple occurrences of “**** WARNING! Free memory is very low!”, which would have been accompanied by FSUIPC's dinging warning noise. But to my surprise (and irritation, since I wanted a screen grab of it to include here), I didn't see an OOM error box, though I was clearly right on the verge of getting one.



The exercise also demonstrated why it is that so many people got their OOM message at the end of a long flight (which must be especially infuriating!) — VAS usage is bound to be at its maximum when all the aircraft landing systems are most active *and* the arrival airport textures (not to mention AI aircraft, ground traffic, static aircraft, and all the rest) are all flooding in.

For me, this confirmed my prior suspicions and comparisons: I don't believe that the 777 is particularly heavy on VAS. I do seem to find that the 777's VAS usage averages out at a tiny bit more than the NGX's — but there again, other people say it is lighter, so who knows: it is clearly not all that much different, anyway, so I reckon that by itself it isn't going to induce an OOM (unless, of course, someone is right on the edge already, as mentioned above).

As a result of my test I do now suspect, therefore, that any complaints about the 777's VAS usage are owing, not so much to a difference in VAS usage between the NGX and the 777, but to the fact that with the 777 the complainants were probably flying into longer runways and therefore larger airports, with a concomitant increase in VAS usage *from the airport*, rather than from the 777. But hey.....

You will find plenty of advice on how to reduce your VAS usage with FSX by using your favourite search engine, so I'll start to close this discussion by first offering you a couple of comments on this topic from the PMDG forum — comments made by Ryan Maziarz of PMDG:

“....we spent an inordinate amount of time testing this, making sure that the VAS usage for the plane was as tight as it could be given the airplane's capabilities etc. I have personally never seen an OOM with it and neither did anyone during the whole testing process, which was 40+ people.”

“I didn't make up the analysis [of how VAS works] that's in the [Introduction] manual — a large part of it was paraphrasing Mark Russinovich from Microsoft, who literally is one of the designers of this system on the Windows

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

kernel team. If we can't trust his explanation of how VAS works, then there is absolutely no one that we can trust. In every case of this that I've dealt with with customers, the number was getting very close to or over 4GB.”

(Over 4Gb? Hmm....) Anyway, let me end with a small amplification about VAS: I have simplified the above discussion about OOMs slightly, in that technically there are in fact two ways you can run out of space. The first is when FSX runs out of contiguous blocks in the 2Gb process address space (so that whilst there's still some space in there, owing to memory fragmentation there isn't a single lump of space big enough to suit its needs), and the second is when FSX quite simply runs out of virtual address space completely. But to be honest, with FSX I think that the distinction is somewhat academic — you should try to stay well clear of both eventualities, if you want to be sure of avoiding the dreaded OOM error. And I do believe that simply installing and vlying the 777 is not going to cause you to experience OOM errors unless you were on the brink of having them anyway, with the result that big airports push you over the edge. Just my 2 cents, YMMV, caveat emptor, you get the message.....

Those interested can find a more technical explanation of Windows memory use from Mr. Russinovich himself here: <http://channel9.msdn.com/Events/TechEd/NorthAmerica/2011/WCL405> 

Summary

Of course there were a few bugs on release. That's in the nature of all software, and believe me, this is an extremely complex simulation! But with PMDG we know that they have already acknowledged the issues (which in itself is so unlike some developers we can all think of <sigh>), and furthermore they have already fixed most of them; and hence one has complete confidence that SP1 will make those issues disappear. Well OK, *almost* all of them — this is still software, right?

So I am going to proceed on the basis that for all practical purposes there are no bugs which are a deal-breaker for the potential purchaser, and await SP1 with the patient expectation that it will be even better than the aircraft we already have.

Which, I have to say, is a gem:

- The sound is dead right. Not just the switches and other cockpit sounds, which are highly impressive, but the engine spool-up, the APU sound varying under load, and even the cruise sound — spot on, both internally and externally. Try moving your external view past the engines to hear the note change..... And give your subwoofer its head when you take off — sublime, although the neighbours may not agree.
- I love hand-flying this aircraft. She feels exactly like the massive thoroughbred that she is, and the superb aerodynamic modelling means you need to be alert to think that bit further ahead to be able to slow her down gracefully during the descent.
- The visual appearance — whether externally, in the Virtual Cockpit, or even the passenger compartment — is quite simply of the highest quality.

But on the basis that this review doesn't have to be eternal to be immortal, I'll restrain myself from continuing in that vein: hopefully, you will have gathered by now that I seriously like this aircraft.

I fell in love with big Boeings when I was first introduced to a full simulation of the 744, a long time ago now. If I'm honest, I must admit that I really bought the 777 as an interim measure until PMDG release their 747 v2 — but I have

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

to say that I am delighted with this bird, and will be vlying her for some time to come.

Truly amazing stuff, PMDG — you've made late 2013 a great time to be a flight simmer!



Verdict:

- External model: 10/10
- Internal model: 10/10
- Sounds : 10/10
- Flight characteristics: 10/10
- Flight dynamics: 10/10
- Documentation: 10/10
- Value for money *: 10/10



Mutley's Hangar score of 10/10, and a Mutley's Hangar Award for Excellence.

* Whilst I don't think anyone sufficiently knowledgeable could seriously argue with most of the above scores, there may be some who regard 89.95 USD for a simulated aircraft as expensive, and hence might query the "value for money" score. I would simply say two things:

a) This aircraft is state of the art. Yes, it costs more than I have ever paid for a virtual aircraft before, but having

PMDG's 777 package – a *Mutley's Hangar* review, October 2013

spent nearly four weeks studying it in considerable detail I am in no doubt whatsoever that it is entirely worth the asking price, especially when you take into account the “*Operations Center*”, all the free liveries, and the paint kit.

b) The second thing is this: what's the alternative? If you really want to fly a simulated 777 as good as this then the only other possibility is in a commercial full flight simulator. The nearest 777 FFS to where I'm sitting is at Gatwick, and you or I can hire that one for an **hourly** charge of £690 (er, that's around 1,100 USD, 815 Euros, or 1,170 AUD). Per hour. Hmm. Do you still think that 90 bucks is expensive?