



PMDG 747-400 & PMDG 747-8i/F *QUEEN OF THE SKIES II*

Introduction and Use

Users who have purchased/installed the PMDG 747-8 Expansion package will find Features and Differences in the Supplement from page 173 onward.

Copyright © 2005-2020
PMDG Simulations
All Rights Reserved



INTRODUCTION

This manual was compiled for use only with the **PMDG 747-400 Queen of the Skies II** simulation for *Prepar3D™* from Lockheed Martin Corporation. The information contained within this manual is derived from multiple sources and is not subject to revision or checking for accuracy. This manual is not to be used for training or familiarity with any aircraft. This manual is not assumed to provide operating procedures for use on any aircraft and is written for entertainment purposes.

It is a violation of the owner's copyright to distribute this document or any portion thereof without permission of the author.

The PMDG Simulations Web Site can be found at:

<http://www.precisionmanuals.com>

Copyright © 2020 PMDG Simulations

This manual and all its contents, pages, text and graphics are protected under copyright law of the United States of America and international treaties.

Duplication of this manual is prohibited. Permission to conduct duplication of this manual will not be sub-contracted, leased or given.

Lockheed Martin, the Lockheed Martin logo and *Prepar3D* are registered trademarks of the Lockheed Martin Corporation. Boeing, the Boeing name and certain brand marks are the property of The Boeing Company. Some graphics contained in this manual were taken directly from the simulator and altered in order to suit duplication on a printed page. All images contained in this manual were used with permission.



Produced under license from Boeing Management Company. Boeing 747, 747-400, 747-400F, 747-400D, 747-400M, 747-400BCF, 747-8i, 747-8F & Boeing are among the trademarks owned by Boeing.



COPYRIGHT AND LICENSE

The original purchaser of this software is granted a limited license to use the software in accordance with the End User License Agreement as agreed to at the time of installation.

Please review the license agreement carefully, as it provides you with only limited rights. ***Specifically, you may not sell, resell, trade or barter this software product/license without the permission of PMDG.***

You should also be aware that you may not use this simulation software for any training, pilot familiarization, recurrent training or operational awareness training.

This software may not be used to demonstrate the airplane, airplane systems, operational norms, flows, procedures or other pilot knowledge application in a classroom or training environment without being supplemented by the appropriate commercial license.

Please note that this version of the simulation may or may not accurately represent the actual operation of many different aircraft systems and no warranty is made to accuracy or correctness.

In all circumstances the aircraft manuals issued by a certified training center for use with a pilot's training course and the manuals located on the flight deck of an aircraft as well as the operational procedures dictated by the aircraft manuals supersede any information taken from this product or the documentation provided with this product.

This simulation may not be used in any public or private display for which users are charged admission, usage fees or other revenue generating charges. Nor may the simulation be used in any manner which reflects poorly on PMDG, PMDG Simulations, Boeing, Boeing's employees, suppliers or customers.



TABLE OF CONTENTS

COPYRIGHT AND LICENSE	3
THE TESTING TEAM	15
PMDG TECHNICAL SUPPORT	16
IMPORTANT – READ THIS PAGE	17
THIS IS NOT JUST ANOTHER BOEING.....	18
GETTING P3D SET UP FOR THE PMDG 747-400 Queen of the Skies II	21
Yes, You Really Should Read This:.....	21
Proper Installation:.....	22
Product Activation:.....	22
Optimal Installation of P3D:.....	22
Running P3D:	23
P3D.CFG Settings:	24
In the [Main] Section:	24
UIAutomationCore.dll fix:.....	24
P3D tweaks:	25
P3D In-Game Settings:	26
Graphics Page:	26
General Page:.....	26
Traffic Page:.....	26
Scenery and Lighting Page:	27
Realism Page:	27
VAS management – stopping out of memory errors:.....	29
Background and theory:	29
Using Process Explorer or FSUIPC to monitor VAS:	30
Causes of high VAS usage:	31
Large amounts of photo scenery areas	31
High amounts of AI traffic	32
Ultra high resolution environment textures	32



INTRODUCTION

Prepar3D.cfg Level of detail radius value	32
Autogen, water, weather	33
High detail addon airports	33
Flying a lot of legs without shutting the simulator down:	33
Using the sound preload options:	33
Conclusion:	33
THE PMDG 747-400 AND FLIGHT-SIM HARDWARE/SOFTWARE.....	34
Conflicting Software:	34
Hardware SDK:	34
FSUIPC users:.....	35
KNOWN P3D'isms TO AVOID:	37
HOW TO USE THE MANUALS	39
Introduction:	39
Tutorials:	40
Flight Crew Operations Manual:	40
Quick Reference Handbook:.....	41
THE PMDG 747-400 DIDN'T DO WHAT YOU EXPECTED?	43
The plane is behaving erratically:	43
I can't load full fuel:.....	43
In the 737 or 777 it worked like this...:	44
I turned the battery on, but the plane has no power:	44
I connected the air conditioning unit, but no duct pressure is showing on the ECS page:	44
The Step Climb is telling me that I need to climb 4000 feet:	44
The PVD is not working / The PVD continues to move even though I'm stopped:	45
I turned off the autopilot, but I can't silence the alarm:	45
It's difficult to taxi:	45
How do I save my route?	45
Why are my tire rims orange?	46
My [insert passenger/VA program here] is flagging me for excessive V/S:	46



INTRODUCTION

I could not get LNAV to arm/engage:	46
The bank limiter is not working as I expected in LNAV:.....	46
The mouse wheel is not working on certain knobs:	46
Pressing the RESET button on the MINS knob does not reset the mins:	47
Sometimes I hear strange sound artifacts after switching views:	47
I get a NAV DATA OUT OF DATE message on the CDU:.....	47
RAAS is calling out the wrong runway numbers:	47
I see a large mass of TCAS targets on the ND around an airport on the ground:	48
The aircraft “bounces” on the ground when I change views:	48
I have service based failures on but nothing ever happens:	48
It takes way too long to enter wind predictions for a long route:.....	49
The weather radar isn’t working.....	49
I am seeing erratic changing fuel loads and autopilot issues.	49
I am getting stutters when sounds load to play:	50

DETAILS AND QUIRKS OF THE PMDG 747-40051

Air Conditioning System:	51
Auto-flight System:	52
Cockpit Shaking Feature:.....	52
Cockpit Displays:	52
Doors:.....	53
Electrical System:	53
Engines:	53
Fire Controls – Engines:.....	54
Flight Controls:.....	54
Flight Management Computer:	54
Fuel Density Model:.....	55
Ground Friction Model:.....	55
Ground Service Vehicles:.....	55
Hydraulic System:.....	55



INTRODUCTION

Landing Gear:	56
Lighting Systems:	57
Physics-based Wing Flex:	57
Pneumatic System:	57
Sounds:	58
THINGS THE WIDE BETA TEAM WANTED YOU TO KNOW	59
INTERACTING WITH THE PMDG 747-400.....	61
Push-Pull Operations:	61
Knob/Switch Turn Operations:	61
Switch/Knob Cursors:	62
Operating a Two Position Switch/Knob:	63
Operating a Multiple Position Switch/Knob:	63
Combined Rotary Knobs:	64
Other applications of gray shaded cursors:	64
Multi-Function Knobs in the Virtual Cockpit:	66
Using click and drag controls:	66
Using Pop-Up Panels	66
Panel Open/Toggle Cursor:	67
Close Panel Cursor:	67
Zoom Display Cursor:	67
Main Panel and Forward Pedestal Click Spots:	68
Rear Pedestal/CDU Click Spot:	69
MCP Popup and Close Click Spots:	69
EFIS Click Spot:	70
TOGA Click Spot:	70
Radio/Audio Panel/XPDR/Weather Radar Popup and Close Click Spots:	71
Save Flight Click Spot:	71
CUSTOMIZE YOUR PMDG 747-400 EXPERIENCE	72
Accessing FMS Based Menus from a Dark Airplane:	72
PMDG 747-400 Home CDU Menu:	73



INTRODUCTION

PMDG SETUP MENU.....74

Understanding Panel vs. Flight Save/Load States:.....76

Save/Load Effect on Failures:.....77

Save/Load from the P3D menu:77

AIRCRAFT SETUP MENUS78

How this helps you:78

How this works behind the scenes (For sim techs and nerds!):79

Using the AIRCRAFT menu:.....80

Restoring a Definition File:81

Using a Different Definition File:81

Using a Fixed Definition File for All Flights:82

EQUIPMENT Options:83

PAGE 1/22 - ADFS, FMS84

PAGE 2/22 - ELECTRICAL.....84

PAGE 3/22 - EGPWS84

PAGE 4/22 – EGPWS 285

PAGE 5/22 – EGPWS 385

PAGE 6/22 – EGPWS 485

PAGE 7/22 – FMC DATALINK.....85

PAGE 8/22 – FMS86

PAGE 9/22 – FMS 286

PAGE 10/22 – FMC 3.....86

PAGE 11/22 – FUEL & WT/BAL87

PAGE 12/22 – FUEL & WT/BAL 287

PAGE 13/22 – HYDRAULIC87

PAGE 14/22 - INSTRUMENTS.....88

PAGE 15/22 - MISC89

PAGE 16/22 - MISC89

PAGE 17/22 – PACKAGES89

PAGE 18/22 – PACKAGES 290

PAGE 19/22 – PANEL OPTIONS90



INTRODUCTION

PAGE 20/22 – PANEL OPTIONS.....	90
PAGE 21/22 - WARNING SYS	91
PAGE 22/22 - WARNING SYS 2	92
DISPLAYS Option Pages:.....	93
PAGE 1/7	93
PAGE 2/7 - PFD	94
PAGE 3/7 - PFD	94
PAGE 4/7 - ND	95
PAGE 5/7 - ND	95
PAGE 6/7 - EICAS.....	95
PAGE 7/7 – EICAS.....	96
FAILURES Customization Pages:	96
OPTIONS MENUS.....	97
SIMULATION Configuration Menu:	98
PAGE 1/11	98
PAGE 2/11	100
PAGE 3/11	101
PAGE 4/11	101
PAGE 5/11	102
PAGE 6/11	102
PAGE 7/11	103
PAGE 8/11	103
PAGE 9/11	105
PAGE 10/11	105
PAGE 11/11	106
IRS Options Sub-Menu:	108
PERFORMANCE Options:	109
PAGE 1/2	110
PAGE 2/2	110
KEY COMMANDS Options:	111
COLOR Options:	112

**INTRODUCTION**

Method 1:	112
Method 2:	112
SOUND Options:	113
FAILURES AND MAINTENANCE	115
Failures: Top Menu:	116
All Systems: Top Menu:	116
Random Failures Sub-Menu:	117
Service Based Failures Sub-Menu:	118
Maintenance Sub-Menu:	119
System Failure / Maintenance Menu:	120
Failures Master List:	121
Air Conditioning: (44)	121
APU: (7)	122
Automatic Flight: (5)	122
Communications: (13)	122
Doors: (17)	123
Electrical: (52)	123
Engine: (48)	124
Fire: (16)	125
Fire Protection: (92)	126
Flight Controls: (23)	128
Flight Instruments: (19)	129
FMS/NAV/ADIRU: (23)	129
Fuel: (46)	130
Hydraulics: (43)	131
Ice Protection: (32)	132
Pneumatic: (22)	133
Warning Systems: (12)	133
Wheels and Brakes: (10)	134
FS ACTIONS MENU SYSTEM	136
Fuel Menu:	137



INTRODUCTION

Payload:	138
Doors:	139
Pushback:	140
Service Vehicles:	141
Ground Connections:	142
Ground Operations:	143
Ground Maintenance:	145
Cabin Lights:	146
Auto Cruise:	147
GETTING THE MOST FROM YOUR PMDG 747-400	148
Virtual Cockpit position and zoom:	148
Using the Landing Lights:	150
TrackIR:	150
Alternate TO/GA Click Spot:	151
Keyboard Direct Entry to CDU Scratchpad:	152
P3D VIEW SYSTEM AND THE PMDG 747-400	153
LIMITATIONS OF THE SIMULATOR	154
Time Acceleration Limit:	154
External Load/Fueling Programs:	154
Do not use non-PMDG external models:	155
Flight recording and playback issues:	155
Hardware toe brakes:	155
External route export programs:	155
THE COLLINS WXR-2100 WEATHER RADAR.....	157
Active Sky Next or Active Sky 2016 requirement:	157
Basic radar concepts and theory:	157
Tilt:	158
Before takeoff and lower part of the climb	158
Mid to high altitude climb:	158
Cruise:	158
Descent: 0 to +10	159

**INTRODUCTION**

Gain:.....	159
WX vs. WX+T modes:	159
Predictive Windshear System (PWS):	159
Limitations:.....	160
Active Sky Next range settings:	160
Future features:	160
THE 747 AND TURBULENCE IN P3D.....	161
What P3D turbulence does:	161
Turbulence filtering:	162
AP/AT TURB MODE TRIGGER option:	163
Other ways of mitigating turbulence effects:	163
P3D turbulence settings	163
Weather addon settings	163
FMC SAVED FLIGHT PLANS AND COMPANY DATALINK.....	164
Flight plan file management:	164
Loading flight plan files	164
Saving flight plan files	166
Weather Forecast Data	167
UPDATE SUPPLEMENT	171
HDR Adjustment Function:	171
Data Functions:	171
Route Handling:.....	172
Setting the Payload:	172
PMDG 747-8 SUPPLEMENT	173
Requirements:	173
Systems:	174
GEnx Engines:.....	175
Avionics:.....	175
Electronic Checklists:	176
Radios and Other Interfaces:	179
Vertical Situation Display:.....	180



INTRODUCTION

Airport Map Display:	181
Electronic Flight Bag:.....	183
CUSTOMIZE YOUR PMDG 747-8 EXPERIENCE:.....	184
PMDG SETUP MENU:.....	184
EQUIPMENT Option Pages:.....	184
PAGE 1/19 - ADFS.....	185
PAGE 2/19 - ELECTRICAL.....	185
PAGE 3/19 - EGPWS.....	185
PAGE 4/19 – EGPWS 2.....	186
PAGE 5/19 – EGPWS 3.....	186
PAGE 6/19 – EGPWS 4.....	186
PAGE 7/19 – FMC DATALINK	186
PAGE 8/19 – FMC DATALINK 2	187
PAGE 9/19 – FMS.....	187
PAGE 10/19 – FMS 2.....	187
PAGE 11/19 – FMS 3.....	188
PAGE 12/19 – FUEL & WT/BAL.....	188
PAGE 13/19 – INSTRUMENTS.....	188
PAGE 14/19 – MISC	188
PAGE 15/19 - PACKAGES	189
PAGE 16/19 – PACKAGES 2	189
PAGE 17/19 – PANEL OPTIONS.....	190
PAGE 18/19 – WARNING SYS	190
PAGE 19/19 – WARNING SYS 2	190
DISPLAYS Option Pages:.....	192
PAGE 1/6 – UNITS.....	192
PAGE 2/6 – PFD	192
PAGE 3/6 – PFD	193
PAGE 4/6 – ND.....	193
PAGE 5/6 – ND.....	193
PAGE 6/6 – EICAS.....	194

**INTRODUCTION**

PMDG Rain Maker:	195
What is RainMaker?	195
Using RainMaker	197
ACARS & PMDG Global Flight Operations:	198
What will ACARS / Datalink Do?	199
What will PMDG Global Flight Operations add?	199
Loading a RTE via Datalink	199
Using the ECL Cursor Control	202
Things the beta team wanted you to know:	206



THE TESTING TEAM

We take great pride on the cohesion and dedication of our testing team members, and we place significant demands on their time, their expertise and occasionally their patience.

We would like to thank the following individuals for their contributions to the **PMDG 747-400 Queen of the Skies II** project as Technical Advisors:

David Andrews	Stephen James
Andrea Biancucci	René Moelaert
Allan Burek	Douglas Moran
Nathan Coats	Alexei Nicolov
Michael Codd	Bryan Rosier
Jose Cortes	Matt

We would also like to thank our dedicated team of wide beta testers who have worked tirelessly to help us improve the quality of this product. Any lapses are ours:

Mark Adeane	Chris Makris
Carl Amari-Cooper	René Pedersen
Michael Cubin	Steve Perry
Aaron Buchanan	Mike Ray
Evangel's Dokos	Jean-Remy Ragaru
Dan Downs	Mike Roth
Jhan Jensen	Randall Smith
Mats Johansson	Evan Veal
Sven Kubusch	Kyle Weber
Tom Landry	Jane Rachel Whittaker
Pete Locascio	Peter Wright
Mike MacCulloch	Sims

**INTRODUCTION****PMDG TECHNICAL SUPPORT**

PMDG employs a ticket-based support system that allows us to provide you with direct, personal attention from a tech support analyst. If you have trouble with this product, we encourage you to visit our technical support portal:

<http://support.precisionmanuals.com>

Our policy on answering support tickets is that you should receive a reply from us within 24-48 hours, depending on the type of request you submit.

Our average reply time to tickets is generally less than 6 hours and our support team is dedicated to getting you up and running as quickly as possible.

Please Note: The support ticket system will require you to create a login that is unique to the ticket system and is not tied to your PMDG Store login.



IMPORTANT – READ THIS PAGE

- **Please read pages 21 through 37 of this manual even if you don't intend to read anything else in it – they contain very important mandatory P3D settings and recommendations for proper functioning of the product.**
- Installation and license activation instructions are on page 22 of this document.
- Liveries are downloaded and installed (among many other functions) through the **PMDG Operations Center** application, which is installed automatically with the **PMDG 747-400 Queen of the Skies II**. You can find it in your Start Menu under PMDG Simulations/PMDG Operations Center.

Note that an Operations Center update may be triggered the first time you run the application – this is normal and is required.

The Operations Center has its own separate manual, which can be found on the About PMDG Operations Center page via the link on the left side of the main screen of the program after it runs.

- Full documentation for the aircraft including the Tutorial flight that explains how to operate and fly it can be found in the PMDG Operations Center application by selecting the 747 product from the main drop down menu and then choosing the Documentation module from the menu on the left side.
- Payload and Fuel loading and aircraft options selections are handled through the FMC directly by pressing MENU > FS ACTIONS and PMDG SETUP. There are no external load or fuel managers for this product. Do not modify payload or fuel with any other method than the FMC pages described above.
- If you need to reinstall your operating system, are upgrading your hardware, or are installing on a completely new computer system, please deactivate your license manually first through the FMC on the MENU > PMDG SETUP > LICENSE page. This will eliminate the need for you to submit a support ticket for license reactivation after you reinstall.



INTRODUCTION

THIS IS NOT JUST ANOTHER BOEING

What can possibly be said about the Boeing 747-400 that hasn't already been said?

The airplane is an icon within a class of icons. The 747-400 is easily the most recognized airplane in the world, even among people who do not enthuse poetically about airplanes.

When we released our first rendition of this airplane back in 2005, it was the first time a fully animated virtual cockpit had been used in a major airliner study simulation for desktop simmers. Looking at that product through the prism of a dozen years, the product looks quaint. Almost folksy.

Especially compared to this, the PMDG 747-400 Queen of the Skies II.

You will notice a bit of product branding schizophrenia in our references to this product. To help it all make sense, it helps to understand that our first version of the 747-400 Queen of the Skies was created for use with Microsoft Flight Simulator 2004. A few years later, we released version 2 of our 747-400 simulation for use with FSX. In doing so, we dropped the "Queen of the Skies" moniker in favor of calling it the 747-400X, in a tip of the hat to the X in "FSX."

With the 747-400 slowly fading from mainline passenger service, we felt it was important to recognize her role as the world's aviation ambassador by bringing back the "Queen of the Skies" moniker and thus v3 of our 747-400 simulation can either be known as PMDG 747-400V3 or PMDG 747-400 Queen of the Skies II.

Do not over-think it. What is truly important is that you get the product installed and jump in to see just how far the state of the art simulation produced by PMDG has progressed in the last dozen years.

Just about everything in the 747-400 product line is simulated. Engine variants, airframes, optional equipment and changes to the design and operation of the airplane throughout its storied career are all packed into this simulation.

Hundreds and hundreds of equipment options, hundreds and hundreds of simulated failures. More than a dozen airframes, brought to life by thousands of animations and more than 1,440 sound files, designed to play/layer and interact in such a way that it really brings the entire airplane to life. From the first press of the battery switch to hearing the

INTRODUCTION

engines spool down at the conclusion of the flight, this is by far the most complete all-around simulation of the entire airplane that you can buy for desktop use.

In fact, many of the things we bring you in this simulation cannot be included in anything short of buying your own 747-400 and flying it around the world. Take some time to marvel at the sophistication and detail of the external model, the actuators and fairings and flaps and spoilers and gear doors. All of it is animated accurately, with many tiny details hidden for you to discover.

In both the internal and external sound environments, you will notice that the sounds produced by the simulation match those produced by the airplane when such things as packs, pneumatic pumps, or pneumatically driven leading-edge devices are moved.

It is all there, in a single package for you to enjoy.

This product also marks the unveiling of our entirely new physics engine that changes the way we approach modeling things such as brakes, temperatures, inertial effects, shaking, sound generation, structural flexing and the like. We tried to come up with a catchy-sounding brand name, but in the end we found it felt sort of silly to try and brand name bringing you a tremendous level of accuracy, just as PMDG has always done.

The PMDG 747-400 product line is a unique in the ability to accurately portray not just the “book values” of a particular airplane, but also the nuances and subtleties of the 747 airplane that are normally unavailable through manuals and guesswork. Experienced aircrew will notice hundreds of subtle details lending themselves to a complete and satisfying simulation experience. (We have compiled a list of such behaviors for you in this document!)

To this end, we have gone to great lengths to simulate the sophisticated environment that is the modern airliner cockpit. Using many of the same tools employed to teach pilots and mechanics how to support the 747 airplane, we have worked to build a simulation that capitalizes on the strengths of the simulation environment while simultaneously working around the simulator’s weaknesses through the use of innovative technology and development.

Invariably there have been times when we needed to make choices between realism and usability. While Microsoft Flight Simulator is a wonderful and dynamic platform for modeling airliners, there are some aspects of Microsoft Flight Simulator that just do not function as well as



INTRODUCTION

we would like, and we have worked hard to overcome them while also enhancing the realism of the PMDG 747-400 experience. To the greatest degree possible we have attempted to document these shortcomings within this manual.

The PMDG 747-400 is an extraordinarily complex simulation platform and we have compiled this documentation in order to provide you with the best information to help you learn how to operate this simulation effectively. We recommend that you read through these documents without trying to retain all details on the first read. It is our experience that even seasoned airline pilots will gain the most from skimming their manuals repeatedly over many months in order to learn everything that is required of them in a new airplane.

We recommend that technique to all PMDG customers as well. Read, learn, and enjoy the results of our hard work!

If you need help or require assistance, please use our support ticket system mentioned earlier or visit our user-to-user customer forum hosted at <http://www.avsim.com> in the forum section. The PMDG forum is the best place to converse with like-minded PMDG customers and to learn new tips and techniques to operating a complex airliner like the 747!

The release of this product brings many of us at PMDG full circle to the airplane against which we feel we began to earn our reputation for incredible detail and accuracy. This simulation took three long years to create, but along the way we never doubted for a moment that the result would be the finest 747-400 simulation you could get your hands on. We do not feel she is finished, by any means, as we still have some new features and functions that will be added in the coming weeks and months. Without your dedication to our products, and to this hobby as a whole, we simply would not have a reason to do what we do. We cannot thank you enough for the opportunity your enthusiasm represents to all of us at PMDG.

So please let us say without qualification: Thank you.

On behalf of the entire team,

Thank you!

The PMDG Development Team
15SEPT18



GETTING P3D SET UP FOR THE PMDG 747-400 Queen of the Skies II

There are hundreds of thousands of possible hardware setups upon which you might run P3D and the **PMDG 747-400 Queen of the Skies II** so it is important that you take a few moments to be certain that P3D is properly set up to run this advanced airliner simulation in top form.

The following recommendations have been created by our support team and are based upon years of helping customers get the most from their PMDG products.

Yes, You Really Should Read This:

During the beta testing period for the **PMDG 747-400 Queen of the Skies II**, without fail, all of the testers who took the time to follow this section's recommendations to improve P3D performance were very pleased with the results.

Even if you have fast hardware, there is something to be gained by following these instructions to get P3D set up and operating effectively.

Also, we STRONGLY discourage users from trying to “beat the (Windows) system” by disabling services and “turning off functionality” within Windows.

The services running on your local machine serve a purpose and providing that you have properly maintained your Windows installation and you follow the guidelines we present here, turning off services is not going to give you much in terms of performance.

It is important to note that PMDG is using the FlexNET Licensing Service and if you turn this off, the **PMDG 747-400 Queen of the Skies II** will cease working.

In short, leave the services alone...

You can gain far greater performance by running Windows 10 64-bit, and by following experienced guidance for optimization, no matter what operating system you use!



INTRODUCTION

Proper Installation:

When you run the **PMDG 747-400 Queen of the Skies II** installer, it is going to ask you whether or not you should install a few Microsoft runtime libraries on your local machine. The sub-installers for these runtimes are intelligent, and they will only install if your local machine NEEDS the installations- so please do not try to second-guess the Microsoft runtime installers. Select YES, and let the installers determine whether or not you need updates to your machine.

Failure to install the required runtimes will lead to unreliable operation of the **PMDG 747-400 Queen of the Skies II**.

Product Activation:

The **PMDG 747-400 Queen of the Skies II** requires an active internet connection to activate the product. Upon first run of the aircraft, a window will appear asking for your license key. This key can be found near the bottom of your purchase confirmation email or attached to the inside of your CD/DVD case. It is a long string of 6 groups of letters and numbers that looks like this:

3P44-XXXX-XXXX-XXXX-XXXX where the Xs are letter or number characters. There is no letter "O" in our keys, it is always the number zero.

Like the **PMDG 777**, the **PMDG 747-400** allows for user-initiated activation returns. To access this function, press MENU on the CDU, then PMDG SETUP, then LICENSE. The prompt is on this page along with one that will show you your key in case you need it for support.

Please make use of this feature when reformatting, changing hardware or PCs and so on.

Optimal Installation of P3D:

Please Note: If you already have P3D installed, you will find the recommendations in this section to be useful the next time you purchase a new computer or conduct a new-machine installation!

- Do not install P3D into the default installation folder: When installing P3D, do not install the simulator into the default directory that it offers. Instead, customize the folder to something different (such as C:\P3D). This will eliminate problems that many users experience resulting from various Windows protection and



INTRODUCTION

permission issues forced upon programs placed in the Program Files and Program Files (x86) folders.

- Choose a modern, 64-bit Operating System: We strongly recommend that users run their simulator from a 64-bit operating system. The best operating system currently available (at time of writing) for P3D is Windows 10 64-bit. The advanced memory management capabilities of modern operating systems are far superior when running complex simulations such as the **PMDG 747-400 Queen of the Skies II**. (More on this a bit later in the section about out of memory errors and VAS on page 29.)
- PMDG has experienced numerous issues with the Windows 8/8.1 platform since its release and we do not offer any official support for these operating systems. We have seen the **PMDG 747-400 Queen of the Skies II** work simply fine in Win8, but we have also seen inexplicable strange problems result on it as well. If you would like to try it, it is at your own risk and we cannot provide support for it.

If you do decide to try it, keep these guidelines in mind:

- Disable User Account Control (UAC). This requires registry editing in Win8 to completely disable. We cannot offer instructions on how to do this. Search online for it.
- Make sure P3D is installed in its own folder such as C:\P3D, not the default location where the OS's permissions issues with this folder can become a problem.
- Always run P3D with the right click "Run as administrator" option as described below:

Running P3D:

- Set P3D to "Run as administrator." This will give P3D the best opportunity to use system resources effectively and without limitations. To do this, right click on the P3D icon, and then select properties. Click on the Advanced button, and then check the box that reads: Run as administrator. From this point onward, whenever you run P3D, the program will run under the administrator permissions group. (You can also follow these steps by right clicking directly on P3D.exe).
- Do not let your antivirus software actively scan P3D: While we are all concerned about the prevention of malware, it is extremely



INTRODUCTION

important that you allow your P3D installation to “opt out” of being actively scanned for viral activity while the software is running.

P3D loads thousands upon thousands of graphic files and models into memory while you are flying, and active malware scanning slows this process dramatically. In some cases active scanning can reduce your simulator performance by up to 75%.

There are too many antivirus suites out there to make recommendations for each one, but if you search for “exclude” in your software’s help system, you will find instructions. Simply EXCLUDE your P3D root directory and you should be all set!

Do not forget to manually run a malware scan on your P3D directory on occasion just to keep you safe!

P3D.CFG Settings:

Lockheed Martin has created a short guide on tweaking the Prepar3D.cfg file available here:

http://www.prepar3d.com/SDKv2/LearningCenter/getting_started/performance/tuning_guide.html

In the [Main] Section:

If you are getting out of memory errors in P3D, adding the following line can help with it according to the development team at Lockheed Martin:

- AlwaysFullLoad=1

This forces the simulator to completely unload all of its data when the flight is reset or changing airports.

UIAutomationCore.dll fix:

We highly recommend the use of a replacement uiautomationcore.dll file if using Windows 7 64-bit. The Windows 7 version of the file is bugged in conjunction with P3D and can cause the sim to crash after repeated menu use over a few hours of flying.

http://downloads.precisionmanuals.com/file_library/UIAutomationCore.zip

Extract the DLL contained here into your P3D root folder, the sim will reference it instead of the bugged Windows 7 default version.



P3D tweaks:

There are numerous tweak guides and websites out there in the P3D community that can help you to get more performance out of the simulator. We recommend reading up on these at the AVSIM forums and deciding for yourself which performance tweaks you would like to use.



INTRODUCTION

P3D In-Game Settings:

We recommend the following settings to help you get the most out of P3D.

Graphics Page:

- Wide-view Aspect Ratio – Check this box if you are using a monitor with a widescreen aspect ratio. This setting locks the vertical field of view and allows for additional horizontal field of view. If the simulator looks highly zoomed in with all the default views, having this setting off is probably the culprit.

General Page:

- Program>Show Scenario Startup Screen – Check this box to ensure the sim loads up on the Scenario screen that lets you select your aircraft, airport and runway, weather, time of day etc. when you first load P3D.
- Program/Panel Serialization – Set this box to off when using the 747 since we perform our own custom panel state save and load operations.
- Information Text>Show cockpit tooltips – set this box to checked on to assist with special knob functions and hidden click spots.

Traffic Page:

The settings you will want to use for managing aircraft and vehicle traffic within the simulator will vary depending upon whether you use a third-party program to produce aircraft traffic within the simulator or whether you use the default P3D mechanism.

Please understand that AI traffic density can have a huge impact on performance, especially at congested airports. We recommend that you experiment with the settings a bit to find the correct balance of traffic density vs. performance for your machine.

You may find that in order to maintain strong performance in high density traffic areas you need to reduce the traffic density settings slightly.

For land and sea traffic, we generally recommend setting these sliders to “around 15-20%” for realistic results. Higher settings will not necessarily improve the visual quality of the simulation enough to compensate for the impact on performance.



Scenery and Lighting Page:

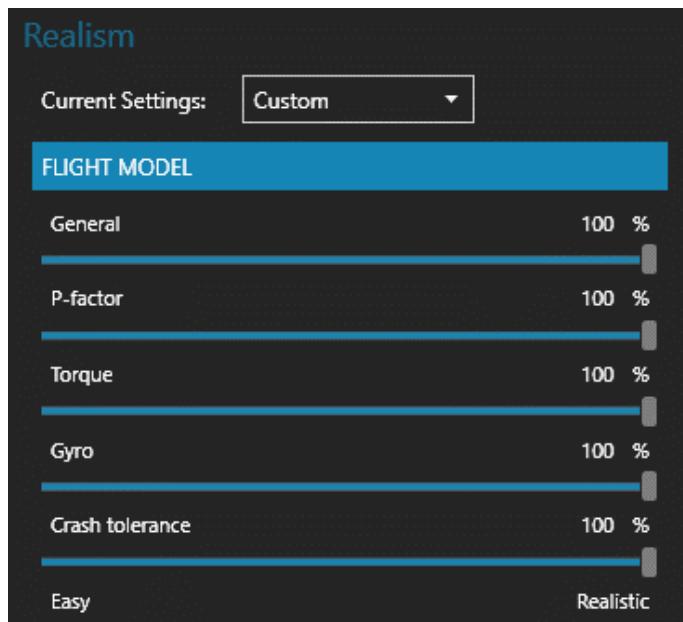
- Bathymetry – turn this off when operating aircraft in P3D. Bathymetry is the terrain under the surface of the ocean. P3D supports submarine simulations and you don't want invisible terrain mesh rendering under the water while you're flying an aircraft.

If you are experiencing poor performance, the scenery and lighting pages are one area where you can gain quite a bit of bang for your buck for even small reductions in your P3D scenery settings.

In our experience, customers who are suffering from poor performance are generally expending huge quantities of processor and memory capacity by having settings that are set too high for their hardware capability. Note: See the section on aircraft “bouncing” on page 48 if you experience this with a mesh setting above 19m.

Realism Page:

We recommend that you set all of the flight model sliders to the right in order to experience the best level of realism when flying the **PMDG 747-400 Queen of the Skies II**.





INTRODUCTION

Pay particularly close attention to the settings displayed in the graphic below. All the boxes in the ENGINES and FLIGHT CONTROLS window should be cleared if they are checked. ATTACHEMENTS refers to military aircraft stores stations and should remain checked when flying a civilian aircraft like the **PMDG 747-400 Queen of the Skies II**.

CRASHES AND DAMAGE

Ignore crashes and damage
 Detect crashes and damage
 Vehicle stress causes damage
 Allow collisions with other vehicles
 Ignore avatar collision

ENGINES

Enable automixture
 Unlimited fuel
 Engine stress damages engine

SPECIAL EFFECTS

Visualize G-effects
 Visualize Momentum Effects

FLIGHT CONTROLS

Use Autorudder

ATTACHMENTS

Ignore weight
 Ignore forces

NOTE: G-Effects can be set to the pilot's preference.



VAS management – stopping out of memory errors:

We would like to acknowledge P3D community member Srdan “Kosta” Kostic’s research into the OOM problem and VAS usage on which a good portion of this section of the manual is based.

Background and theory:

P3D is a 32-bit application. Even under the recommended Windows 10 64-bit operating system, the Prepar3D.exe process always faces the same mathematical limitations that all 32-bit applications do. One of these is a 4GB hard limit on something called “virtual address space” (VAS). When P3D crashes with an error message saying that your computer has run out of available memory (commonly called an “OOM” in the sim community), it’s actually talking about VAS, not physical memory like the amount of RAM in your system. Customers who have huge amounts of RAM like 16GB or 32GB are often baffled by this message for good reason – they certainly aren’t running out of physical memory. Microsoft probably should have made the error say, “The application has run out of virtual address space.” instead of the vague “memory” term.

VAS is effectively a pre-allocation of everything the simulator can potentially access during a flight and will fluctuate over the course of using the simulator as you fly between different areas. Note that VAS is *NOT* the same thing as the “virtual memory” swap file that you can set the size of in the Windows system options – they are two very different things and having a large virtual memory swap file does not protect you from the 4GB VAS limit. The mathematical limit itself comes from the definition of “32-bit” – a bit is the most basic data structure in computer science and it can have two values, a 0 or 1, which can mean all sorts of things like true or false, on or off, etc. Therefore, at the core a computer executes “binary” code. The amount of VAS a 32-bit process can access can be calculated by raising the number of possible values for each bit (2) to the power of the number of bits available (32). So, 2^{32} equals exactly 4,294,967,296 bytes (not bits). When you do the rest of the conversion math this value comes out to exactly 4 gigabytes of potentially addressable memory for a 32-bit process.

The reason we recommend using a 64-bit operating system like Windows 10 64-bit is because it can give P3D.exe that entire 4GB block of VAS. In 32-bit Windows the default is a maximum of 2GB of VAS for P3D and 2GB reserved for the operating system. This can be increased to 3GB for P3D through an edit to the boot environment configuration (“the 3GB switch”), but this is still 1GB lower than you’ll get with the 64-bit version of Windows and it makes both OOMs more likely and OS crashes more likely because it reduces the amount of VAS the OS itself has to work



INTRODUCTION

with. 32-bit versions of Windows can also only ever access 4GB of total physical memory, so if P3D is using 3GB itself, there is not much there for the OS and other applications. 64-bit Windows does not have this limit and with a lot of RAM you can essentially run as many other applications outside of P3D (browser, weather apps, flight planners etc.) as you want with no effect on the system. There is literally no reason not to run the 64-bit version of Windows 10 on a P3D simming PC.

If you would like to read more in depth about VAS and the other types of memory used in Windows, Mark Russinovich's blog has an excellent series of articles that detail it:

<http://blogs.technet.com/b/markrussinovich/archive/2008/11/17/3155406.aspx>

Mark is the author of the Process Explorer tool below, a member of the Windows kernel design team at Microsoft, and one of the most knowledgeable people in the world on how Windows works.

Using Process Explorer or FSUIPC to monitor VAS:

With the proliferation of so many high detail aircraft and sceneries for P3D in recent years, the sim can easily approach and in many cases exceed the 4GB VAS limit. As the sim approaches the limit, very odd things start can start happening like disappearing scenery, disappearing or transparent visual models on the aircraft, flashing artifacts, long pauses and so on. If it exceeds the limit you will get the OOM error window or the sim will just crash to desktop (CTD) without any error message at all.

If you are having VAS issues, the first step is going to be to determine how much VAS P3D.exe is actually using throughout your flight. Fortunately, Microsoft has a tool that allows you to do exactly this called Process Explorer – you can download it here:

<http://technet.microsoft.com/en-us/sysinternals/bb896653.aspx>

Once you have it downloaded, unzip the files to a folder of your choosing and run the proexp.exe file. You're going to see a rather bewildering looking list of all the processes running on your computer with various columns full of parameter values that are constantly updating.

The first thing you're going to want to do is enable the VAS display – to do this, right click in the area where the column names are and choose “Select Columns”. Go to the “Process Memory” tab in the window that pops up and put a check mark next to the one called “Virtual Size” and press OK. This is going to enable the column, but it will likely be at the far right of the Process Explorer display. I recommend maximizing the



window and then dragging the Virtual Size column over so that it's right next to the CPU column so that you can easily see it. Click the top of the column where it says "Virtual Size" until you see a downward pointing arrow, which means the list is now sorted with the highest VAS using applications first in the list. You can now resize the window to a more manageable size.

Now run P3D and monitor this number for the P3D.exe process while you use the simulator. It should quickly move to the top of the Virtual Size column as the sim loads. If you see it start to get close to 4,194,304K (this is 4GB in kilobytes) – you know you have a VAS problem.

If you have a registered version of FSUIPC, you can place a very handy free VAS meter into the P3D window's title bar by going to the Logging tab and then entering into one of the lines of the "Specific value checks" section the Offset 024C and Type S32. Check FS Title Bar in the "Display to" section below it. Press OK and you will see a readout of the free VAS in kilobytes in the title bar. FSUIPC will play a Windows "ding" sound if the sim is getting close to an OOM error. This is a good time to save your flight.

Causes of high VAS usage:

The **PMDG 747-400 Queen of the Skies II** aircraft itself uses approximately 700 to 800MB of VAS based on our testing, split roughly equally between the VC and external models and the aircraft systems programming. This is in line with other high-end addons aircraft on the market and is not excessive given the advanced capabilities of the product. Great care was taken to optimize and not increase the VAS load of the aircraft beyond what is necessary to simulate it properly. Here are some of the more common causes of high VAS usage we've identified:

Large amounts of photo scenery areas

Products that install photo scenery for whole US states or whole European countries are a particularly high source of VAS usage when a lot of them are enabled at once. There are several such packages on the market and all of them will exhibit this issue. P3D unfortunately allocates VAS for these areas even *if you are not flying over them and never go near them*. We have observed almost instantaneous OOM errors upon loading our products on customer PCs where they had for instance the entire eastern United States photo scenery installed. Disabling the photo scenery reduced the total VAS load by well over 1GB and allowed the simulator to function normally. Users have reported success with photo scenery and our products by enabling only the states or countries their



INTRODUCTION

route passes over. Use Process Explorer to monitor VAS and see if this works for you.

To the best of our knowledge the reason this happens is because photo scenery uses a unique texture for every single area within it. Normal P3D scenery uses a small group of textures that get repeatedly used via the landclass system. Having to precache and allocate for the presence of that many textures is likely at the root of the problem.

Here is a link to a good open source utility called SceneryConfigEditor that will allow you to make groups of scenery areas that you can turn on or off with a single click:

<http://sourceforge.net/projects/fs-sceditor>

High amounts of AI traffic

Be reasonable with the amount of traffic you are putting into the simulator. Often the high 100%-type levels become unrealistic anyway from the fact that P3D's ATC system bunches them up and cannot handle vectoring them all. You end up with a ton of go-arounds, a massive line for takeoff and so on. That many airplanes also eats into the VAS allocation. Again, this is not dependent on the specific traffic product you are using.

Ultra high resolution environment textures

Many “environment” type addons (as with the photo scenery and traffic there are several of these available) contain options to install very high-resolution textures for things like clouds, water, runways and taxiways and so on. It is our experience that these maximum resolution textures often increase the VAS load disproportionately to the amount of visual improvement they provide. A 4096x4096 resolution texture contains 16 times the amount of pixel data that a 1024 resolution version of the same texture does. The 1024 or 2048 versions of the textures you are installing are likely going to be visually indistinguishable to you from the maximum 4096 version and they will result in both lower VAS usage and lower GPU memory usage.

Prepar3D.cfg Level of detail radius value

Some tweak guides recommend increasing this setting in the P3D.cfg file above its normal 4.500000 maximum value. While this does improve visual detail into the distance, that improvement comes at the expense of increased VAS usage because P3D must load in more autogen, more high detail mipmaps for textures etc. Leave this setting at 4.500000 unless you are actively monitoring your VAS usage and are sure that setting it higher isn't putting you into OOM territory.



Autogen, water, weather

The usual culprits for lowered performance in P3D also are the main drivers of VAS usage. Lowering them can significantly reduce the VAS load if you have exhausted the other possibilities.

High detail addon airports

Since 2013, we have observed several recent addon airports using upwards of 1GB of VAS as they come into view.

Flying a lot of legs without shutting the simulator down:

P3D appears to not fully release the contents of scenery areas that have been used during the session. We have observed OOMs happen when flying around to a bunch of different high detail airports over high detail terrain all over a long period of time. To avoid this simply save your flight after landing and shutdown, close P3D, and then reload it and your flight and you should be in a reset VAS state.

Using the sound preload options:

The 747 has options that allow for the caching of sound files in memory. This was done in attempt to eliminate the stuttering that some users have experienced as sound files load. If you are having OOM issues, we recommend selecting the default NONE option. This will only load sounds into memory as they're needed and releases them from memory 60 seconds after playback. This will significantly reduce the VAS load vs. the SELECTIVE or ALL options. (See page 58 for more information about this feature.)

Conclusion:

There are real limits in the 32-bit P3D environment that you must be aware of and manage. It is likely impossible for you to run every high-end aircraft and scenery addon all together at their maximum settings without making compromises to stop the OOM error from happening. It is up to you to decide what is most important to you and prioritize between different addons using the tools outlined here.



INTRODUCTION

THE PMDG 747-400 AND FLIGHT-SIM HARDWARE/SOFTWARE

When modeling advanced aircraft systems to the degree that we like, we often find that it is necessary for us to “take control” of various aspects of the simulator in order to force the results that are needed in the interest of realism.

Conflicting Software:

One classic example of this “taking control” relates to the fuel system on the airplane. Without getting into complex details, the fuel consumption/management process that is at the core of P3D is based on the theory that all fuel tanks are stacked vertically with a standpipe running between them. This, combined with the fact that the engine fuel consumption model used by P3D is far from accurate for a turbine gas generator engine (modern turbofan!) means that we must engage in some very complex adjustments to make certain that the fuel management and consumption logic in during the course of your flight results in accurate fuel behaviors.

For this reason, our simulations are generally not compatible with any virtual airline software that monitors the level of fuel in the tanks and deducts “points” for changes to the fuel value. We recommend disabling any such features or encouraging your virtual airline programmers to contact us for guidance on how to work with this advanced feature within the PMDG simulation product line.

Hardware SDK:

A challenge faced when creating highly complex add-on aircraft for P3D is making certain that our simulation product will be compatible with the broadest swath of flight simulator controls and hardware as possible not just for today's users, but for users three years from now.

There are literally thousands of flight sim controllers and hardware pieces available and it is impossible for us to test the **PMDG 747-400 Queen of the Skies II** with every possible configuration.

In addition, PMDG's products are extremely complex and to a large degree we are using P3D primarily as a world platform for a highly complex external simulation that is running side by side with the P3D platform.



INTRODUCTION

This means that there are circumstances where we choose to work around the standard P3D control interfaces because they are inadequate to simulate completely the complex environment of a modern airliner cockpit.

Our goal is to allow hardware manufacturers and intrepid users to create their own drivers so that their hardware can be made compatible with our software. We have included a Software Development Kit (SDK) that allows hardware manufacturers to independently create drivers to ensure the highest degree of compatibility.

The only restriction that we place on developers is that these drivers must be provided at no cost to their customers. SDK documentation and code examples are included in the <P3D root folder>\PMDG\PMDG 747 QOTS II\SDK folder.

FSUIPC users:

The goal of the developers was to create greater interoperability between the P3D platform and add-on developers like PMDG. In theory this should all but eliminate the requirement for users to install and use FSUIPC as an interface between complex add-ons and the P3D platform.

Like most things in the FS world however, the skills of developers like Pete Dowson continue to play an extremely valuable role in the way many add-ons interact with P3D.

Many users have found that FSUIPC continues to provide value for improving the P3D experience by smoothing control axes, wind shifts in weather, etc.

During testing, we came up with some general recommendations that we felt were important to pass along:

- The **PMDG 747-400 Queen of the Skies II** is fully compatible with FSUIPC **except** that we recommend that you do not calibrate your flight controllers through FSUIPC. We recommend that you use the driver/software that comes with your hardware. (Calibrating through FSUIPC may not cause any problems, but in certain circumstances with certain hardware we found that problems existed that could only be resolved by having the user conduct the calibration via the driver/software.)



INTRODUCTION

- During testing we have found that in **extremely rare** circumstances, users with FSUIPC installed would need to delete their FSUIPC4.ini file after installing the **PMDG 747-400 Queen of the Skies II** in order to get everything playing well together. We recommend that you try this if it seems the 747 is not behaving normally after installation. If you see strange issues with engines not producing thrust despite looking like they're running or the aircraft climbing with an unusual nose-down attitude, this is probably the cause.
- Please ensure that you have the latest version of FSUIPC installed – during our testing process, an issue was fixed that caused the mouse cursor to flicker when using the 747's ECL system. If you see this, make sure you have the latest FSUIPC!

In all cases, any “disagreement” between the PMDG 747-400 and FSUIPC was corrected by simply deleting the FSUIPC4.ini file and allowing them to regenerate.

We continue to explore ways to make the **PMDG 747-400 Queen of the Skies II** interact more smoothly with FSUIPC and we'll make those changes available as they are finalized. Both FSUIPC and the **PMDG 747-400** are trying to accomplish the same goals and following the above recommendations should keep you out of trouble.



KNOWN P3D'isms TO AVOID:

The best way to think of the **PMDG 747-400 Queen of the Skies II** is to approach it in terms of a stand-alone simulation that is using your P3D installation in order to provide a world in which to simulate the 747's flight operation.

We have put a tremendous amount of time and energy into make certain that this experience is as seamless as possible, but occasionally we find unintended consequences of our efforts to provide you with the most accurate simulation possible.

A few notes to keep you from running into trouble:

- There is a common misconception that when loading a complex simulation like the **PMDG 747-400 Queen of the Skies II** that you should first load the default Cessna into the simulator, then load the **PMDG 747-400** on top of it. This is not a factual conception and in fact we do not recommend the practice at all. What is required however is for a default aircraft to be your default startup flight in P3D. The reason for this is that this flight actually loads in the background invisible to the user – if it's set to a complex addon it can result in the inability to set certain internal variables that the 747 relies on until the simulator is restarted.
- One shortcoming of all PMDG products for P3D is that our products do not like to be “reloaded” on top of themselves. This means that if you have one livery or variant of the airplane selected and running within the simulation world (say, a 747-400) and you wish to change liveries to a different 747-400, you will need to shut down the simulator and then select the new variant or livery you wish to switch to from scratch. If you load a 747 livery or variant on top of itself you will see strange issues in the cockpit, P3D may CTD or otherwise crash, etc.
- Setting the **PMDG 747-400 Queen of the Skies II** as your default flight can cause the same behavior described above from reloading it on top of itself. The default flight is loaded in the background as you start P3D and thus if the 747 is your default flight and you then select another variant, it loads on top of itself even though you may not actually see it happen. Keep the default flight as one using a default aircraft and you will not have any issues with this.



INTRODUCTION

- When flying over the ocean, there is a bug in P3D that can cause the displays to freeze in place. It happens as a result of passing through the “Tower” view preset when outside of the range of any suitable actual tower. Flip back between the “Cockpit” and “Virtual Cockpit” views and it should clear. To avoid this, use the right click menu to select views directly, instead of cycling through the views using the S and A keys on the keyboard.
- We do not recommend the use of “DLL injection” to modify the simulator’s graphics capabilities. This includes ENB Series, SweetFX, FXAA Injector etc. While the effects these DLLs can add are very impressive, they often destabilize the simulator and cause crashes. If you use these, you do so at your own risk. If you are experiencing strange crashes or anything like that, remove any DLL injection files you’re using and see if the problem goes away.
- We have modified the functionality of the P3D default “B” key that sets the altimeter. When pressed above transition altitude, it will now preselect the local ground level altimeter setting rather than directly setting it. This makes it easy for you to switch over correctly as you descend through your transition level.



HOW TO USE THE MANUALS

The **PMDG 747-400** comes with four documents:

- **PMDG 747-400** Introduction (You are reading it now!)
- **PMDG 747-400** Tutorial #1
- **PMDG 747-400** Flight Crew Operations Manual
- **PMDG 747-400** Quick Reference Handbook

Taken altogether, this can seem like an intimidating amount of information, but the point that we want to make most clearly is that *if you can fly the default airplanes, you can fly the PMDG 747-400!*

We have created a truly scalable experience for simmers who love the 747. If you want to just push up the throttles and fly, you can do this. If you want to dive as deeply into the details as a career airline pilot, you can do this also. The simulation will support you no matter what your goal is for any particular simming session!

Following is a quick rundown on how to get the most out of your manuals:

Introduction:

We have put this document together in order to collect in one place as much information about how to use the **PMDG 747-400 Queen of the Skies II** as possible.

This introduction will give you some tips on how to set up P3D for optimal performance with the **PMDG 747-400** and it will explain PMDG's proprietary custom icons and cursor symbology as it is used in the **PMDG 747-400**.

The introduction document will also show you how to use the in-sim capabilities to change your cockpit layout, cockpit displays, the visual appearance of the external model, as well as the use of mechanical reliability, failures, ground services and pushback capabilities.

This document includes a list of "fun to know" quirks that experienced 747 pilots will recognize within the simulation. We thought you'd like to know just how detailed we have made your new **PMDG 747-400**.



INTRODUCTION

Tutorials:

In order to help new users, get acclimated to the capabilities of the **PMDG 747-400 Queen of the Skies II**, we have created a tutorial to get you up and running quickly.

The first part of the tutorial should be viewed as a “Quick-Start Guide” that will take you from loading the sim to launching off on your first flight in the **PMDG 747-400**. The purpose of the first flight is to keep things simple and straight forward, thus giving you the opportunity to enjoy all that the simulation has to offer without getting lost in the details!

The first tutorial will start you in a powered-up and ready-to-go 747-400 at **KDEN – Denver**, right at the foot of the Rocky Mountains. You will follow along step by step and eventually find yourself parked at **KSFO – San Francisco** nestled between the San Francisco Bay and the Pacific Ocean with your passengers deplaning!

The second more advanced tutorial will cover long haul flying and detailed EROPS planning and will be released later.

Flight Crew Operations Manual:

The FCOM is one *extremely* large book that is split into two pieces in order to make it manageable.

Volume 1 of the FCOM provides you with the following information:

- Technical Notes about the 747: These are not important to you, but they do provide a fascinating insight into the evolution of the 747 airplane since it was certified.
- Limitations: This chapter is a one-stop shop for all the limits that you should never exceed while flying the airplane.
- Normal Procedures: This section of the manual should be thought of as your “step by step detail guide to operating the airplane.” You can start with an airplane in just about any condition and the Normal Procedures will give you a step-by-step process to reaching the next phase of flight. We highly recommend loading up a “Cold and Dark” scenario and working through this chapter. This will give you an in-depth view of the detail level contained in the **PMDG 747-400**.
- Supplementary Procedures: This chapter is similar to the Normal Procedures, except that it contains procedures that you will not perform on every flight. For example, start an engine using a



ground-start-cart? The supplementary procedure for performing this task is your go-to location to find out how it should be done properly!

- Performance: This chapter contains all the published performance data that is available for the 747 type airplane. If you like to go through the mental exercise of planning your own flights down to the last detail, this chapter will give you everything you need! (Note: The performance data for reduced thrust engine types is not published and therefore is not available. All the data currently available is included in this chapter.)

The **PMDG 747-400 Queen of the Skies II** provides you with an unprecedented level of accuracy in the simulation of the mechanical systems on the 747 airplane. We have worked tirelessly with expert input, reams of data and nearly continual verification processes in order that the **PMDG 747-400 Queen of the Skies II** should very precisely behave in the way the real-world airplane behaves.

Pay attention to the small details described in this manual. You will be surprised again and again just how deep the level of simulation runs in the **PMDG 747-400 Queen of the Skies II**!

Quick Reference Handbook:

This is a document that many simmers never open, and in doing so fail to take advantage of a really fascinating part of the simulation!

The Quick Reference Handbook is, for lack of a better description, the approved method for pilots to conduct troubleshooting while flying the 747 airplane.

Inside this book are the approved procedures that you may perform in response to virtually any situation you might face. From an engine fire all the way down to a simple annunciator light in the cockpit, the Quick Reference Handbook will take you step-by-step through the process of troubleshooting, resetting and sometimes even fixing any problem that you might experience!

In the **PMDG 747-400 Queen of the Skies II** we have added the ability to activate aircraft mechanical failures for those who are interested in them. Many of these failures are quite obvious and simple to understand. Others may present various symptoms and have various different effects on your flight.



INTRODUCTION

For example, various FUEL warnings on the EICAS might be simply informational, something that requires a normal action, or it might indicate something more sinister.

How do you know the difference?

Pull out the Quick Reference Handbook, look up the warning in the index, then follow the checklist procedure!

There are many mechanical failure scenarios in the **PMDG 747-400 Queen of the Skies II** that behave this way, and learning to use the Quick Reference Handbook will help you find easy solutions to complex problems while also teaching you more about the **PMDG 747-400 Queen of the Skies II** systems than you ever thought you might learn!

We recommend you spend some time playing with the failures and exercise the Quick Reference Handbook. You cannot hurt anything, and you can always hit the reset button if you get in over your head!



THE PMDG 747-400 DIDN'T DO WHAT YOU EXPECTED?

Here is a collection of items and features that we saw during development and testing that we think might be likely to trip you up:

The plane is behaving erratically:

Over the years, many developers have gone to great lengths to add realism into the sim. The tools are wide ranging but can negatively impact the aircraft in just as many ways. Certain camera add-ons move the viewpoint to simulate turbulence/breathing/vibration, which can look like the aircraft behaving oddly, while others inject motion into the air. Other programs inject weather in odd ways, which can cause the aircraft to behave erratically, or perform poorly. When you are flying the aircraft and notice any odd behavior, it is best to try flying without one of those programs to narrow down the cause. From there, you can usually find a setting in the other program to help eliminate the issue.

I can't load full fuel:

The density of fuel will vary slightly, depending on where you are in the world. (Fuel Density is essentially the mass of a gallon or liter of fuel. This value is defined by industry standards and varies depending upon where the fuel was extracted, where it was refined and its temperature at time of boarding. None of this is important to you UNTIL you get fuel that is low density (6.4lbs/gal, say) and very warm. Suddenly you may find that you cannot load the desired fuel weight aboard the airplane because the tanks have a limited volume.

This has been modeled in the **PMDG 747-400 Queen of the Skies II**.

When you are boarding fuel, you can tell if your fuel density will prevent full weight of the tanks from being usable by looking at the density figure shown on the refueling page. In this case the density will be shown with the density value in reverse video (or a bright background behind the text). That being said, if you are in a place with poor fuel density, such as China on a hot day in August, you may not be able to get the full advertised range of the aircraft. Something to consider when planning flights!

One other item to keep in mind when you are fueling the airplane: If you are using the Ground Operations to refuel the airplane in real time, and you will need fuel to be boarded into the stabilizer tank, you must set the stabilizer to 6 degrees of trim in order to allow the refueling manifold to



INTRODUCTION

operate properly. If you forget to do this, the refueler will call you on the intercom and ask you to re-trim the stabilizer to six degrees.

Listen to the exchange of conversation between the ground crew and the cockpit, and you should be able to conduct this operation without having to look it up in the manual!

In the 737 or 777 it worked like this...:

One thing the Beta team consistently noted was that the **PMDG 747-400** is definitely not what you have become accustomed to with the **PMDG 777** or **PMDG 737 NGX**. While there are many similarities in that they are both Boeings, the differences between them are numerous enough that you will want to be wary of preconceived notions carried over from your earlier experiences with other aircraft. As an example, you may be in for a rude surprise if you are used to how the 777 will automatically configure the GENs, and then turn either the APU or engines off without verifying which source you are using.

I turned the battery on, but the plane has no power:

The **PMDG 747-400** manages power draw to ensure it has the necessary functions at all times. The aircraft is only giving you about enough power to start the APU or connect ground power. Once either one of those power sources comes online, the rest of airplane will come to life.

I connected the air conditioning unit, but no duct pressure is showing on the ECS page:

This is modeled correctly. High pressure air is being supplied directly to the mixing plenum, which is downstream of the pressure sensing units.

The Step Climb is telling me that I need to climb 4000 feet:

The default step size is ICAO, which is not the RVSM that you may be used to from the **PMDG 777**. ICAO specifies the minimum vertical separation for IFR flight as 1000 ft (300 m) below FL290 and 2000 ft (600 m) above FL290, except where Reduced Vertical Separation Minima (RVSM) apply. This means that your step size will be 2000 ft below FL290 and 4000 ft above FL290. If you wish to use RVSM separation, use a step size of 2000.



The PVD is not working / The PVD continues to move even though I'm stopped:

The PVD will only activate when:

- On the ground
- PVD system is powered
- At least two IRUs are in NAV
- ILS is tuned
- ILS signal is received
- LOC deviation is less than 2.0 degrees
- Within a 45-degree intercept course to the runway centerline

Additionally, the PVD, like the LOC indication, is based on amount of deviation, and not motion.

I turned off the autopilot, but I can't silence the alarm:

You need to press the autopilot disconnect button on your joystick (or the Z key) twice in order to silence the alarm. Make the first press, wait a second or two and then press it again. If you double-press too fast, it will not silence. Always use the disconnect button, do not use the disconnect "bar" on the MCP – you'll have the siren constantly going off if you do.

On aircraft with the RESETTABLE SIREN option set to NO, pressing the master warning button on the glareshield will not stop the alarm – this goes for any master warning in fact, not just the autopilot.

It's difficult to taxi:

One of the more difficult transitions from smaller aircraft to larger aircraft is the adjustment to the length of the fuselage. For those who have experience with the **PMDG 777**, taxiing should be relatively straightforward. Adjusting to the longer length when coming from the **PMDG 737NGX**, however, will be a slightly more difficult adjustment. The most helpful would be that you should taxi past the taxiway centerline until it is in line with the bar between the two side windows.

How do I save my route?

You must have a valid route entered and activated first and you must be on the ground. Then, go to the RTE page 1, and press LSK 4L < ROUTE SAVE. This lights the EXEC button. If you press it now, it will give the file an automatically generated name. You can also type a custom name into the scratch pad, and it will save the route under that name. The .rte files are saved to <P3D root folder>\PMDG\FLIGHTPLANS\747.



INTRODUCTION

Why are my tire rims orange?

The **PMDG 747-400** realistically models brake heating. If you are seeing the brakes glowing orange, you have definitely overused them. They will not be as effective (or effective at all) in this state and if the heat increases further you run the risk of fire and blowing tires.

You can cool the brakes this by bringing up the CDU and going to MENU/FS ACTIONS/GROUND MAINTENANCE, hit NEXT PAGE, then select COOL BRAKES at LSK 1L.

My [insert passenger/VA program here] is flagging me for excessive V/S:

A common misconception is that passengers are sensitive to vertical speed when they are not. The only difference that the passengers would note would be that their ears were popping more frequently. The departure profile is flown in a pitch-for-speed mode, where you set the throttles on the particular throttle limit and hold speed through aircraft pitch. At lighter weights, these pitch angles may be considerable. In order to reign in some of the thrust for lower pitch and vertical speed, derates may be used.

I could not get LNAV to arm/engage:

LNAV has some specific parameters that must be met in order for it to arm/engage. These are:

- To arm LNAV while on the ground: The first waypoint in your flight plan must be within 5 degrees of the departure runway course.
- To arm LNAV in flight: Requires a valid interception point for active leg, interception angle less than 90 degrees OR within 3 miles cross tracks error OR within 3 miles from active. LNAV will stay armed until interception.

The bank limiter is not working as I expected in LNAV:

LNAV uses its own auto-bank limit when turning to follow the LNAV course. It will use a maximum of 25 degrees unless in approach mode or in holding.

The mouse wheel is not working on certain knobs:

There is no mouse-wheel operation on the bank limiter, BARO or MINS knobs: they were made operable only with left/right mouse clicks on



INTRODUCTION

purpose to save you from accidentally triggering them while spinning their inner knobs with your mouse-wheel.

Pressing the RESET button on the MINS knob does not reset the mins:

This is modeled correctly. The button does not remove the numbers from the display. It simply removes the flashing amber notification. In order to clear the display, you will need to dial the value back to its minimum (click and hold the MINS knob and drag left slightly until the value disappears).

Sometimes I hear strange sound artifacts after switching views:

This is a known bug in P3D, especially with complex add-ons that use lots of custom sounds like the **PMDG 747-400**. We recommend that you press the Q key twice after switching views, as this always eliminates the problem.

I get a NAV DATA OUT OF DATE message on the CDU:

The navigation data included with the **PMDG 747-400** is provided by Navigraph and up to date at the time of release. (January 2013, the AIRAC 1701 cycle) After this cycle expires in early February 2017, you will have to upgrade for a small fee if you wish to maintain up to date real world navigation data.

This data can be purchased here:

<http://www.navigraph.com/FmsData.aspx>

If you don't care about having current data and just want to remove the NAV DATA OUT OF DATE message, you can open up the file fmc_ident.txt, located at <P3D root folder>\PMDG\NAVDATA and edit the third line - OpProgram= JAN05FEB01/17- to read a different date range that will not trigger the message.

RAAS is calling out the wrong runway numbers:

The RAAS system calls a file called runways.csv that exists in the root P3D folder. This file is generated by a program called MakeRunways.exe, made by Pete Dowson of FSUIPC fame.

It can be downloaded here:

<http://fsuipc.simflight.com/beta/MakeRwys.zip>



INTRODUCTION

Unzip it to the P3D root folder and then run the exe, it will generate an update runways.csv that should fix any problems with RAAS calling out the wrong runway numbers.

I see a large mass of TCAS targets on the ND around an airport on the ground:

This is caused by the way vehicles are simulated in ground support addons like GSX and AES (they are “aircraft” objects virtually). This should not occur unless you have increased the TCAS range settings in the options beyond what is realistic.

The aircraft “bounces” on the ground when I change views:

We have traced this issue to using a P3D Mesh resolution setting that is higher in resolution than 19m. These are the 10m, 5m, 2m, and 1m settings. This appears to be a P3D terrain engine bug and isn't something we can fix. If it bothers you, you can set the terrain resolution to 19m or lower. These are the 19m, 38m, 76m, 152m, or 305m settings.

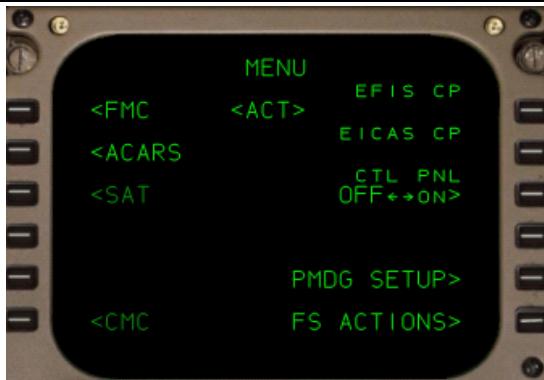
Be aware that lowering this setting can affect the use of sceneries that require the higher setting. For example, many airports require high settings to simulate taxiway bridges and similar structures. If you have high resolution terrain mesh installed this will also decrease the detail of mountains and other such features if you go below the mesh's level.

I have service based failures on but nothing ever happens:

Modern jet aircraft are extremely reliable, and most airline pilots will go through their entire careers without having a serious failure incident on their airplane. The data that the service-based failures feature was created with reflects this – these are rare events.

We recognize however that most simmers probably don't have a lifetime to spend waiting for that one-in-ten-million engine failure at V1, so to improve upon the original way this feature was implemented in the **PMDG 737NGX**, we've created a rate multiplier function that will essentially accelerate the aging of the various parts on the aircraft to give you failures more frequently.

To access this feature, bring up the CDU and then press MENU, then PMDG SETUP, then AIRCRAFT, then FAILURES. Select the ALL SYSTEMS page at LSK 2L:



When service-based failures are enabled, the RATE field at LSK 3R allows entry of any number from 1 to 1024. This will accelerate the aircraft's aging and you should see more frequent failures in terms of real usage time.

It takes way too long to enter wind predictions for a long route:

In real life, 747 pilots get their wind data sent to them over the datalink, which eliminates time consuming manual entry of the figures.

We have provided multiple ways to simulate this functionality and they are described in the section near the end of this manual.

The weather radar isn't working.

The Collins WXR-2100 simulation present in the **PMDG 747-400 Queen of the Skies II** requires the Active Sky Next or 2016 weather engine software from HiFi Technologies Inc. The reason for this is that it is the only weather addon on the market at the time of this writing that outputs a 3D precipitation dataset that we can (finally!) use to realistically simulate radar physics. This is not possible currently with the P3D default weather or any other weather addon. We will be working with other weather addon developers to integrate similar technology if they provide it within their program.

AS2016 is available for purchase here:

<https://hifisimtech.com/as16/>

I am seeing erratic changing fuel loads and autopilot issues.

There is an issue with the BIOS/UEFI clock and high precision event timer on certain recent Asus motherboards at the time of this writing. The



INTRODUCTION

timer becomes erratic or stops completely and causes issues with the aircraft systems. We use these timing functions extensively and they must be working correctly for proper operation of the airplane. Check with Asus for a firmware update and consider replacing the CMOS battery on your motherboard if you experience these issues. The problem is not specific to PMDG or to P3D and has been widely reported on the big hardware forums around the Internet. If you are building a new PC for P3D, we recommend staying away from Asus motherboards until this issue is confirmed to be resolved.

I am getting stutters when sounds load to play:

Sound preload options are available that can help alleviate this issue on certain configurations prone to it (i.e. – slower mechanical HDs instead of SSDs, lower end sound chipsets or cards etc.). These options are detailed on page 113 of this manual.



DETAILS AND QUIRKS OF THE PMDG 747-400

During the design and development of PMDG products, we integrate input from several experts and users of the aircraft. This combined with our detailed research and design process allows us to add behaviors, quirks and nuances to our simulations that add a true flavor of realism to the simulation.

These behaviors are the kinds of items that an experienced 747 pilot or maintenance technician will see and recognize them as hallmarks of a truly detailed simulation product.

The following behaviors are a non-conclusive list of behaviors that you will find in the **PMDG 747-400 Queen of the Skies II** that are simulated precisely as they appear in the actual airplane:

Air Conditioning System:

- You may think that these temperature readings on the air conditioning synoptic are a result of a simple simulation, where you set a target temperature and then simply modify the zones temperatures to eventually achieve this figure over some time. There has been always a lot more to it in all our products, simulating the whole flow path of air from engine bleed to air compressor to the mix manifold to trim air ducts etc., with all valves along the way fully simulated. What is new in the **PMDG 747-400 Queen of the Skies II** is the temperature simulation of individual zones based on a detailed heat exchange model that takes into account thermal loads such as:
 - Electric loads (e.g. operating display screens and dome/floods lighting in the cockpit, cabin lighting)
 - Supplementary heating sources (footer/shoulder heaters & windshield air)
 - Number of passengers on board and distribution to zones
 - Solar heat (areas of windows in each zone, time of day, current cloud coverage)
 - State of doors
 - Interaction conductivity of different aircraft compartments (cabin, cargo bays etc.) with exterior and between each other



INTRODUCTION

Auto-flight System:

- The autopilot/flight director system on a modern airliner is a very precise instrument, but it is not foolproof. You may see the airplane vary slightly from the desired speed, track or altitude as the airplane works to manage energy in order to accomplish the path-defined goal. It will make decisions to turn slightly inside or outside of the path, accept a slightly fast or slow condition, or even pass through an altitude slightly in order to prevent exceeding acceleration limits or engine spool up/down capabilities.
- When you press a switch on the MCP, that mode may not engage instantly, but instead will exhibit a small time delay necessary to bring all the various components through their self-checks prior to actuating.

Cockpit Shaking Feature:

- A new feature implemented for the first time in a PMDG aircraft provides the feeling of shaking of the cockpit with the associated rattling sounds under various conditions:
 - Ground roll
 - Touch down
 - Engine excessive vibration or failure
 - In-flight turbulence
 - Stall conditions (angle of attack)
 - High speed buffeting
 - Excessive g-force
 - Speed brakes application

Cockpit Displays:

- Both CRT and LCDs are modeled, with their associated visual cues. The curvature of the CRTs can be seen behind the glass pane, while the LCDs are flat and have a matte finish.
- Each display type has custom color definitions to faithfully recreate the subtle differences in how the colors appear based on the type of unit selected.



Doors:

- Most door warnings that you receive while on the ground will result from faulty, cluttered or obstructed sensors. While on the ground, cycling a door open/closed will usually cure the problem for you. If the problem does not clear, takeoff is inadvisable.
- Door warnings received in the air have potentially serious consequences. Follow checklist procedure carefully to avoid aircraft damage or loss of pressurization.
- If you allow GROUND OPERATIONS to run, the flight attendants will manage the cabin doors automatically, including the arming, disarming opening and closing of doors at the appropriate time.

Electrical System:

- You can fail any bus on the airplane and suffer the appropriate penalties as equipment powered by that bus falls offline.
- The **PMDG 747-400 Queen of the Skies II** has a live, real-time amperage consumption model. Every system on the airplane has its real-world electrical consumption tracked in real-time. Many items use only 0.005 amps, but the airplane has many thousands of electrical consumers, so load shedding behavior will vary depending upon what systems you have consuming power at the time load shedding occurs!
- Every piece of equipment on the airplane that uses electricity is correctly wired to its appropriate electrical sources. If you lose a DC bus, you might lose the switches that are powered by that DC bus, and thus lose interaction with the items those switches control. Something to think about if you are experiencing power failures.

Engines:

- All three engine manufacturers are simulated: PW, GE, and RR.
- If you have failures enabled, monitor your engine oil pressure/temperature, EGT and vibration readings regularly. Unhandled failures result in a cascade of other failures. For example, an engine oil leak will eventually trigger an electrical generator failure, an oil pressure failure and inevitably (in a probabilistic manner) result in increased vibration, fuel flow and finally complete engine seizure.
- Failures such as an ENG OVHT are dynamic, and will be triggered slightly differently each time, requiring that you follow the checklist to resolve them effectively.

INTRODUCTION

Fire Controls – Engines:

- Bottles and Squibs are tracked. If you fire the bottle for one side, it will not work for the other side.
- Fire Bottle Squibs can and do fail to test. If this happens, you should catch it during the TEST function.
- Engine overheats may not necessarily result in the need to shut down an engine... but you will have to follow the procedure in the QRH to find out.

Flight Controls:

- Flap deployment speed is affected by the mode that the system is operating in. When the trailing edge flaps are moved using the ALTERNATE or SECONDARY flap system, they are EXTREMELY slow. And you lose access to the full range in some cases!
- Rudder control inputs are moderated by aerodynamic forces. Full rudder deflection in even moderate IAS is thus impossible. This Q-System model facilitates yaw stability and prevents inadvertent yaw induced roll. Nevertheless, rudder authority is sufficient to allow for runway alignment (de-crab) or even a sideslip (wing low) approach even at high cross winds.

Flight Management Computer:

- The RTE 1 page 1 shows an ACTIVATE prompt at LSK 6R even when there is no route entered. If you press it, the EXEC light is lit and if you press the button it just reverts to the previous state. This is realistic and is a quirk of the real-life unit.
- Unlike the FMC in the **PMDG 737 NGX** (but similar to the **PMDG 777**), the flap setting/Vref speed combination you select on the APPROACH REF page is advisory only. The airplane will not automatically slow to this speed – you need to speed intervene manually on the MCP to do it. The FMC by default places a 170-knot speed at the runway, which is also advisory only. In real life, pilots do not enter in their Vref into this restriction or anything like that, it's all done with speed intervention on the MCP.
- All speed restrictions in the 747 FMC are treated implicitly as at-or-below restrictions. For example, if you have a 300-knot restriction but your ECON descent speed is 275, the airplane will cross the restriction at 275, it will not speed up to 300.



Fuel Density Model:

- Depending on where you are in the world, the fuel you take on board will vary in density. For most flights, this does not cause any issues, but in areas where the density is particularly low, you may find that the fuel will take up the capacity of the tanks without reaching the advertised weight values.
- When density is below the level where the tanks can take on a full fuel load (by weight), the density is displayed in reverse video.

Ground Friction Model:

- P3D has a very odd ground contact model that can lead to odd behaviors while taxiing. For the first time in a PMDG aircraft, we have effectively side-stepped the limitations of the simulator so that the ground roll is more authentic.

Ground Service Vehicles:

- In addition to the static representation of ground connection carts seen in our previous products the 747 introduces dynamic animation of ground service vehicles:
 - Ground power, air conditioning, and air start units driven in place by tractors
 - Galley service & cabin cleaning trucks
 - Mobile air stairs
 - Cargo loaders and bulk cargo belts
 - Tail stand
 - Fuel pump truck
 - Lavatory, potable water, and maintenance vehicles.
- All these are fully integrated to the aircraft (doors/cargo bays will open in time, fuel truck will connect to under-wing refuel panel, etc.) and will become alive either under the Automatic Ground Operations feature or you can call any individual vehicle/service manually whenever you need it.

Hydraulic System:

- Violating operating limitations on pumps will cause the case drain fluid to overheat, resulting in an OVERHEAT warning.
- We have used realistic times for pumps to come online and drop offline.



INTRODUCTION

- Engine Driven Pumps (EDP) turn if the engine is turning. The "pump switch" on the overhead is not actually turning the pump on or off. Instead, this switch controls a solenoid that cuts off fluid flow to the system respectively from the EDP. That solenoid is held in the closed (off) position by DC power, so loss of that associated DC bus will cause the solenoid to fail-open, thus allowing the EDP to provide pressure to fluid on that side of the airplane once again. This could be bad if you had that pump disconnected for a reason!
- Overheat sensors in the Electric Motor Driven Pumps (EMDPs) will trip pumps offline to protect them from overheat. It is important to note that these are different sensors (and different temperature ranges) than those that control the OVERHEAT lights- so even when the overheat LIGHTS go out, you still may not be able to activate the EMDP because for a while longer while it is still cooling.
- EMDP cooling time will depend upon whether the pump is running, or whether the pump is OFF. (Should take approximately 5 minutes to cool to normal temps when running, but approximately 30 minutes when off because the fluid provides cooling to the pump. This of course will vary slightly, depending upon fluid temperature and wheel well temperature depending upon condition.)
- Hydraulic Quantity indication is affected by gear/flap/spoiler/flight control position, as well as thermal shrinking. You will notice changes in hydraulic quantity indicated during flight as you change the configuration of the airplane, set the parking brake, etc.
- Hydraulic quantity is displayed as measured to the standpipe within each reservoir. You may retain some pressure and functionality even when the system shows no quantity because there is fluid below the standpipe!

Landing Gear:

- Brakes are subject to Brake Temperature Soak. The brake temperature will climb for a period of time after heavy brake use.
- Wheel well fire warning can be triggered by sucking hot brakes up into the gear bay. Follow the checklist if you get a wheel well fire indication!



- We have simulated the full alternate gear extension for the 747. You will notice that the landing gear doors remain open during an alternate extension. To retract them after landing, simply power up the hydraulics, push the landing gear lock override, then cycle the handle up and then back down.
- You will notice that the volume of the gear-bay turbulence sound changes as the nose gear forward bay doors open and close during extension and retraction. This sound is entirely code controlled and dynamic, so if you lower the gear using the alternate extension, the turbulence noise will be louder on the flight deck than it is when those doors close as they normally do during extension.

Lighting Systems:

- The diagram used to determine the power source for every bulb on the flight deck takes up 165 standard sized print pages.

Physics-based Wing Flex:

- For the first time in a PMDG aircraft, we have included a fully physics-based wing flex model. The wings will sag while on the ground, depending on how much fuel is in them. While in flight, the wings will be lifted upward by the amount of lift being generated but bent in a characteristic way under the significant weight of the aircraft.
- Environmental factors are also included in the calculations, so turbulence and gusts will also influence the wing flex behavior. As the wings react to these environmental factors, the engines and engine pylons will as well.

Pneumatic System:

- The bleed pressure produced by each engine is directly computed based upon bleed production of the engine for current RPM and appropriate combination of high and low pressure stages bleed air as controlled by the HPSOV (High Pressure Shut-off Valve), and the PRSOV (Pressure Regulating and Shut-off Valve). The logic of these two valves (condition to open/close, target pressure values to regulate, etc.) is simulated in detail, resulting in highly accurate bleed pressure production values for each engine.

INTRODUCTION

Sounds:

- This package uses over 1400 digitally recorded sounds to replicate the living, breathing work environment of a 747 pilot.
- While in the external views, you will hear sounds made by ground equipment, windmilling engines, wing fuel pumps, electric hydraulic pumps, air conditioning packs and the APU. All these sounds layer together to provide a very realistic exterior sound environment.
- We recorded sounds for nearly every switch on the flight deck and then linked them in such a way as to ensure that they are synchronized to switch movements whether fast or slow.
- Many sounds in the product have multiple recordings that trigger randomly to produce a subtle difference in the sounds each time a particular one plays. This is a technique borrowed from music production (Armen and Ryan are both musicians), where randomized drum samples are often used to produce a more human sounding programmed drum performance.
- Some mechanical systems on the airplane can be faintly heard from the flight deck (electric hydraulic pumps, for example) and you will hear them from the flight deck if you listen closely.
- Sound level mixing was done over many hundreds of hours in order to provide the best mix of sounds to accurately replicate the cockpit sound environment.



THINGS THE WIDE BETA TEAM WANTED YOU TO KNOW

- At high gross weights – particularly those at “hot and high” airports – be prepared for underwhelming performance. Take off rolls will be much longer, and the climb rate will be sluggish, particularly at acceleration altitude when retracting the flaps.
- When planning, normal remaining fuel values are much higher than you are used to. A good minimum is at least 30,000 pounds.
- If TO/GA is not selected prior to 50 knots, AT operation will be inhibited until 400 feet. In this case, the throttles will only move manually until that point.
- When soft disconnecting the AT, the disconnect switches need to be clicked twice with a 1-2 second pause in between to avoid the auto throttle disconnect EICAS message and associated caution.
- Proper takeoff procedure with respect to your physical throttle:
 - Advance the throttles to approximately 50% N1.
 - Press TO/GA (don’t use the MCP A/T button, it takes half a second or so to “capture”).
 - Wait until you see THR REF annunciated on the FMA.
 - Push the throttles fully forward. They are dead now because the AT is active.
- The stabilizer trim rate in the 747 is quite slow compared to other airplanes you may be used to.
- Fuel management in the 747 is a lot more involved than that of the NGX and 777. The pilot must handle center tanks, stab tanks, aux tanks in the case of the ER, and an array of wing tanks that need to be switched at a specific point in flight.
- The 747 has a lot of energy behind its mass and will require planning and energy management on tight approaches. Plan ahead and if it won’t work, go around!
- On landings, be mindful that you are much higher in the 747 than you would be in the NGX or 777.
- Despite the higher viewpoint, the 747 is relatively easy to land, provided the approach is stable. Make full use of the radio altimeter callouts to judge the height above the runway.



INTRODUCTION

- The APU will run while airborne, but it will not start unless the aircraft is on the ground. There is enough redundancy on the aircraft that its use while airborne is not required.
- Unlike the 777, the transfer of power between the engine generators and the APU is manual. Remember to reach up and transfer the power source from the engines to the APU prior to cutting fuel to the engines. Pilots of the NGX will likely be less prone to forgetting this step.
- Don't forget to press the MIC button on the ACP panel (below the radios panel) corresponding to the radio you want to transmit on or no-one will hear you online. Yes, it's modeled that closely!
- There are certain calculations that you perform through the CDU that take a surprising amount of time to complete. A good example is the required trim setting generated by entering the %MAC. Keep in mind that the processing power in this FMC is equivalent to the old Intel 8086 processor. The FMC has been purposefully designed to have the same response times as the real FMC.
- When using a cargo variant, the nose and side cargo doors require that a power source be available, but not in use. As an example, if you are using APU power, GEN1 can be used for power, but GEN2 will need to be switched off (left AVAIL) for the doors to operate.
- GSX will interfere with the PMDG Ground Service vehicles. If you use GSX for parking, be sure to restart couatl before selecting service vehicles.
- When taxiing, keep speeds in turns at 12 knots or less to ensure that the body gear steering is active to assist the turn.
- The fifth engine ferry option is not available on all engine types.



INTERACTING WITH THE PMDG 747-400

The **PMDG 747-400 Queen of the Skies II** uses a fully custom, highly flexible interface methodology in order to make your **PMDG 747-400** experience as intuitive as using your own hand.

This section will help you to learn how to push/pull levers, rotate knobs and push buttons within the cockpit. The guidance is identical whether you use the 3D Virtual Cockpit, or whether you use the flat 2D popups.

The **PMDG 747-400** utilizes a specific cursor shapes that are visible in both the 2D and Virtual Cockpit in order to assist the user to:

- Easily locate the regions where mouse operations are applicable.
- Instantly identify what kinds of mouse operations are applicable for each click spot.
- Identify what each mouse operation can be expected to do.

Push-Pull Operations:

Push-Pull operations apply to pushbuttons and knobs that can be either pushed or pulled in order to effectuate an action. One of three cursor shapes will appear when the mouse is placed over a pushbutton or switch that fits into this category:

Push cursor:



Only push operation is applicable. Use left or right mouse button.

Pull-Only cursor:



Only pull operation is applicable. Use **right** mouse button.

The push/pull icon will change to reflect the operation selected by the user. So, if for example the left mouse button is pressed, the cursor will change to the “push” cursor, and if the right mouse button is pressed the cursor will change to the “pull” cursor.

Knob/Switch Turn Operations:

Knob/Switch turning can apply to knobs, dials, wheels and switches that must be turned or rotated. Three different cursor shapes will appear when the mouse is placed over the knob.

INTRODUCTION

Switch/Knob Cursors:

For knobs/switches that turn/move left/right the following applies:

-  This cursor indicates that the switch may be rotated to the left/right. This is the “neutral” cursor, meaning that you are not currently rotating the switch.
-  Press either the **left** mouse button or turn the mouse **wheel down** or to **turn the knob to the left**. While doing so the cursor will also rotate to the left as seen here.
-  Press either the **right** mouse button or turn the mouse **wheel up** or to **turn the knob to the right**. While doing so the cursor will also rotate to the right as seen here.

Note that the mouse wheel does not function for switches, only knobs.

For switches that move up/down the following applies:

-  This cursor indicates that the switch may be moved up/down. This is the “neutral” cursor, meaning that you are not currently rotating the switch.
-  Press the **left** mouse button to **move the switch down**. While doing so the cursor will also rotate to the left as seen here.
-  Press the **right** mouse button to **move the switch up**. While doing so the cursor will also rotate to the right as seen here.

Operating a Two Position Switch/Knob:

On the **PMDG 747-400** flight deck there are a broad range of knobs and switches that will be moved using the left and right click action described above. For knobs/switches with two positions, left **or** right clicking on the switch will move the switch between the two positions.



Operating a Multiple Position Switch/Knob:

For knobs/switches with multiple positions, or with a range of positions (such as a temperature selector knob) successive right or left clicks (or scrolling of the mouse-wheel) will cause the switch to continue moving in the direction of the click until reaching the full limit of the knob's available motion.



For knobs that do not have distinct position detents, such as a dimmer or a temperature knob, holding down the left or right mouse button will cause the knob to scroll through its available range of motion in the same direction as the mouse click. Additionally, you can use the mouse wheel on your mouse to scroll rapidly.

Some hits to remember when using knobs:

- Using the mouse wheel will let you rapidly enter heading/speed/altitude changes into the MCP!
- Double clicking the left or right mouse button while the mouse is over a rotary knob will cause the knob to move immediately to its full left or right position.
- This functionality applies to all knobs such as dimmers that control brightness (display units brightness knobs on the lower



INTRODUCTION

main panel, as well as PANEL/FLOOD lighting controls on the lower main panel, the overhead and the center console.)

- The middle mouse button can be used to instantly place any rotary panel lighting control in the center 50% position.

Combined Rotary Knobs:

In some cases, there are multiple rotary knobs embedded into a single location, such as the heading knob found on the MCP. In order to help clarify the operation of these knobs, you should note the color of the Left/Right rotation cursor. The primary rotary function of the knob will use white rotary icons as described above, while the secondary rotary function on the knob will use gray shaded rotary cursors as shown below:



Other applications of gray shaded cursors:

You will notice that in certain places that require special action, such as the landing gear handle unlock switch, or on the guards covering guarded switches, the cursor will appear gray. This is to indicate to you that the action is special as it relates to that switch, guard or knob.

Example:

As an example, the mouse operations on the heading select knob are shown in the following figure:



1. This shaded cursor indicates that you are able to rotate the secondary outside knob that operates the bank limiter, but only using left and right clicks, not the mouse wheel.
2. This un-shaded icon indicates that you can rotate the primary heading select knob both with left and right clicks and with the mouse wheel.
3. This cursor indicates that you can press the button embedded inside the two rotary knobs.

If you spent a few moments feeling around the **PMDG 747-400** cockpit with your mouse, you will find many different areas where you can click, rotate, move up/down or left/right various controls. Over time, these cursors and their associated actions will become second nature!

INTRODUCTION

Multi-Function Knobs in the Virtual Cockpit:

All of the mouse cursor functions described above work in the Virtual Cockpit or the 2D popup environment. As you move the mouse cursor over a knob or switch, simply watch to see which cursor (primary or secondary rotary cursor, push, move up/down or move left/right cursor) is displayed. This will help you to identify which function you will affect by mouse input.

NOTE: Depending upon your monitor size and resolution, you may have some trouble accurately placing the mouse cursor over a switch while in the VC. If you experience this problem, we recommend that you zoom closely to the switch. This will greatly increase the accuracy of your mouse and is similar to “leaning” toward something on the flight deck in order to make it more accessible. Holding spacebar and rolling the mouse wheel is the easiest way to look around and zoom in P3D.

Using click and drag controls:

Several controls in the cockpit including the MINS and BARO selectors, the manual pressurization Landing Altitude selector, the Fuel to Remain selector, the Rudder Trim knob, and the Flight Deck Temperature selector when moving between MAN and AUTO use a click and drag style logic that moves between different control “levels.”

To use the MINS knob as an example:



You will see the normal cursor, but to operate the control you must right or left click and hold, which will produce the tooltip shown above. In the case of both the MINS and BARO selectors, there are two speed levels, slow and fast. To move between the two levels, drag the mouse a short distance while continuing to hold the button down.

Using Pop-Up Panels

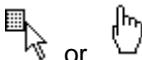
The essence of the **PMDG 747-400** Pop-Up Panel control schema is based around click spots located at strategic locations throughout the



INTRODUCTION

Virtual Cockpit (VC). When the user moves the mouse cursor over one of these click spots, the cursor changes in order to help the user understand what options are available via the click-spot.

When accessing the various pop-up panels, the following cursors may be displayed to the user:

Panel Open/Toggle Cursor:

or

When either one of these cursors is displayed, the **left or right** mouse button can be used to **open** or **toggle** a panel window. These types of mouse click spots are normally located on the main panel.

Close Panel Cursor:

This cursor indicates that you can use either the **left or right** mouse button to **close** the current panel window. The mouse click spot is usually located on the **top-right corner** of the panel window.

Zoom Display Cursor:

These cursors are displayed when the mouse is moved over the central area of one of the display units or the screens of the CDUs in the VC. A **left or right** mouse click when the “+” cursor is displayed will open the display unit or the CDU on a new window of larger dimensions.

When the zoomed window is open a “--cursor will display on both the zoomed window click-spot and the corresponding normal display click-spot. Use the **left or right** mouse click on either click-spot to close the zoomed window.

NOTE: If you forget what a specific click-spot will do, simply hover your mouse over the spot and a tool-tip will appear to remind you. (Provided you have tool-tips enabled!) They will also tell you what the left/middle/right click functionality of certain clickspots is.

At night, the click locations are illuminated using the MAIN PANEL brightness knob in order to make them easy to find.

The following pages show/explain the mouse click hotspots that are used to pop up/control the various flight displays, 2D pop-up panels and yokes.

INTRODUCTION

The different cursor types that the user will see when the mouse is moved over click spots are also depicted.

Main Panel and Forward Pedestal Click Spots:





INTRODUCTION

Rear Pedestal/CDU Click Spot:



MCP Popup and Close Click Spots:



INTRODUCTION

EFIS Click Spot:

NOTE: Same location on FO Side.

TOGA Click Spot:

NOTE: Both Captain and FO alternate TOGA click spots shown.



INTRODUCTION

Radio/Audio Panel/XPDR/Weather Radar Popup and Close Click Spots:

NOTE: Captain and FO click spots shown. The radio popups are side-aware. They will show CAPT radios when clicked on the left side and F/O radios when clicked on the right side (747-400 and 747-8). Right clicking the radio pop-up click spot will bring up the EFB pop-up (747-8 only)

Save Flight Click Spot:

The "EVENT RCD" button acts as a click spot to save a flight (similar to the ; key.)

INTRODUCTION

CUSTOMIZE YOUR PMDG 747-400 EXPERIENCE

With the **PMDG 747-400** product line we continue to use the methodology that allows you to change just about anything in the airplane without ever having to leave the simulation. From your fuel load to the passenger load, cockpit configuration, external model options, failures, maintenance and cockpit equipment: **everything can be configured live, in P3D, without having to pull down a menu and without having to leave the immersion of the simulation!**

Accessing FMS Based Menus from a Dark Airplane:

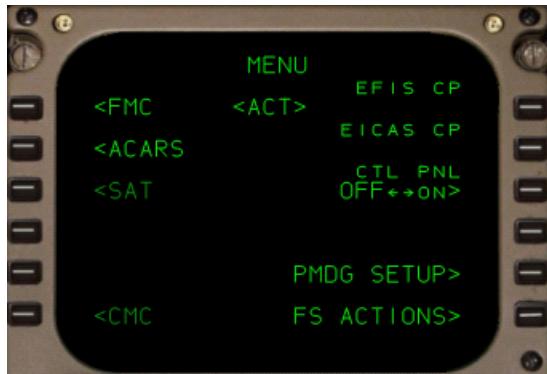
Since we have moved all the configuration options into the FMS in order to promote simulation continuity, we also had to give you a way to access those menus even if the airplane is not currently powered.

To access the FMS based Setup/Configuration menus from a Cold & Dark cockpit, simply press and hold the MENU button on the FMS until the FMS screen comes to life.



**PMDG 747-400 Home CDU Menu:**

At any time while flying the **PMDG 747-400**, you can press the **MENU** button on the CDU, and you will be presented with the top menu for the CDU system:



On the left side of the screen, you can select the <FMC prompt to enter the aircraft flight management functions. On the right side you will find the PMDG SETUP> and FS ACTIONS> prompts. These options are the core of your ability to customize your **PMDG 747-400** flight experience.

If at any time you get lost in the CDU, simply press the MENU button and you will be brought immediately back to this page.

INTRODUCTION

PMDG SETUP MENU

Pressing the PMDG SETUP> prompt at will display the following menu:



The PMDG SETUP page is the “home base” from which you will configure your PMDG 747 to suit your needs. From this menu you can adjust the specific options for your airplane cockpit as well as many options to control various aspects of the simulation experience itself.

There are a few things to keep in mind while learning how to tune the **PMDG 747-400** to suit your tastes:

- <**AIRCRAFT**: The **PMDG 747-400** allows you to configure the equipment options you want on your 747 and in your cockpit and then bind them to the registration number of the livery you are currently flying. This gives you the opportunity to set up the flight deck for individual liveries according to the configuration used by different airlines or on specific airplanes and quickly switch between them. The items listed under <**AIRCRAFT** are airframe specific, so you can change them when loading different liveries.
- <**OPTIONS**: The **PMDG 747-400** allows you to set global options such as the mechanical failures model, performance tuning, key commands and sound options that remain in place even as you switch between different liveries or 747 body types.
- Panel **SAVE STATE>** and **LOAD STATE>**: The save/load state prompts allow you to save the current setup of the panel to a file that you can then reload at any time in the future. Saved panel states are independent of specific saved flights so if, for example, you wished to save the current state of the cockpit as you left it at the conclusion of your flight, you can then reload this panel

INTRODUCTION

condition in the future and find all switches and system in the desired settings. (This is not the same as saving a flight because it merely saves the condition of the airplane, thus allowing you to load your panel configuration into any flight you wish.)

- STARTUP STATE: This prompt allows you select a saved panel state that you would like the simulation to use as your default panel condition every time the simulation is launched. For example, if you were to select a Cold and Dark scenario as the STARTUP STATE for the airplane, you will be presented with that cold and dark panel state whenever and wherever you choose to load the PMDG 747.
- LICENSE>: This prompt allows you to view your license key or manually deactivate the license on your computer, as mentioned earlier.
- ABOUT>: A short animation with the names of the Development, Tech and Beta teams.



INTRODUCTION

Understanding Panel vs. Flight Save/Load States:

When it comes to saving your flight, there are a few things that you should clearly understand in order to avoid confusion.

Saving a Flight: Saving a flight is done via the P3D File/Save Flight menu. This will save the airplane position, status and configuration into a file that can be loaded later via the P3D File/Load Flight menu.

Saving a Panel State: Saving a panel state is a bit different. Panel states allow you to save the airplane's current configuration without any regard to the phase of flight or location of the airplane. This being the case, panel states are entirely mobile and thus give you great flexibility.

For example, let us say that you want to create a condition in which the airplane is on the ground with the APU running, the IRS's aligned and everything ready to start the engines. You do this by setting the airplane up as you desire, then going to the PMDG SETUP menu in the FMS and pressing STATE SAVE>.

You will be prompted for a name for the panel state, and the FMS will then create the necessary files in your <P3D ROOT>\PMDG\PMDG 747 QOTS II\PanelState folder.

Once this state is saved, you can have the airplane in any location in the P3D world and use the LOAD STATE> prompt to instantly put the airplane into the desired configuration.

We have created some panel states that we thought might be desired by users:

- Cold and Dark
- Default
- Long Turn
- Short Turn

These panel states can be loaded at any time and the airplane will be instantly configured according to the panel state selected. This can be convenient for quickly setting up a flight to start precisely where you want!



Save/Load Effect on Failures:

In the **PMDG 747-400 Queen of the Skies II** the current state of failures is always saved. If you have a particular failures mode saved, and various failures are already active or armed to become active, they will remain as such when you load the flight that was saved in that condition.

This can be useful for saving flights enroute without losing any of the activities that have taken place earlier in the flight sequence.

Some users may not want the failure conditions to transfer to a newly loaded flight. If this is a concern, then please be certain that you clear all failures and disable failures from the FAILURES menu prior to saving the flight.

Save/Load from the P3D menu:

You can also conduct save/load operations from the P3D menu. The **PMDG 747-400 Queen of the Skies II** will intercept the save/load function and create both the P3D save file and the **PMDG 747-400** panel save file for you using the name you select.

You will then be able to load your flight and panel state from the P3D menu as well and the airplane condition will be just as you left it.

On the PMDG SETUP menu you will notice a STARTUP STATE prompt. You can use this prompt to force P3D to load the **PMDG 747-400** in exactly the same configuration every time you launch the simulator.

In addition to the 744 DEFAULT engines running state, we have included the following panel states for you to use:

- 744 CLDDRK: This is the airplane completely shut down with the shutdown, securing, and power down procedures complete. The L2 entry door is open since you presumably entered through it. The airplane is chocked.
- 744 SHORT: This is the airplane on a short ground turn. The shutdown procedure has been completed and the APU is running and providing power and air. The securing procedure is partially completed. The L2 entry door and all three cargo doors are open, and the airplane is chocked.
- 744 LONG: This is the airplane on a long ground turn. The shutdown and securing procedures have been fully completed. Ground power and air conditioning are both connected, and the airplane is chocked. The L2 entry door and all three cargo doors are open.

INTRODUCTION

AIRCRAFT SETUP MENUS

The AIRCRAFT menu allows you to configure the equipment, displays and mechanical fitness of your airplane to suite your needs.

When using the **PMDG 747-400** you should think of aircraft options in terms of airframes. Through this menu system we allow you to define the equipment contained on the flight deck of a limitless number of aircraft, defined by airframe tail numbers.

For example, if you wished to define the specific equipment carried on N744PM, you can do so, saving the information via the AIRCRAFT menu. You might then define a different equipment setup on N744GE and save that configuration via the AIRCRAFT menu.

Thus, you can quickly return to whatever configuration you choose by simply loading that aircraft's configuration file via the AIRCRAFT menu.

How this helps you:

The **PMDG 747-400** tracks everything in terms of individual airframes. As you fly N744PM, for example that airplane will accumulate flight time. Any changes you make to the equipment carried on that aircraft can be saved and the simulator will load those options the next time you choose to fly N744PM.

If you wish to use a different aircraft configuration, simply select it via the AIRCRAFT menu and the changes will be instantaneous.

***How this works behind the scenes (For sim techs and nerds!):***

You don't need to read this section to use the AIRCRAFT menu, but we are including it for those who want to know details about how the AIRCRAFT menu system works.

Each livery comes with a pre-defined definition ini file that defines all of the options related to that particular airplane. The file is fully editable.

The definition file is named to match the tail number on the livery and gets copied to the <P3D root>\PMDG\PMDG 747 QOTS II\Aircraft folder by the livery installer. A backup original copy is left in the texture folder so that you can use the AIRCRAFT menu to revert to the original configuration file if you make changes that you no longer wish to keep.

When you select a livery, and then launch the simulator, the **PMDG 747-400** will determine what equipment is installed on the airplane by reading the definition file for that livery's tail number. When the sim launches your cockpit will be set up according to that definition.

If you make changes to the cockpit layout and save the definition file using the AIRCRAFT menu, those changes will be present in the airplane any time you load that livery.

So, the key thing to remember is that each aircraft should be viewed in terms of its tail number. When you load a livery, the definition file matching the airplane's tail number will be used to populate your cockpit, display and maintenance options.

If desired, you can save multiple definitions for the same airplane in order to simulate changes in the equipment carried over time. For example you could set one set of options for the N744PM setting, then manually make changes and save the file as N744PM2.ini. Then, if you desire to use the second configuration, simply select it from the menus as will be described below.

NOTE: The livery number displayed in the AIRCRAFT menu will always match the tail number installed with the livery. This is because the maintenance and flight time tracking must be tracked for that individual tail number!

Do not manually change the tail number in the DETAILS pane of the aircraft select screen in P3D. This will mess up or otherwise disable the livery options.

INTRODUCTION

The following matrix should help you to visualize how the airplane-specific equipment, display and maintenance options are tracked for individual tail numbers:

***Using the AIRCRAFT menu:***

When you load a livery from the P3D scenario creation menu and then launch the simulator, the **PMDG 747-400** will load the definition file that describes how that aircraft is laid out in terms of cockpit equipment, displays and mechanical fitness.

The AIRCRAFT menu is designed to give you the ability to change the equipment installed in the cockpit, change the way information is displayed to you on the cockpit displays, and to interact with the mechanical reliability of the airplane.



You do this through the following menu prompts:

- < EQUIPMENT
- < DISPLAYS
- < FAILURES

We will explore the content of these menus in a moment, but for now just remember that any time you make a change, the **PMDG 747-400** will automatically save the change you made to the aircraft's definition file. This has the effect of making the change permanent until you make future changes.

NOTE: There is no danger to changing the contents of the AIRCRAFT menu, even while the aircraft is in flight!

Restoring a Definition File:

If you make changes and later wish to revert to how the airplane was configured at the time you installed the livery, simply press the RESTORE > prompt on the AIRCRAFT page.

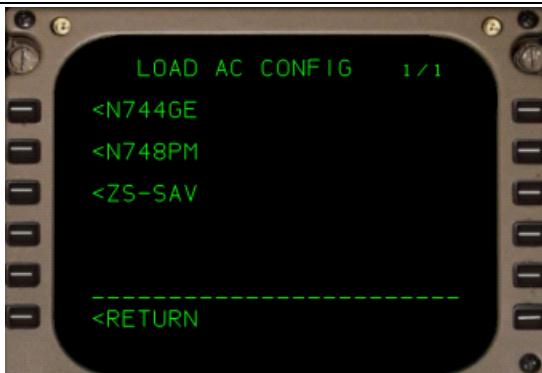
This will copy the original definition file from the backup folder to the active folder, replacing the one you have already altered. (This cannot be un-done!)

Using a Different Definition File:

In some circumstances, you may decide that you want to use a different aircraft configuration than the one that is defined for that livery. As an example, if you fly with a particular configuration frequently and have grown comfortable with that cockpit setup, it may not be convenient to have to remember every single configuration change that you made in order to get a different livery configured to match your preferred settings. In order to make things easy, we have allowed you the option to load a different aircraft definition than the one that is loaded by default with any livery. You can do this using the Load From ANOTHER > prompt on the AIRCRAFT menu.

Selecting the ANOTHER > prompt will take you to the following menu:

INTRODUCTION



This menu will list all the available aircraft definition files currently loaded or that you have created.

To load the N744PM configuration displayed in the example above, you simply press the line select key, and then confirm the entry.

This will cause the configuration definition for N744PM to be used with whatever livery you currently have loaded.

*NOTE: If you switch liveries, you will need to re-select the N744PM definition if that is your wish. Every time you load a livery from the free flight P3D menu, the **PMDG 747-400** will load that livery's definition file!*

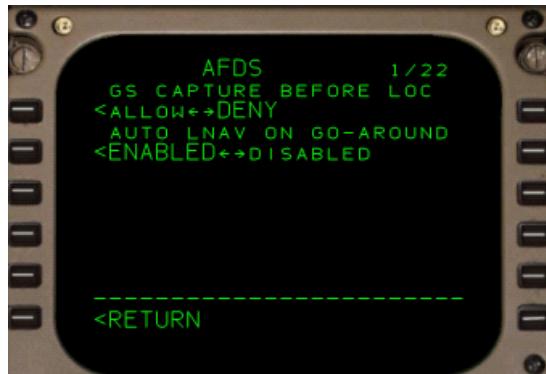
Using a Fixed Definition File for All Flights:

You may find that you settle into a favorite cockpit configuration that you want to use no matter which livery you are flying. In this case you can set the configuration as your FIXED CONFIG by using the FIXED CONFIG prompt to select it from displayed list.

Once you have selected an airline definition file as your FIXED CONFIG it will remain until you delete. (Press the DEL key, then the FIXED CONFIG prompt to delete.)



EQUIPMENT Options:



When purchasing an airplane from Boeing, the airline customer will choose from a package of equipment options that provide advanced capabilities beyond what the basic airplane is capable of.

These options are available for you to select from in the EQUIPMENT pages so that you can experiment with the mix of data equipment options that are interesting to you as a pilot.

There are numerous pages of options available that will allow you to customize the displays in the cockpit of your 747. You can use the PREV PAGE and NEXT PAGE buttons on the CDU to move forward and back through the pages.

In the list that follows, we have provided images to show you the difference between equipment types when applicable. We also document some of the known conflicts between equipment types (if any) so that you are aware that turning some features ON may disable other features.

You can't hurt anything by experimenting with combinations of features, so feel free to turn things on or off and add/remove equipment capabilities as your needs or interest may allow!

If you get into a simulated flight and decide you'd like to try some changes, you can do so live, in the simulator, without having to worry about disrupting your current flight.

**INTRODUCTION****PAGE 1/22 - ADFS, FMS**

- **GS CAPTURE BEFORE LOC:** This option allows you to determine whether the autopilot/flight director will command the airplane to follow the glideslope on an approach even if the localizer has not yet been captured. Airlines generally provide specific policy guidance on this topic, and they will select the equipment option so that the airplane adheres to corporate policy. The DENY option is the safer, more conservative option.
- **AUTO LNAV ON GO-AROUND:** This option allows the AFDS to automatically engage LNAV on a go-around with a missed approach loaded in the FMC.

PAGE 2/22 - ELECTRICAL

- **APU TR START OPTION:** This determines whether or not a (Transformer Rectifier Unit) TRU is added to start the APU. This avoids stressing the battery if AC power is available. The TRU is also used as a back-up emergency power source.
- **ELEC STBY SYSTEM:** The updated option powers the Captain side FMC and displays with the APU Battery.
- **ALTN EFIS SWITCH:** This option places a switch below the MCP allowing you to select captain or F/O sources.

PAGE 3/22 - EGPWS

- **V1 CALLOUT:** Allows you to select the GPWS “V1” callout to ON or OFF.
- **BANK ANGLE CALLOUTS:** This option allows you to select whether or not you will hear aural bank angle warnings if you exceed prescribed bank angles.
- **APPR MINIMUMS CALL:** This option selects the aural callout type that plays when approaching your minimum altitude on an approach. The airplane can issue no warning, or it can call out “Approaching Minimums” or “Approaching Decision Height” or “Plus Hundred.”
- **MINIMUMS CALL:** This option selects the aural callout type that plays at your minimum altitude on an approach. The airplane can issue no warning, or it can call out “Minimums,” “Minimums Minimums,” or “Decision Height.”
- **2500 FEET CALL TYPE:** Most airlines use the “Twenty-Five Hundred” call, but some airlines have adopted the “Radio Altimeter” aural advisory instead. You can choose which you wish to hear.



PAGE 4/22 – EGPWS 2

- CALL 2500: Here you can set 3 options for the 2500 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 1000: Here you can set 3 options for the 1000 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 500: Here you can set 3 options for the 500 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 400: Set the 400 ft call to ON or OFF.
- CALL 300: Set the 300 ft call to ON or OFF.

PAGE 5/22 – EGPWS 3

- CALL 200: Set the 200 ft call to ON or OFF.
- CALL 100: Set the 100 ft call to ON or OFF.
- CALL 50: Set the 50 ft call to ON or OFF.
- CALL 40: Set the 40 ft call to ON or OFF.
- CALL 30: Set the 30 ft call to ON or OFF.

PAGE 6/22 – EGPWS 4

- CALL 20: Set the 20 ft call to ON or OFF.
- CALL 10: Set the 10 ft call to ON or OFF.
- FLARE TONES: Like those used in classic 747 aircraft, this option determines whether the automated flare tone is played. The tone provides audible guidance of when to flare.

PAGE 7/22 – FMC DATALINK

- AUTO PREFLIGHT UPLINKS: With this option selected, initiating a ROUTE REQUEST from the RTE page during preflight will automatically trigger in sequence WIND DATA and DES FORECAST requests. The data for each request will become available once data of the previous request in the sequence is loaded and accepted.
- AUTO POS RPRT DOWNLINK: With this option selected, position reports are automatically downlinked during the cruise phase of the flight each time a waypoint is sequenced. This option is simulated by the presence of the REPORTING and REPORT SENT prompts - there is no sending of an actual report to anywhere.

**INTRODUCTION****PAGE 8/22 – FMS**

- **TAKEOFF THRUST DERATES:** This option determines whether or not the THRUST LIM page displays the TO-1 and TO-2 fixed percentage thrust derates for use.
- **CLB DERATE WASHOUT TYPE:** This option sets the altitudes at which the climb thrust rating returns to its full maximum value when using the fixed CLB-1 or CLB-2 derate.
- **CLB1 -> CLB:** Shows the altitudes related to the above option.
- **CLB2 -> CLB:** Shows the altitudes related to the above option.
- **CRZ PHASE THRUST LIMIT:** This option determines whether the cruise flight N1 limit is CLB or CRZ.

PAGE 9/22 – FMS 2

- **FMS DEFAULT ALTITUDES** (list of four): These options allow you to customize the default acceleration altitude, default engine out acceleration altitude, default thrust reduction altitude, altitude and default transition altitude in order to comply with the standards typically used by your airline and/or country.

For example, the transition altitude in the United States is 18,000 feet, but in other countries this value will vary. If you live in a country where 5,000 feet is normally used then you can set this value to 5,000 and you will not have to change the transition altitude in the FMS on every flight.

It's important to understand that these values will be overridden by what's saved in a panel state or saved flight due to the way the FMC is initialized. If you wish to have these values in a panel state, load the panel state first, adjust the values, then save the state with a new name such as "(livery name) _CLDDRK" or whatever you'd like.

Also, with respect to the THRUST RED ALT/FLAPS setting – this can be set to a value of 5 instead of an altitude, which causes the thrust reduction to happen when the flaps are moved from 10 to 5, regardless of altitude.

PAGE 10/22 – FMC 3

- **FMC CALCULATES V SPEEDS:** This option determines whether the FMC will provide V speeds on the TAKEOFF REF page.



- **AUTO SHOW VNAV CLB PAGE:** This option determines whether the FMC will automatically change to the CLB page from the TAKEOFF REF page after departure.

PAGE 11/22 – FUEL & WT/BAL

- **FUEL SYSTEM:** The original fuel system is the pre-AD fuel pump and messaging as the original 747-400 was configured. This system requires the pilot to shut off the pumps with fuel remaining in the Center and Horizontal Stab in accordance with the Boeing directive that came out in 1996. EICAS messaging will alert you when you reach those levels.

The updated fuel system incorporates all the AD requirements that mandated as part of the final AD rule: auto pump shutoff, current limiters, revised pump motors and housings, motive flow scavenge pumps and updated EICAS messaging.

- **TAIL XFR TRIGGER:** Changes the point at which fuel is transferred out of the tail tanks.
- **WEIGHT BALANCE SYSTEM:** This option determines how many sensors are installed to provide the weight of the aircraft on the PERF INIT page. NONE requires a manual entry – either ZFW or GW – by the crew, whereas SINGLE and DUAL provide a weight value that the crew can verify against the dispatch paperwork and select.
- **FUEL BALLAST SYSTEM:** This option changes the fuel logic to include a ballast protection for fuel that should not be burned from the center fuel tanks while in flight to keep the aircraft within CG limits.
- **JETTISON SEL WITH MLW:** This option changes the fuel dump system to allow for the selection of MLW (max landing weight) instead of having to do the math of how much fuel should remain. If the option is enabled, the system will automatically dump fuel until at the MLW of the aircraft.

PAGE 12/22 – FUEL & WT/BAL 2

- **STAB TANK INSTALLED:** This option determines whether the aircraft has additional fuel tanks in the stabilizers.

PAGE 13/22 – HYDRAULIC

- **HYD1 AUX PUMP INSTALLED:** This option determines whether the aircraft has an AUX pump installed in HYD1.

INTRODUCTION

- HYD2 & HYD3 DEM PUMPS: This option determines the type of demand pumps installed: electric or pneumatic.

PAGE 14/22 - INSTRUMENTS

- ADF INSTALLED: This option determines whether the aircraft has ADF receivers for tuning NDBs installed. INOP stickers will appear over the EFIS ADF pointer selectors if not installed.
- STANDBY INSTRUMENTS: This option allows you to decide whether you want to have the ISFD or SEPARATE standby instrument option installed. The ISFD (Integrated Standby Flight Display) is an electronic, solid state digital display that contains its own backup battery source of power. The SEPARATE standby gauge configuration provides the AI, ASI and ALT as separate instruments, as pictured below.

**ISFD****Separate**

- RMI INSTALLED: This option determines whether the aircraft has an RMI installed on the captain side.

**PAGE 15/22 - MISC**

- **HEADRESTS** (list of four): This option determines whether the headrests are shown. This option also allows users to avoid the P3D viewpoint shift bug.
- **YOKE PLACARDS**: This option determines whether the yokes display the default placard, a custom placard, or none.

PAGE 16/22 - MISC

- **WINDOW FRAME STYLE**: This option determines whether the window frame is the older, thicker window frame, or the newer, thinner frame.
- **MEM DEVICE ON YOKE**: This option determines whether the memory device is shown on the yoke. This is used to dial in the flight number to aid ATC calls.
- **LAV IN COCKPIT**: This option determines whether there is a lavatory installed in the cockpit.

PAGE 17/22 – PACKAGES

- **FLIGHT TEST PACKAGE**: We have included this package for those who might enjoy seeing the visual aspects of the standard flight test gear carried aboard an airliner during flight testing. This includes a tail drogue and extra air data sensors protruding through red window plugs in the forward cabin area. This is a visual model enhancement only and does not provide any data display anywhere on the flight deck.
- **ANTENNAS**: This option sets the position of the external SATCOM, VHF, ELT, and WIFI antennas on top of the fuselage.
- **MAIN DECK SIGNALLING** (F models only): Changes the location and type of main deck signaling/alerting functions.
- **FIRE DETECT MFG**: Changes the fire detection system manufacturer between Kidde and Systron. These systems are entirely interchangeable, but they operate differently during the fire system test.
- **5TH ENGINE POD** (RR model only): Shows or hides a fifth engine under the wing for spare engine ferrying. This will also have associated changes on various FMC pages to accommodate the additional drag.

INTRODUCTION**PAGE 18/22 – PACKAGES 2**

- **ENG AUTOSTART SYSTEM:** Determines whether autostart is installed. Note that, depending on the engine type, the switches will show in different locations.
- **ICE PROTECTION OPTION:** Changes between the basic anti-ice system, a system with ice detectors, and an auto anti-ice system.
- **DUAL FIRE/OVHT TEST:** Determines whether a second switch is installed on the overhead to test the ENG, APU, and cargo detection systems separately.
- **TAXI LIGHTS INSTALLED:** Determines whether the aircraft has taxi lights installed.
- **PARA VISUAL DISPLAY:** Changes between no PVD, a PVD built to the original design spec (barber poles slant inward), and a PVD that is more commonly seen on aircraft currently using it (barber poles point in the same direction).

PAGE 19/22 – PANEL OPTIONS

- **AFDS MCP STYLE:** Switches between the new (LCD) and old (analog) style MCP.
- **RADIO TUNING PANELS:** Switches between the original Boeing radio tuning panel and the Gables unit.
- **PUSH-TO-TALK ON GS:** Determines whether a PTT switch is installed on the glareshield.
- **INTERCOM HANDSET:** Determines whether the handset at the back of the pedestal is installed.
- **EVAC PANEL INSTALLED:** Determines whether the EVAC panel is installed at the back of the pedestal.

PAGE 20/22 – PANEL OPTIONS

- **AUTOBRAKES SWITCH:** Changes the location of the autobrakes switch.
- **MINIMUMS & BARO KNOBS:** This option selects between realistic spring-loaded switches (SLOW/FAST setting) that need to be held and constant rotation rotaries for the MINS and BARO knobs on the EFIS control panel. The SLOW/FAST option is accurate to the real aircraft but may not be as conducive to the simulator environment as the rotary option.



PAGE 21/22 - WARNING SYS

- **RESETTABLE SIREN:** Allows the Master WARNING/CAUTION siren to be reset by pushing the Master WARNING/CAUTION reset switch.
- **AP DISC WARNING:** Here you can select between the WAILER or SIREN Autopilot Disconnect sounds.
- **AP DISC SCHEME:** Provides options for the behavior of the yoke AP disconnect button. “1 PRESS” will disconnect the AP with no warning sound, “2 PRESSES” will disconnect the AP with the first press and immediately silence the resulting warning sound with the second press. If the two presses are fast enough, no sound will play. “2 PRESSES UNSILENCED” always plays a cycle of the warning sound and will not silence until the playback is over regardless of how fast the two presses are.
- **ALT ALERT SETTING:** This option sets the altitudes at which the airplane will trigger the altitude approach alert and the amount of deviation from the MCP altitude necessary to trigger the alert sound and visuals.
- **ALTITUDE APPROACH AURAL:** This option allows you to turn the aural altitude approach “C chord” sound ON or OFF.



INTRODUCTION

PAGE 22/22 - WARNING SYS 2

- **MASTER CAUTION SOUND:** Here you can select between two versions of master caution sounds.
- **CREW ALERTNESS MONITOR:** Use this option to turn the monitor ON or OFF. The aircraft continuously monitors switch action on the MCP, EFIS control panel, display select panel, CDUs, and radio transmitter microphone switches. When a predefined time elapses after the last switch action was detected, the EICAS alert message PILOT RESPONSE is displayed. The message is inhibited below 20,000 feet, during climb, and when flaps are not up.
- **RAAS INSTALLED:** Enables the Runway Awareness and Advisory System, which plays aural callouts for a variety of situations on the ground or approaching an airport in the terminal area (runway name callouts, warnings if trying to takeoff on the incorrect runway or a taxiway, etc.)

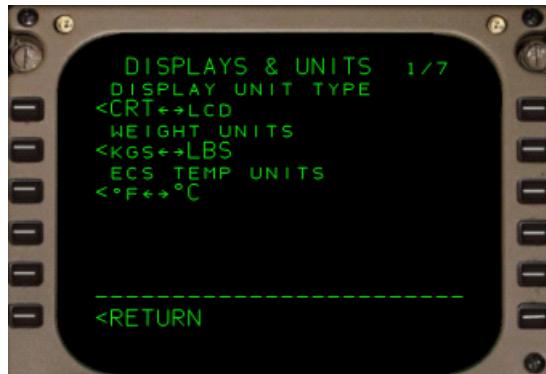
The RAAS system was developed by FS2Crew and is locked to the PMDG 747 airplanes. If you would like to use the system on all of your other P3D aircraft, purchase the full version here:

<http://www.fs2crew.com/cart/products/FS2Crew%3A-RAAS-Professional.html>

- **TERR: WATER IN CYAN:** This setting allows you to choose whether sea-level bodies of water will appear in cyan on the ND's EGPWS terrain display.
- **TERR: PEAKS MODE:** Peaks mode is a refinement on the original terrain awareness system. The original system only displayed terrain in proximity to the aircraft (from green 2000 feet below, to red 2000 feet or more above). Peaks mode always displays terrain within the filter altitudes displayed on the left side of the ND.



DISPLAYS Option Pages:



When purchasing an airplane from Boeing, the airline customer will choose from a package of options describing what data is shown to the pilots on the cockpit displays.

These options are available on the DISPLAYS pages so that you can experiment with the mix of data options that are interesting to you as a pilot.

There are numerous pages of options available that will allow you to customize the displays in the cockpit of your 747. You can use the PREV PAGE and NEXT PAGE buttons on the CDU to move forward and back through the pages.

We have included images where helpful, but you should feel free to turn items on and off while in the simulator- you won't hurt anything by cycling back and forth to see what the options look like or how they change your flying experience!

The following customization options are available from the DISPLAYS menu:

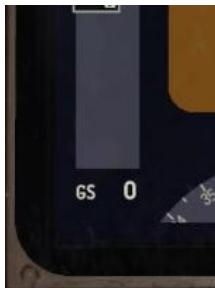
PAGE 1/7

- **DISPLAY UNIT TYPE:** Changes between cathode ray tube (CRT) and liquid crystal display (LCD) units.
- **WEIGHT UNITS:** This option selects between metric (KG) and imperial (LBS) weight units throughout the aircraft's systems.
- **ECS TEMP UNITS:** This option sets the temperatures displayed on the AIR synoptic to either C or F.

INTRODUCTION

PAGE 2/7 - PFD

- **FLIGHT DIRECTOR TYPE:** Select the style of flight director that will be displayed. The split axis option provides independent pitch and roll steering cues, while the single cue option provides a single chevron shape.
- **GROUND SPEED DISPLAY:** Displays your current ground speed on the PFD as shown here:



- **RISING RUNWAY:** Turn the rising runway symbol on/off for display on instrument approaches.
- **SHOW V2:** Displays the V2 speed on the PFD that has been selected in the FMS for takeoff.
- **SHOW LANDING FLAPS:** Displays the landing flaps setting on the PFD that has been selected in the FMS for the approach and landing.

PAGE 3/7 - PFD

- **RADIO ALT ABOVE ADI:** Displays the radio altitude above the ADI.
- **ROUND RADIO ALT DIAL:** Allows the radio altitude to be shown in round dial format.
- **LANDING ALT BAR:** Displays the landing altitude bar on the PFD altitude display.
- **V/S INDICATOR TCAS:** Displays the required ranges for vertical speed on the V/S indicator to resolve a TCAS conflict.
- **PITCH LIM IND POP UP:** This option determines whether a pitch limit indication will appear on the PFD when pitch is approaching the pitch limit.



PAGE 4/7 - ND

- **TRACK UP:** This option selects between a track-up navigation display or a heading-up navigation display.
- **RANGE ARCS:** Display range arcs on the navigation display when appropriate for the selected display mode.
- **TCAS 3NM RANGE RING:** Display 3nm range ring with TCAS.
- **TAS INDICATION:** Displays the true airspeed on the ND.
- **IRU TIME TO ALIGN:** Displays the remaining time to align the IRUs on the ND.

PAGE 5/7 - ND

- **MIN RUNWAY LENGTH:** Airports with runways below this length will not be shown on the ND.
- **SHOW NEXT ALT CONSTR:** Displays the next altitude crossing constraint next to the waypoint on the ND without the DATA switch on.
- **OTHER TRAFFIC (TCAS):** This toggle allows you to choose whether TCAS only shows you proximate traffic (realistic) or shows you all traffic in your vicinity. (Not realistic but convenient for online flying!)
- **RANGE:** Allows you to manually change the display range for TCAS traffic. (Useful for online fly-ins if you need to limit the number of aircraft displayed on the screen.) We recommend leaving this set to 40nm.
- **ALT SEPARATION:** Allows you to manually de-clutter traffic that is above/below you. (Useful for online fly-ins if you need to limit the number of aircraft displayed on the screen.) We recommend leaving this set to 2800FT.

PAGE 6/7 - EICAS

- **SHOW GW ON EICAS:** Displays the gross weight on the EICAS above the total fuel indication.
- **DOOR ARMING INDICATION:** This option determines whether or not the arming status of each entry door is shown on the lower EICAS DOORS synoptic.
- **LIST DISABLD HYD SYSTEMS:** This option determines whether or not the affected hydraulic systems will be listed on the lower EICAS HYD synoptic.



INTRODUCTION

- **ECS PAGE SHOWS BULK CGO:** This option determines whether or not the bulk cargo zone will be shown on the lower EICAS ECS synoptic.
- **GEAR PAGE TIRE PRESSURE:** This option determines whether or not the tire pressure will be shown on the lower EICAS GEAR synoptic.

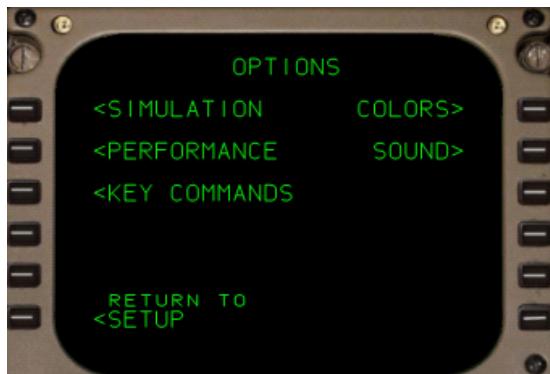
PAGE 7/7 – EICAS

- **APU OIL QTY DISPLAY:** Determines whether the oil quantity is displayed only when the APU selector switch is in the ON position, or always.
- **FLT CTL DISPLAYED ON:** Determines whether the flight control indications are displayed on the ENG or the STAT page.

FAILURES Customization Pages:

The failures and maintenance logic is covered in great depth in the FAILURES AND MAINTENANCE section.

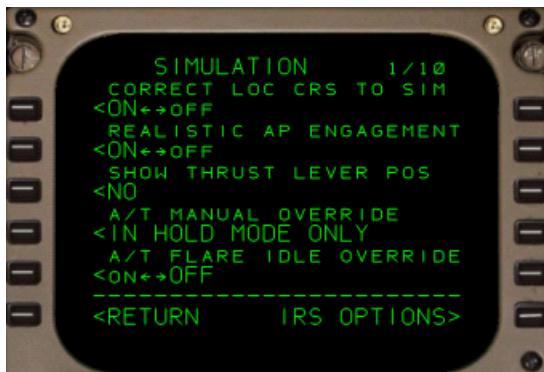
OPTIONS MENUS



The configuration options located under the OPTION menu provide you with the opportunity to modify your simulation experience to suit your tastes. These include performance tweaks, assigning key-driven commands to cockpit functions, adjusting the way the sound environment is simulated and many more. The OPTIONS menu is broken into sub-menus to categorize options for ease of organization.

- <SIMULATION>: This menu will allow you to change a number of features in the simulation such as maintenance failures, user interface items and other global features that apply across all aircraft tail numbers to customize the simulation to your tastes.
- <PERFORMANCE>: The options contained in this menu will allow you to tweak slightly certain items that may be of benefit to users suffering from poor performance on older machines. Going through these items will help you to avoid using unnecessarily performance hungry options if you are concerned about performance on your computer.
- <KEY COMMANDS>: This menu will allow you to assign various key commands to knobs, buttons, switches or controls on the flight deck. You can use these key commands to interface actions with your flight simulation hardware, or just to simplify actions while flying the airplane.
- <COLORS>: This menu will allow you to customize PFD, MFD, instrumentation and cockpit lighting colors in the simulation.
- <SOUND>: This menu will allow you to customize some areas of the sound environment in the simulation.

INTRODUCTION

SIMULATION Configuration Menu:**PAGE 1/11**

- **CORRECT LOC CRS TO P3D:** When it comes to navigation data, P3D has an inherent weakness in that data related to ILS/LOC stations is hard coded into the simulator and is not updated to keep it current with the normal magnetic shift. The end result is that the localizer final approach course in the P3D world will sometimes vary from the real world. Since many users are also using real-world navigation charts, this can create some confusion and can also create problems if the LOC course is not correctly set to match the P3D hard-coded information. (The airplane cannot fly the localizer properly if the CRS on the CDU NAV RAD page is set incorrectly) To compensate for this, we recommend setting this option to ON, and we will read the appropriate P3D localizer course and adjust the setting for you, thus saving you time and frustration.
- **REALISTIC AP ENGAGEMENT:** This option can be used to simplify the autopilot engagement process if desired. When set to “Realistic Engagement” the autopilot will require that the airplane is in a balanced trim condition prior to accepting a pilot command to activate. Thus, if you are holding control input in place to maintain the desired flight path, you would need to re-trim the airplane until control force is no longer required to maintain the desired flight path. Selecting “OFF” will simplify the engagement logic for those who are just learning how to fly the simulator, thus reducing your workload. If you notice the autopilot failing to take control of the airplane when you press the AP button, refer back to this paragraph as a refresher!



If you set the autopilot engagement limitations to REALISTIC, then you must be within a small margin of "in trim" (no control forces required to keep airplane on desired path), you cannot be actively trimming, and the flight director should be nearly centered. If you violate any of these conditions, the autopilot will not engage.

- **SHOW THRUST LEVER POS:** When the airplane is being flown using auto-throttles, the throttle position quickly gets out-of-sync with the position of your joystick throttle. This can create an uncomfortable change in thrust when you disconnect the auto-throttle on approach or immediately prior to landing. In order to eliminate the need for you to quickly adjust your throttles to avoid a thrust change we have devised a system that will allow you to easily sync your throttle position to the auto-throttle position:

By selecting Show Thrust Lever Position to ON, you will notice that moving your throttles while the auto-throttles are engaged will cause a small cyan marker to appear on the EPR/N1 thrust tapes on the upper EICAS. The cyan mark is showing you the current physical position of your joystick throttle. Simply put the cyan mark to the same location as the white throttle tick mark displayed on the same tape, and you will have your throttles properly synchronized with the current auto-throttle setting.

- **A/T MANUAL OVERRIDE:** This option allows you to decide how you want the autothrottle react to changes in your joystick throttle position. In the airplane, moving the throttles will momentarily change the thrust of the engines, but they will return to the previous position when released, unless the autothrottle is in HOLD mode. You can realistically simulate this by selecting the <IN HOLD MODE ONLY option.

If you wish to simplify the process a bit while learning to fly the airplane, you can select <NEVER (in which case any movement of your joystick throttle will be ignored by the auto-throttle) or you can select <ALWAYS (in which case the auto-throttle will always allow you to override the desired thrust by simply moving your joystick throttle).

We recommend setting this to <IN HOLD MODE ONLY.

NOTE: If the autothrottle is in HOLD mode and you move your



INTRODUCTION

joystick throttles, the engine will change power. If you have trouble with this, then simply set this option to NEVER.

- **A/T FLARE IDLE OVERRIDE:** This option allows the physical throttle to override the autothrottle's retard to idle during the flare sequence. This may be useful to some users who feel their thrust reversers are not engaging fast enough. In the real airplane pilots often manually pull the thrust levers to idle manually quickly during the flare in order to get the reversers activated right as the main landing gear touch down.
- **IRS OPTIONS>:** The IRS Options sub menu at LSK 6R provides you with options to customize the way the Inertial Reference System operates within the simulator. You can choose the length of time it should take for the IRS to align and whether or not the IRS will retain the last known memory position of the airplane at the time it was powered down.

PAGE 2/11

- **HI IDLE ON FLARE:** Determines whether the thrust is maintained at high idle through the flare. While setting the option on may more faithfully simulate approach idle, due to P3D limitations, it may also delay thrust reverser deployment after touchdown.
- **CTL INPUT WITH AP ON:** This option allows the sim to ignore any hardware connected to the simulator when the AP is on. This is particularly useful if your hardware is prone to send spikes that occasionally disconnect the AP.
- **CTL COLUMN NULL ZONE:** This option sets the percentage of your controller's total movement in the pitch axis required before the pitch mode changes to manual control from the hands-off speed stability or path hold modes.
- **CTL WHEEL NULL ZONE:** This option sets the percentage of your controller's total movement in the roll axis required before the roll rate demand mode engages.
- **AP/AT TURB MODE TRIGGER:** P3D's turbulence modeling is unrealistic and results in constant severe G loads on the aircraft that can interact negatively with realistic autopilots. This option sets the threshold for engagement of special turbulence stability modes of the autopilot and autothrottle. The threshold is set in knots of average deviation of the tail wind component (a measure of wind fluctuation). The allowable range is 0.5 to 5.0 knots and the default value is 1.0 knot.



PAGE 3/11

- **SERVICE-BASED FAILURES:** When using service based failures, you will experience a highly realistic statistical model for mechanical failures that uses the airplane's age and operating experience in order to predict equipment failures in a fashion similar to the real world operating experience of 747 operators. This model was created using real world data defining the Mean Time Before Failure for nearly every operational part of the airplane. This being the case, equipment will wear out, and mechanical failures will happen, requiring you to use the Quick Reference Handbook to manage mechanical failures, and the Aircraft Maintenance menus in the FMS to service the airplane as you use it.
- **USE SAVED ENG OIL QTY:** This option stores the remaining engine oil at the end of a flight so that it will be the level at the beginning of the next flight (in the particular tail number, unless using a fixed config).
- **DISPLAYS POWERUP TIME:** Realistic mode takes several minutes for the cockpit to "boot" from cold and dark. Fast mode significantly decreases the wait time.
- **TAB KEY FOR CDU INPUT:** This feature uses our Keyboard Direct Entry methodology for simplicity. To activate the function, simply hold down the TAB key and type on your keyboard as you normally would (as if you were holding shift to type capital letters). Releasing the TAB key will return keyboard functionality to normal.
- **DISABLE CAPT PFD POP-UP:** This option disables or enables the ability to pop up the CAPT side PFD. Beginning with changes Lockheed martin made for P3D v3.1, enabling this option caused some users to experience a sim CTD after approximately 4-7 hours of operation. If you enable this option and experience a CTD, we recommend turning this option off, and using the copilot PFD popup instead.

PAGE 4/11

- **GROUND COMMS:** Selects between voice, text, both voice and text, or no comms for the pushback sequence.
- **SYNC CAPT AND F/O BARO:** Normally both pilots are responsible for setting their own altimeter's barometer setting. For simplicity, we have allowed you the option to have all the altimeters in the cockpit set to match, without regard to which

**INTRODUCTION**

altimeter you set. This will prevent you from having to move around the cockpit in order to sync the altimeters. Note that we recommend turning this feature off if using a multi-crew cockpit.

- **SYNC CAPT AND STBY BARO:** Same as the above option, only it relates to setting the standby/ISFD altimeter's barometer setting.
- **PNF CALLS OUT AIRSPEED:** This is the "Airspeed Alive" callout on the takeoff roll.
- **PNF CALLS OUT 80 KTS:** Selects voice callout by the pilot not flying (PNF) for airspeed 80 knots.

PAGE 5/11

- **PNF CALLS OUT V1:** Selects voice callout by the pilot not flying (PNF) for airspeed V1.
- **PNF CALLS OUT VR:** Selects voice callout by the pilot not flying (PNF) for airspeed VR.
- **PNF CALLS OUT V2:** Selects voice callout by the pilot not flying (PNF) for airspeed V2.
- **PNF CALLS OUT POS RATE:** Selects voice callout by the pilot not flying (PNF) for positive rate of climb.

PAGE 6/11

- **AUTO STEP CLIMBS:** Automatically increase the MCP altitude at step climb points and climb to the new altitude. Useful if you are flying long haul while not at your computer.
- **PAUSE AT TOP OF DESCENT:** Some users appreciate having the simulation pause when the aircraft reaches the VNAV Top of Descent for the programmed route of flight. This allows the user to step away from the simulation without having to worry that the airplane will overfly the T/D point. You can select the function on/off here as desired
- **REACHING TANK/ENG:** This option allows the user to select between the pilot handling the TANK/ENG actions, pausing the simulator when TANK/ENG actions are required, or the sim handling the TANK/ENG actions. It is important to note that this logic is only in effect during the cruise portion of flight. The sim will not pause, nor will the pumps and crossfeed valves be automatically reconfigured for you if the airplane has not yet reached cruise or if the airplane has already entered the descent



phase of flight. (This helper-feature is designed to prevent the airplane from winding up misconfigured during a long cruise phase if you happen to walk away from the sim!)

- **AUTO TIME COMPRESSION:** Selects the maximum time compression rate for the PMDG automatic time compression feature (this can also be set on the AUTO CRUISE page).
- **CHR BUTTON RIGHT CLICK:** Selects whether right clicking the clock's CHR button turns on PMDG automatic time compression or standard P3D time compression.

PAGE 7/11

- **SPLASHES IN DAYLIGHT:** Allows the external model light splashes to function in the daytime. Note that this may cause visual artifacts due to the specifics of the lighting technique used.
- **FLOODS IN DAYLIGHT:** Allows the cockpit flood lights to function in the daytime. Note that this may cause visual artifacts due to the specifics of the lighting technique used.
- **FLOOD LTS DEFAULT LVL:** Sets the default value in percent of the cockpit flood lights.
- **PANEL LTS DEFAULT LVL:** Sets the default value in percent of the cockpit panel backlighting.
- **HDR ADJUSTMENT LEVEL:** Sets the default HDR adjustment value to NONE, LOW, MEDIUM or HIGH.

PAGE 8/11

- **ACP CONTROLLING P3D:** In the real aircraft, each Audio Control Panel (ACP) is configured for transmission and reception only for the person using it. If the captain configures the left ACP to transmit/receive on COM1 and the F/O configures the right ACP for COM2, then the captain will not be able to transmit to COM2 or be able to monitor the COM2 frequency, unless the VHF2 receive switch on the left ACP is pressed.

In P3D there is only one person interacting with the radios. Normally this is assumed to be the captain, meaning the ability to transmit/receive only on radios that are properly configured on the left ACP.

The ACPs should not be confused with the Radio Tuning Panels (RTPs), which are not side specific.



INTRODUCTION

Three alternatives are provided for this option:

- CAPT ONLY (Default – Left ACP controls radios, as above)
- F/O ONLY (Right ACP controls radios)
- EITHER CAPT OR F/O (Either ACP can be used)

In the first two cases, only the selected ACP will be functional.
The other two will not interfere with P3D radios at all.

Example 1:

If the left ACP is selected, to transmit on VHF2 you have to press the VHF2 MIC switch on the left ACP. If you want to monitor COM1 at the same time you have to also press the VHF1 receive switch on the left ACP. The position of the MIC and receive switches on the right and OBS ACPs will be irrelevant.

Example 2:

If the VHF1 receive switch is pressed on left ACP and the VHF1 MIC switch is pressed on the right ACP you will be able to transmit on COM2 and receive on both COM1 and COM2.

Example 3:

If the VHF2 MIC switch is pressed on the left ACP and the VHF1 MIC switch is pressed on the right ACP, you will be transmitting and receiving on COM1. Obviously you can't transmit on both radios, so COM1 is selected (COM1 will be preferred over COM2 in these cases)

- **SIM COMMS DISABLED:** In case COM1 or COM2 cannot be used, either because of a failure or because the controlling ACP is not properly configured for transmission/reception on this radio, the radio can be disabled in P3D. In these cases the P3D radio is masked by tuning it to a fake frequency of 136.975. The RTPs will still display the selected frequency, but internally the disabled radio will be tuned to 136.975.

This feature has caused some problems with 3rd party add-ons and radio hardware that use directly the P3D frequencies. This combined with some FSUIPC "features" can create a mess sometimes. So we are providing the following alternatives for this option:

- WHEN FAILED/MISCONFIG – DEFAULT
- NEVER



INTRODUCTION

WHEN FAILED/MISCONFIG will work as described above.
NEVER will disable this feature and will never tune P3D to the fake frequency of 136.975.

If you are experiencing any problems with hardware radio panels, FSUIPC, SquawkBox, FSInn, etc. set this option to NEVER

- **YOKES MOVE WHEN LOWERED:** This option controls the behavior of the yokes when they are hidden (lowered). Note that this is not a real option on the actual 747, the yokes only have one position (normal) in real life.
- **SIM PLN FILE FOR WX:** Automatically exports the active FMC route into a P3D format WX.pln file saved in My Documents\Prepar3D v3 Files for loading into external weather programs. This file is created and subsequently updated each time the user selects a CDU page that contains a weather data related REQUEST prompt (RTE DATA, DES FORECAST, ALTN pages).

PAGE 9/11

- **GROUND ROLL SHAKING:** Enables or disables shaking in the VC to simulate cockpit shaking due to rough surfaces during ground rolls.
- **TOUCH DOWN SHAKING:** Enables or disables shaking in the VC to simulate cockpit shaking during touchdown.
- **ENGINE FAIL SHAKING:** Enables or disables engine shaking during engine failures, simulating an unbalanced turbine or fan.
- **TURBULENCE SHAKING:** Enables or disables shaking in the VC to simulate cockpit shaking during turbulence.
- **AERODYNAMIC SHAKING:** Enables or disables shaking in the VC to simulate cockpit shaking during aerodynamic stalls, turbulence and environmental buffeting.

PAGE 10/11

- **PILOTS IN EXT VIEW:** You can remove the pilots from the cockpit (such as when parked at the terminal) by selecting HIDE, and place them back in the cockpit by selecting SHOW.
- **GROUND SERVICE OBJECTS:** Shows or hides the built in ground service objects. If SHOW SELECTED is chosen, the next option allows various ground service objects to be selected.

**INTRODUCTION**

- **GROUND SERVICE OBJECTS** (dependent on above option): Allows specific ground service objects to be selected.
- **GROUND CONNECTIONS**: Determines whether the ground service objects will be animated on arrival, or instantly appear.
- **GLOBAL OPS CENTER**: Determines whether the PMDG Global Operations Center features are enabled or not.

PAGE 11/11

This page allows you to tell the airplane software whether or not you are using the AXIS STEERING SET setting within Prepar3D. To use this properly, first open the Prepar3D OPTIONS, CONTROLS menu and then click on Axis Assignments. You should select the Axis Steering Set setting, assign it to a joystick axis, and most users will want to select the “reverse” check box in order to get proper orientation on the axis.

It is important to set the “USE P3D TILLER AXIS” setting to YES if you are planning to use the tiller axis. Your tiller will work without this setting set properly, but you will not be able to access any of the functions related to tiller steering in the PMDG product.

- **USE P3D TILLER AXIS**: This setting should be set to YES if you have activated the AXIS STEERING SET setting within Prepar3D. If you have not activated this axis, then leave this setting in the NO position.
- **FULL RANGE STEERING**: Prepar3D only allows you to exercise up to +/-57 degrees of ground steering. The 747 airplane actually provides the crew with +/-70 degrees of steering. To give you the additional steering range (which is important when maneuvering in congested ramps, or when a reversal is needed on a runway at a small airport) you should select this setting to ON. Note that steering beyond 57deg should only be used at speeds slightly faster than walking speed, so we recommend only turning the tiller to full deflection if your speed is around 1 to 2 knots. Speeds faster than this are uncomfortable for passengers toward the tail of the airplane and could be dangerous to cabin crew standing in the isles or galleys.
- **STEERING SENSITIVITY**: The following settings are available when tiller steering is active:



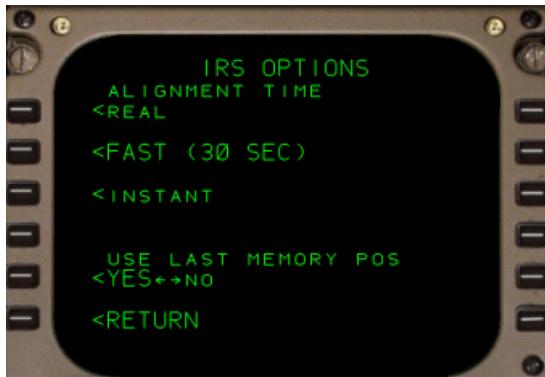
INTRODUCTION

DEFAULT: This setting disables PMDG custom steering logic and defaults back to the basic P3D steering mechanism. Note that the maximum steering displacement available is 57 degrees.

LOW/MEDIUM/HIGH: These settings represent different sensitivity levels in order to allow customers with a broad range of hardware to find a setting the feels correct for their hardware. We generally recommend that high-precision hardware such as that found in many large home flight decks will generally behave well when set to HIGH. Most users will find that MEDIUM is a good setting as this replicates the airplane's control channel most closely. Users with consumer grade or older hardware may find that LOW helps to minimize errant signal noise while allowing for good control of the tiller.

- **ADD LAG TO INPUTS:** Activating this function will turn on an internal signal smoothing in order to eliminate spikes or errant signals that might emit from certain hardware devices. Some users also report that activating this setting gives them a smoother, heavier feel to the steering control input.
- **WEATHER RADAR:** For users of ActiveSky P3D or REX weather radar, you can select your radar choice with this setting. Please note that if the weather radar platform is not detected, the option will remain shaded to indicate that it is not available.

INTRODUCTION

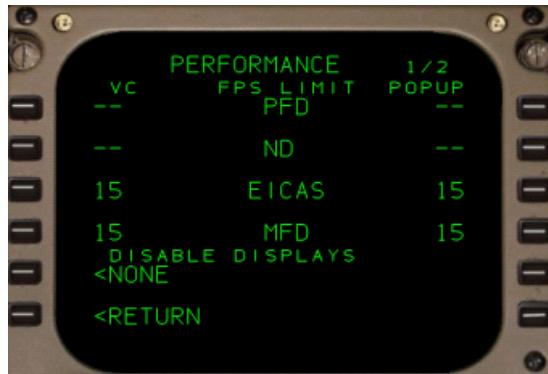
IRS Options Sub-Menu:

Under the SIMULATION menu (page 1) there is an IRS OPTIONS sub-menu at LSK 6R that contains a group of options related to the Inertial Reference Systems on the airplane.

- **ALIGNMENT TIME:** Normally, the IRS takes approximately ten minutes to align, a period during which the airplane cannot be moved. Sometimes this is not convenient in a simulation, so we have offered some alternatives to allow you to align the IRS more quickly:
 - **REALISTIC:** This option will force the minimum ten-minute alignment while the IRS senses planetary rotation in order to bring itself to full alignment.
 - **FAST (30 SEC):** This option will align the IRS in 30 seconds, thus requiring that you be aware of the alignment requirement without making you wait ten minutes.
 - **INSTANT:** Just as it says.
- **USE LAST MEMORY POSITION:** A modern IRS/FMS is capable of remembering where it was when it was powered off. You can simulate this by setting this feature to YES.



PERFORMANCE Options:



With the performance tuning menu, you can adjust the update rates of the cockpit displays in order to optimize their influence on your simulation experience. You can also turn off the first officer's displays in the VC.

In general, we recommend that users adjust their scenery, traffic and simulator settings in order to improve performance of the simulator. As a last resort, you can adjust the rate of frame updates in on the displays within the **PMDG 747-400**. The performance tuning methodology operates under the premise that fewer updates to the displays in the cockpit will mean greater performance in the simulator itself. Your results will vary depending upon your hardware and your simulator settings, and we generally recommend leaving this performance as it is set in the default.

For those who are not interested in having all of the displays powered at all times, you can gain back some performance by disabling the first officer's displays in the VC. You do this via the toggle in the PERFORMANCE TUNING menu.

NOTE: We recommend that users follow the optimization guidance provided at the beginning of this document. This will give you the best performance for your machine!

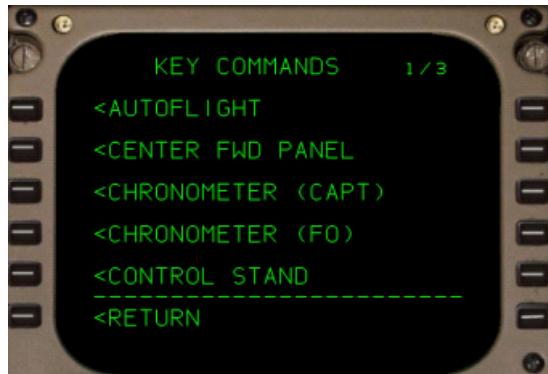
INTRODUCTION

PAGE 1/2

- **FPS LIMIT:** Here you can adjust the frame rate (FPS) limit of the PFD, the ND, EICAS and lower EICAS/MFD by entering the desired FPS limit. Enter the desired limit into the scratchpad and press the LSK of the value you want to change. When the entries are blanked with two dashes, the display is unlocked and will display the highest FPS it can.
- **DISABLE DISPLAYS:** This setting allows you to disable the First Officer's display or the Captain's display. To show both displays, set this value to NONE.

PAGE 2/2

- **TERRAIN IMAGE DETAIL:** This setting controls the ND range at which the terrain display begins averaging individual terrain samples together in order to not affect performance. If you experience a performance hit with the terrain display on, try setting this option to medium or low.
- **TERRAIN IMAGE SIZE:** This setting controls the resolution of the internal bitmap terrain cells are drawn to before being displayed on the ND. Higher settings look better at the possible expense of performance.
- **TERRAIN DITHER COLORS:** This setting determines whether or not the terrain map is dithered, which results in a realistic "dot" type look to the display. If turned off, the display will be drawn with solid colors. This setting is mainly visual, and you can set it to your preference.
- **TERR SWEEP:** This setting turns the raster sweep effect on or off. In the real aircraft, the terrain mode draws to the ND using the same internal hardware that the weather radar does. This is simulated and you will see a sweep effect across the ND simulating the raster hardware's buffered display method.

**KEY COMMANDS Options:**

In order to offer the widest variety of functionality to the broadest sector of users, we have made many functions in the cockpit "assignable" to a key command, thus giving you the ability to control various functions using key commands directly or via your flight sim hardware as desired.

You can assign key commands to functions within the cockpit by locating the desired switch from the list of functions presented in the KEY COMMANDS menu. (The available assignments are broken into categories under the KEY COMMANDS menu.)



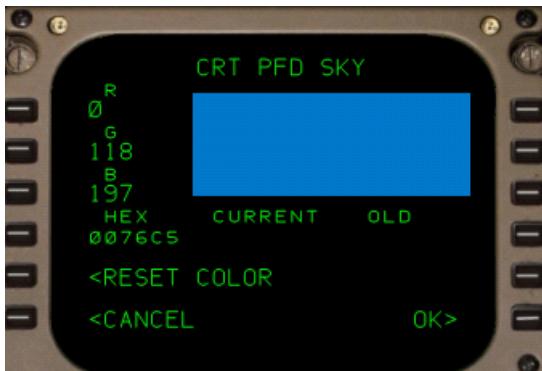
When you select a component, you will be presented with instructions that will allow you to assign a custom key command to the desired function. The currently assigned key command will be displayed in green in the key command menu.

INTRODUCTION

COLOR Options:

We have included the color option feature in order to offer you the ability to customize PFD, EICAS, instrumentation and cockpit lighting colors in the simulation.

In order to adjust a specific item's color value, click on the LSK next to it.



In the above image you will see that there are two different methods to change the color of the PFD SKY:

Method 1:

Enter the RGB (**R**ed, **G**reen, **B**lue) color values in LSK 1 [**R**ed], LSK 2 [**G**reen] and LSK 3 [**B**lue] by entering the values into the scratch pad and then pressing the corresponding LSK.

Method 2:

Enter the HEX (hexadecimal) color code into the scratch pad and then press LSK 4.



SOUND Options:

During production of the **PMDG 747-400** we recorded hundreds of sounds in order to provide the greatest degree of sound immersion possible. As part of the process, we have spent a significant amount of time balancing the sound levels, mixing them based upon volume and location in the cockpit.

To get the highest degree of sound fidelity, we recommend that you go into your P3D sound settings and verify that they are set as shown here:



Next, in the SOUND menu, you will find the following settings and options available to you:



- **MASTER VOLUME:** This setting controls the overall level of all custom sounds generated by the 747's sound processor, as opposed to the P3D sound engine settings above. We have balanced the cockpit sounds for the 747 at a default setting of 50.
- **<VOLUME LEVELS ADJUST sub-menu:** You will be presented with a series of options that allow you to set the sound volume levels for various sound components individually. This allows you



INTRODUCTION

to achieve a balance that works best for you based upon your own sound hardware.

It is worth noting that the default setup we have provided to you should provide the best overall realism to replicate the sound environment of the 747 type airplane.

- **IN EXT VIEW:** This setting controls whether the custom cockpit sounds will play while an external view is selected in P3D.
- **IN BKGND:** This setting controls whether the custom sounds generated by the PMDG sound processor will continue playing while the P3D window is in the background (aka not “in focus”). This is useful for users of addons that force the main P3D sound engine to continue playing while in the background.
- <DEVICE sub-menu: If you have multiple sound playback devices attached to your computer, you can choose between them using this sub-menu.
- **PRE-LOAD SOUNDS:** This option allows you to choose which PMDG custom sounds are pre-loaded (cached) into memory at various times. This can be used to prevent stuttering or reduce the airplane’s VAS footprint.

The options are as follows:

- **NONE:** This is the default mode. It does not preload at all and releases sounds 60 seconds after they are played and reduces VAS issues and out of memory errors. More stutters from sound file loading may result on certain PC configurations, however. If you experience stutters and are not having VAS/OOM issues, try **SELECTIVE** or **ALL**.
- **SELECTIVE:** This mode will pre-cache only the sounds most likely to be needed for each phase of flight.
- **ALL:** This mode pre-loads all sounds upon load of the panel or switching of the option on. This option will result in the smoothest experience for users getting frequent sound related stutters. Please be aware, however, that this option can cause a *significant increase in VAS usage*. If you are close to the VAS limit and an out of memory crash during your flights, this setting will exacerbate the situation! (see page 29 for more information on VAS and out of memory errors)



FAILURES AND MAINTENANCE

Due to the depth of information required to adequately describe the failures and maintenance system, we are giving this topic its own space in the manual.

For users who do not wish to interact with the potential for mechanical failure in their simming experience, you can simply skip over this section. The mechanical reliability of your **PMDG 747-400** is set to “perfect” by default.

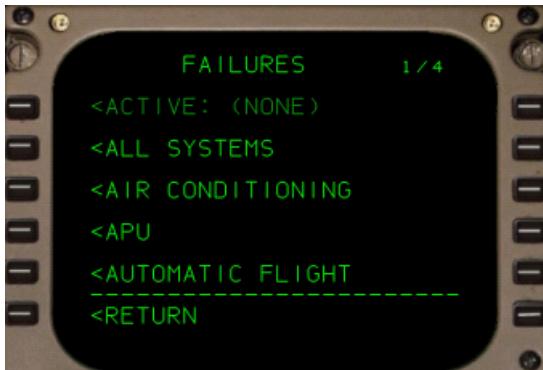
If you wish to experience the potential for mechanical failures, there are currently three ways in which you can challenge yourself:

1. RANDOM: When you activate random failures, you will have the opportunity to set the rate of random failures while also setting limits on the total number of events that may be triggered. This method will allow you to challenge yourself and your airplane knowledge while also setting limits on the number of times that a failure will be triggered during the scope period.
2. SERVICE BASED FAILURES: When you activate service-based failures, you will experience mechanical reliability that closely approximates the mechanical reliability of the airplane in normal service operation. Each mechanical system aboard the airplane has been programmed to operate using a “Mean Time Before Failure” (MTBF) model to determine if/when a component may fail. The MTBF data is compiled from industry experience with the 747 airplane type and augmented to make the data compliant with the expected utilization rate of this simulation product.
3. Programmed Failures: We have provided you with the ability to set programmed failures for individual sub-systems. You can immediately trigger a specific system failure by choosing it from a list, or you can tell the system to randomly select a failure from within that system.

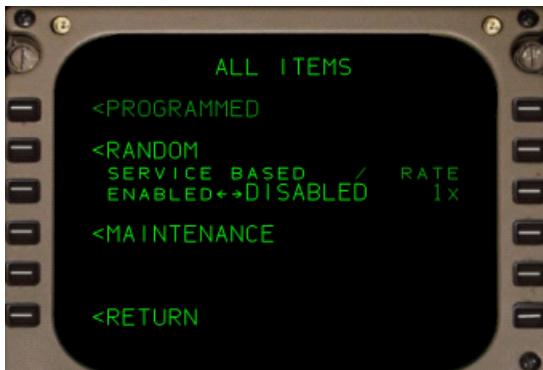
INTRODUCTION

Failures: Top Menu:

Entering the failures menu from the SETUP menu will display the following menu:



From the FAILURES top menu, you can select from individual systems (use the PREV PAGE and NEXT PAGE to scroll up and down) or you can go into the ALL SYSTEMS to set random or service based failures, or you can select an individual system from within which you can set specific failures.

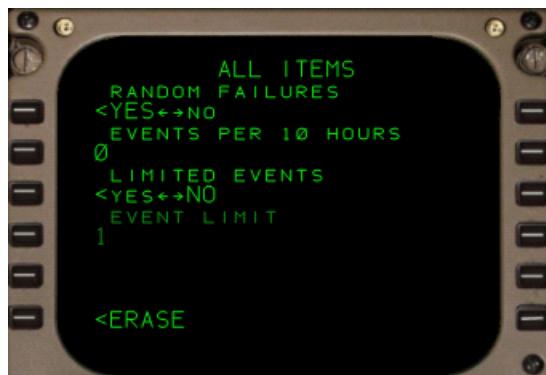
All Systems: Top Menu:

This menu allows you access to establish the RANDOM and SERVICE BASED FAILURES modes. This page will also allow you to enter the maintenance performance section.

***Random Failures Sub-Menu:***

The random failures menu allows you to set up a process for random failures to be triggered at a specific rate, with a limit to the total number of events that may be triggered.

To turn the random failures mode on, simply set the RANDOM FAILURES selector to YES. This will turn the random failure settings to white to indicate that they are now active for manipulation.



Use of the random failure feature is pretty straight forward. First, choose the approximate number of failure events you would like to see triggered during an average 10-hour period of simulation. The rate at which failures will occur will roughly approximate the theoretical [EVENTS PER HOUR / 10 HOURS].

Note that the actual rate may vary slightly so it is possible that you might see failures triggered in rapid succession, and you may see more than



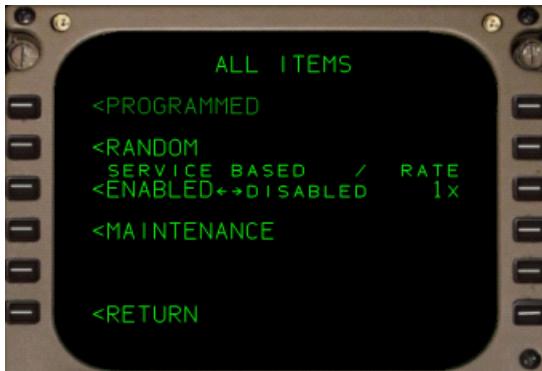
INTRODUCTION

the desired number of failures in a specific ten hour period, but the average rate of failures will closely approximate your settings.

If you wish to limit the number of events that are triggered, you can set this number by turning LIMITED EVENTS to YES and the setting the hard limit in the EVENT LIMIT line.

You can use this limit if you want to trigger a rapid series of events, but also want to limit the total number failures.

Service Based Failures Sub-Menu:



Service Based failures will provide you with a highly realistic simulation of failures on and operational airplane. As you fly the simulator, the total flight time and system operation of the airplane is tracked. The combination of factors will be compared against known data predicting the Mean Time Before Failure for every component on the airplane.

As failures take place, you will need to use the Quick Reference Handbook to resolve the failures and your judgment as captain to determine whether it is feasible to continue on to your destination, or whether a diversion for maintenance is required.

When operating under the serviced based failures process, you may fly for many hours without seeing any mechanical unreliability in your airplane. Conversely you experience a streak of mechanical failures from the mundane to the critical.

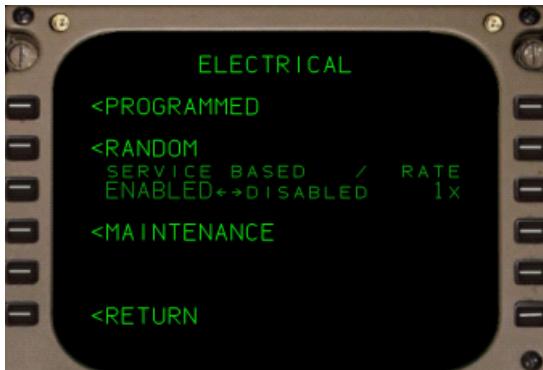
When operating with the Service Based Failures module active, it will be necessary to occasionally have your airplane “serviced” by your line maintenance crews.

Maintenance Sub-Menu:

The following functions are available to you in the maintenance page:

- <CLR ACTIVE: When failures are triggered, you can use the CLR ACTIVE button to reset any failures that have already been triggered.
- <CLR ALL: This will clear failures that have already triggered as well as failures that are armed to be triggered at a later time.
- <NEXT SERVICE IN: This indicates to you the approximate amount of time until the next service period for the airplane is due.
- <SERVICE ALL: This setting allows you to simulate the effect of maintenance personnel servicing the airplane in accordance with the normal maintenance schedule. It is worth noting that flight crews normally have very little interaction with the routine servicing of an airliner. The servicing process is generally managed by the airline maintenance department and is largely transparent to the crew. In this case however, you are responsible for complying with the service requirements for the airplane to ensure that the airplane remains in proper mechanical condition.

INTRODUCTION

System Failure / Maintenance Menu:

If you wish to work with mechanical failures located within an individual system, you can do so quite easily by selecting the system from the list displayed under <FAILURES.

In the example graphic shown above, we are shown the ELECTRICAL page of the failures menu. There are four items displayed here from which you can choose:

- <PROGRAMMED: This menu will display all of the potential mechanical failures that the system is capable of simulating. You can then individually activate, arm, disarm or deactivate the failures listed.
- <RANDOM: This menu will allow you to activate/deactivate random failures within this system, just as you would with the global random failures method described above.
- <SERVICE BASED FAILURES: Allows you to interact with the service-based failures just as you would in the top menu described above. (Will be grayed out if service-based failures are not selected active in the top menu.)
- <MAINTENANCE: Allows you to interact with the maintenance functionality for the selected system.

***Failures Master List:***

The following failures are possible:

Air Conditioning: (44)

- Pack Temp Control A
- Pack Temp Control B
- Zone Temp Control
- Pack 1 FCV Valve
- Pack 2 FCV Valve
- Pack 3 FCV Valve
- Pack 1 Overheat
- Pack 2 Overheat
- Pack 3 Overheat
- Pack 1 Internal Fault
- Pack 2 Internal Fault
- Pack 3 Internal Fault
- Master Trim Valve
- Trim Air Valve L
- Trim Air Valve R
- Trim Air Isolation Valve
- Lower Lobe Forward Trim
- Lower Lobe Aft Trim
- Recirc Fan Upper Left
- Recirc Fan Upper Right
- Recirc Fan Lower Left
- Recirc Fan Lower Right
- Flight Deck Fan
- Forward Cargo Heater L
- Forward Cargo Heater R
- EQ CLG Exhaust Fan
- EQ CLG Supply Fan
- Cargo Heat Override Valve
- Aft Cargo Heat Valve
- Bulk Cargo Heat Valve
- EQ CLG Inboard Supply Valve
- EQ CLG Inboard Exhaust Valve
- EQ CLG Bypass Valve
- EQ CLG Ground Exhaust Valve
- EQ CLG Smoke Override Valve
- EQ CLG E6/E9 Valve
- EQ CLG Card



INTRODUCTION

- Cabin Press Control A
- Cabin Press Control B
- L Cabin Press ICU
- R Cabin Press ICU
- L Outflow Valve Fail
- R Outflow Valve Fail
- Rapid Decompression

APU: (7)

- Starter Motor Failed
- Overheat
- Overspeed
- APU Oil Leak
- Shutdown Failure
- Air Inlet Door Failed
- Critical System Error

Automatic Flight: (5)

- Autothrottle INOP
- Left AFDC INOP
- Right AFDC INOP
- Center AFDC INOP
- AFS Failed

Communications: (13)

- Audio Control Panel Captain
- Audio Control Panel First Officer
- Audio Control Panel Observer
- Radio Tuning Panel Captain
- Radio Tuning Panel First Officer
- Radio Tuning Panel Observer
- VHF Left Radio Fail
- VHF Right Radio Fail
- VHF Center Radio Fail
- HF Left Radio Fail
- HF Right Radio Fail
- ACARS System Fail
- SATCOM System Fail

***Doors: (17)***

- Door 1 Left
- Door 1 Right
- Door 2 Left
- Door 2 Right
- Door 3 Left
- Door 3 Right
- Door 4 Left
- Door 4 Right
- Door 5 Left
- Door 5 Right
- Door Upper Deck Left
- Door Upper Deck Right
- Forward Cargo Door
- Aft Cargo Door
- Bulkhead Cargo Door
- Side Cargo Door (F, BCF, M)
- Nose Cargo Door (F)

Electrical: (52)

- Generator 1 Fail
- Generator 2 Fail
- Generator 3 Fail
- Generator 4 Fail
- Generator 1 Breaker
- Generator 2 Breaker
- Generator 3 Breaker
- Generator 4 Breaker
- Generator 1 Drive Disconnect
- Generator 2 Drive Disconnect
- Generator 3 Drive Disconnect
- Generator 4 Drive Disconnect
- Bus Tie 1
- Bus Tie 2
- Bus Tie 3
- Bus Tie 4
- APU Generator 1
- APU Generator 2
- APU Generator 1 Breaker
- APU Generator 2 Breaker
- Split Sys Breaker
- Static Inverter

INTRODUCTION

- Static Inverter APU
- TRU 1
- TRU 2
- TRU 3
- TRU 4
- TRU A
- TRU B
- Main Battery Charger
- APU Battery Charger
- Main Battery
- APU Battery
- AC Main Bus 1
- AC Main Bus 2
- AC Main Bus 3
- AC Main Bus 4
- Captain Flight Instrument Transfer Bus
- FO Flight Instrument Transfer Bus
- AC Ground Service Bus
- AC Ground Handling Bus 1
- AC Ground Handling Bus 2
- AC Standby Bus
- DC Bus 1
- DC Bus 2
- DC Bus 3
- DC Bus 4
- DC Ground Handling Bus
- DC Battery Bus Main
- DC Battery Bus APU
- DC Hot Battery Bus Main
- DC Hot Battery Bus APU

Engine: (48)

- EEC Mode 1
- EEC Mode 2
- EEC Mode 3
- EEC Mode 4
- ENG 1 Severe Damage
- ENG 2 Severe Damage
- ENG 3 Severe Damage
- ENG 4 Severe Damage
- ENG 1 Flame-out
- ENG 2 Flame-out



- ENG 3 Flame-out
- ENG 4 Flame-out
- ENG 1 EGT Exceedance
- ENG 2 EGT Exceedance
- ENG 3 EGT Exceedance
- ENG 4 EGT Exceedance
- ENG 1 Oil Leak
- ENG 2 Oil Leak
- ENG 3 Oil Leak
- ENG 4 Oil Leak
- ENG 1 Oil Pressure
- ENG 2 Oil Pressure
- ENG 3 Oil Pressure
- ENG 4 Oil Pressure
- ENG 1 Oil Temperature
- ENG 2 Oil Temperature
- ENG 3 Oil Temperature
- ENG 4 Oil Temperature
- ENG 1 Vibration
- ENG 2 Vibration
- ENG 3 Vibration
- ENG 4 Vibration
- ENG 1 V1 Cut
- ENG 2 V1 Cut
- ENG 3 V1 Cut
- ENG 4 V1 Cut
- ENG 1 VR Cut
- ENG 2 VR Cut
- ENG 3 VR Cut
- ENG 4 VR Cut
- ENG 1 V2 Cut
- ENG 2 V2 Cut
- ENG 3 V2 Cut
- ENG 4 V2 Cut
- ENG 1 Reverser
- ENG 2 Reverser
- ENG 3 Reverser
- ENG 4 Reverser

Fire: (16)

- APU Fire
- ENG 1 Overheat

INTRODUCTION

- ENG 2 Overheat
- ENG 3 Overheat
- ENG 4 Overheat
- ENG 1 Fire
- ENG 2 Fire
- ENG 3 Fire
- ENG 4 Fire
- Main Deck Cargo Fire
- FWD Cargo Fire
- AFT Cargo Fire
- Equip Cool Sys Smoke
- Smoke Lavatory
- Smoke Crew Rest
- Smoke Rest UPR DR 5

Fire Protection: (92)

- ENG 1 Fire Loop A Fault
- ENG 2 Fire Loop A Fault
- ENG 3 Fire Loop A Fault
- ENG 4 Fire Loop A Fault
- ENG 1 Fire Loop B Fault
- ENG 2 Fire Loop B Fault
- ENG 3 Fire Loop B Fault
- ENG 4 Fire Loop B Fault
- ENG 1 OVHT Loop A Fault
- ENG 2 OVHT Loop A Fault
- ENG 3 OVHT Loop A Fault
- ENG 4 OVHT Loop A Fault
- ENG 1 OVHT Loop B Fault
- ENG 2 OVHT Loop B Fault
- ENG 3 OVHT Loop B Fault
- ENG 4 OVHT Loop B Fault
- APU Fire Loop A
- APU Fire Loop B
- FWD Lower Cargo Fire Loop A
- AFT Lower Cargo Fire Loop A
- FWD Lower Cargo Fire Loop B
- AFT Lower Cargo Fire Loop B
- Main Deck Fire Loop 1 A (Cargo Models Only)
- Main Deck Fire Loop 2 A (Cargo Models Only)
- Main Deck Fire Loop 3 A (Cargo Models Only)
- Main Deck Fire Loop 4 A (Cargo Models Only)

INTRODUCTION

- Main Deck Fire Loop 5 A (Cargo Models Only)
- Main Deck Fire Loop 6 A (Cargo Models Only)
- Main Deck Fire Loop 7 A (Cargo Models Only)
- Main Deck Fire Loop 8 A (Cargo Models Only)
- Main Deck Fire Loop 1 B (Cargo Models Only)
- Main Deck Fire Loop 2 B (Cargo Models Only)
- Main Deck Fire Loop 3 B (Cargo Models Only)
- Main Deck Fire Loop 4 B (Cargo Models Only)
- Main Deck Fire Loop 5 B (Cargo Models Only)
- Main Deck Fire Loop 6 B (Cargo Models Only)
- Main Deck Fire Loop 7 B (Cargo Models Only)
- Main Deck Fire Loop 8 B (Cargo Models Only)
- Wheel Well Loop A Fault
- Wheel Well Loop B Fault
- Bleed Duct L Loop A Fault
- Bleed Duct R Loop A Fault
- Bleed Duct C Loop A Fault
- Bleed Duct L Loop B Fault
- Bleed Duct R Loop B Fault
- Bleed Duct C Loop B Fault
- ENG Bottle 1 Left Squib
- ENG Bottle 1 Right Squib
- ENG Bottle 2 Left Squib
- ENG Bottle 2 Right Squib
- ENG Bottle 3 Left Squib
- ENG Bottle 3 Right Squib
- ENG Bottle 4 Left Squib
- ENG Bottle 4 Right Squib
- APU Bottle Squib
- ENG Bottle 1 A Squib
- ENG Bottle 1 B Squib
- ENG Bottle 2 A Squib
- ENG Bottle 2 B Squib
- ENG Bottle 3 A Squib
- ENG Bottle 3 B Squib
- ENG Bottle 4 A Squib
- ENG Bottle 4 B Squib
- Cargo Bottle A Squib FWD
- Cargo Bottle B Squib FWD
- Cargo Bottle C Squib FWD
- Cargo Bottle D Squib FWD

INTRODUCTION

- Cargo Bottle E Squib FWD (Cargo Models Only)
- Cargo Bottle F Squib FWD (Cargo Models Only)
- Cargo Bottle G Squib FWD (Cargo Models Only)
- Cargo Bottle A Squib AFT
- Cargo Bottle B Squib AFT
- Cargo Bottle C Squib AFT
- Cargo Bottle D Squib AFT
- Cargo Bottle E Squib AFT (Cargo Models Only)
- Cargo Bottle F Squib AFT (Cargo Models Only)
- Bottle 1A Discharge
- Bottle 1B Discharge
- Bottle 2A Discharge
- Bottle 2B Discharge
- APU Fire Bottle Discharge
- Bottle 3A Discharge
- Bottle 3B Discharge
- Bottle 4A Discharge
- Bottle 4B Discharge
- Cargo Bottle A Discharge
- Cargo Bottle B Discharge
- Cargo Bottle C Discharge
- Cargo Bottle D Discharge
- Cargo Bottle E Discharge
- Cargo Bottle F Discharge
- Cargo Bottle G Discharge

Flight Controls: (23)

- Flap/LED Control Fail
- Flap Fail
- LED Fail
- Spoiler ACT 1 or 12 Fail
- Spoiler ACT 2 or 11 Fail
- Spoiler ACT 3 or 10 Fail
- Spoiler ACT 4 or 9 Fail
- Spoiler ACT 5 or 8 Fail
- Spoiler ACT 6 or 7 Fail
- Aileron PCP L Fail
- Aileron PCP R Fail
- Flaperon PCP L Fail
- Flaperon PCP R Fail
- Rudder PCA U1 Fail
- Rudder PCA U2 Fail



- Rudder PCA U3 Fail
- Rudder PCA L1 Fail
- Rudder PCA L2 Fail
- Aileron Lockout
- ACE L1 Failed 777
- ACE R Failed 777
- ACE C Failed 777
- ACE L2 Failed 777

Flight Instruments: (19)

- DU Left Outboard Fail
- DU Left Inboard Fail
- DU Upper Fail
- DU Lower Fail
- DU Right Inboard Fail
- DU Right Outboard Fail
- EIU Left Fail
- EIU Right Fail
- EIU Center Fail
- DSP Fail
- EFIS Control Panel L Fail
- EFIS Control Panel R Fail
- ISFD Fail
- Standby ADI Fail
- Standby ASI Fail
- Standby Alt Fail
- RMI Fail
- Clock L Fail
- Clock R Fail

FMS/NAV/ADIRU: (23)

- FMC L Fail
- FMC R Fail
- IRS Left Fail
- IRS Center Fail
- IRS Right Fail
- IRS Only ATT Avail
- GPS L Fail
- GPS R Fail
- CDU L Fail
- CDU R Fail
- CDU C Fail

INTRODUCTION

- IRS L Fail
- IRS R Fail
- IRS C Fail
- VOR L Fail
- VOR R Fail
- DME L Fail
- DME R Fail
- ADF L Fail
- ADF R Fail
- Radio ALT Left Fail
- Radio ALT Center Fail
- Radio ALT Right Fail

Fuel: (46)

- Main 1 FWD Pump
- Main 1 AFT Pump
- Main 2 FWD Pump
- Main 2 AFT Pump
- Main 3 FWD Pump
- Main 3 AFT Pump
- Main 4 FWD Pump
- Main 4 AFT Pump
- Main 2 FWD Override Pump
- Main 2 AFT Override Pump
- Main 3 FWD Override Pump
- Main 3 AFT Override Pump
- CWT Left Pump
- CWT Right Pump
- Stab Left Pump
- Stab Right Pump
- Fuel Leak
- Check Valve Leak
- Refuel Manifold Leak
- Crossfeed 1
- Crossfeed 2
- Crossfeed 3
- Crossfeed 4
- Spar Valve 1
- Spar Valve 2
- Spar Valve 3
- Spar Valve 4
- Engine Valve 1



- Engine Valve 2
- Engine Valve 3
- Engine Valve 4
- Main XFR Valve L
- Main XFR Valve R
- Res XFR Valves L
- Res XFR Valves R
- Stab XFR Valves
- APU Fuel Valve
- APU DC Fuel Pump
- APU AC 2 Fuel Pump
- APU AC 3 Fuel Pump
- Mech Scav Pump
- Aux Fuel Backup System
- Fuel Jett Card A
- Fuel Jett Card B
- Fuel Management Card A
- Fuel Management Card B

Hydraulics: (43)

- ENG Pump 1 Fail
- ENG Pump 2 Fail
- ENG Pump 3 Fail
- ENG Pump 4 Fail
- DEM Pump 1 Fail
- DEM Pump 2 Fail
- DEM Pump 3 Fail
- DEM Pump 4 Fail
- ENG Pump 1 Leak
- ENG Pump 2 Leak
- ENG Pump 3 Leak
- ENG Pump 4 Leak
- DEM Pump 1 Leak
- DEM Pump 2 Leak
- DEM Pump 3 Leak
- DEM Pump 4 Leak
- Sys 1 Overheat
- Sys 2 Overheat
- Sys 3 Overheat
- Sys 4 Overheat
- HYD Isolation Valve L
- HYD Isolation Valve R



INTRODUCTION

- Sys 1 Quantity Refill Required
- Sys 2 Quantity Refill Required
- Sys 3 Quantity Refill Required
- Sys 4 Quantity Refill Required
- System 1 Data
- System 2 Data
- System 3 Data
- System 4 Data
- ENG Pump 1 Sensor
- ENG Pump 2 Sensor
- ENG Pump 3 Sensor
- ENG Pump 4 Sensor
- DEM Pump 1 Sensor
- DEM Pump 2 Sensor
- DEM Pump 3 Sensor
- DEM Pump 4 Sensor
- System 1 Press Sensor
- System 2 Press Sensor
- System 3 Press Sensor
- System 4 Press Sensor
- RAT Deployed

Ice Protection: (32)

- Pitot Heat Capt
- Pitot Heat L Aux
- L AOA Vane
- L Ice Detect Fail
- TAT Probe Heat L
- Pitot Heat F/O
- Pitot Heat R Aux
- R AOA Vane
- R Ice Detect Fail
- TAT Probe Heat R
- L WAI Valve
- R WAI Valve
- ENG 1 AI Valve
- ENG 2 AI Valve
- ENG 3 AI Valve
- ENG 4 AI Valve
- ENG 1 AI Leak
- ENG 2 AI Leak
- ENG 3 AI Leak



- ENG 4 AI Leak
- ENG 1 AI Overpress
- ENG 2 AI Overpress
- ENG 3 AI Overpress
- ENG 4 AI Overpress
- L Side Window Heat
- L Front Window Heat
- R Side Window Heat
- R Front Window Heat
- L Side Window Overheat
- L Front Window Overheat
- R Side Window Overheat
- R Front Window Overheat

Pneumatic: (22)

- ASCTU Channel A
- ASCTU Channel B
- ENG 1 HPSOV Valve
- ENG 2 HPSOV Valve
- ENG 3 HPSOV Valve
- ENG 4 HPSOV Valve
- ENG 1 PRV Valve
- ENG 2 PRV Valve
- ENG 3 PRV Valve
- ENG 4 PRV Valve
- ENG 1 PRSOV Valve
- ENG 2 PRSOV Valve
- ENG 3 PRSOV Valve
- ENG 4 PRSOV Valve
- APU Bleed Valve
- L Isolation Valve
- R Isolation Valve
- Bleed Air Leak
- Bleed 1 Overheat
- Bleed 2 Overheat
- Bleed 3 Overheat
- Bleed 4 Overheat

Warning Systems: (12)

- ALT Alert Sys Fail
- Config Warn Sys Fail
- GND Prox Sys Fail

INTRODUCTION

- Terrain Fail
- TCAS Fail
- XPNDR 1 Fail
- XPNDR 2 Fail
- RAAS Fail
- WX Radar Sys Fail
- WXR RT L Fail
- WXR RT R Fail
- Windshear SYS Fail

Wheels and Brakes: (10)

- Brake Failure
- Tire Failure
- Nose Tire Balance
- Antiskid ALTN Valve
- Antiskid NORM Valve
- Brake Sys Control Unit
- Brake Torque Limit
- Brake Temp Sys
- Autobrake Control Sys
- Truck Tilt



NOTE: For any failure, we strongly recommend that you use the Quick Reference Handbook to practice diagnosing the problem. The QRH makes it extremely easy. Simply look up the warning light or symptoms that you see in the QRH index and then follow the checklist provided!

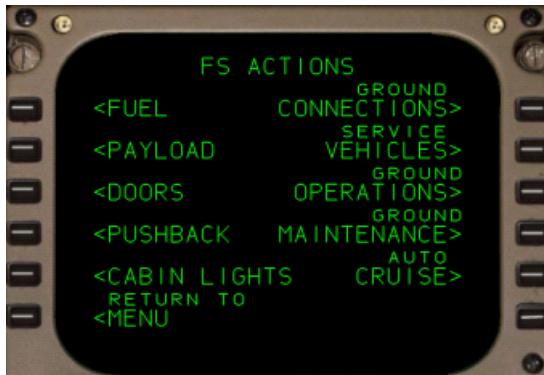
NOTE 2: Some failures, particularly those related to engine overheat warnings, pneumatic bleed over-pressures and door related warnings can have multiple meanings. For example, an engine overheat warning may require that you shut down an engine, or it may simply require a reduction in thrust. A door warning may simply be a faulty warning, or it may indicate a door seal failure that requires emergency action. This makes the simulation exciting and encourages you to use the Quick Reference Handbook to follow the trouble shooting procedures to deduce what type of failure you are dealing with!

NOTE 3: We suggest you read the DETAILS AND QUIRKS OF THE **PMDG 747-400** section. You will learn some interesting things about the simulation you are about to fly!

INTRODUCTION

FS ACTIONS MENU SYSTEM

The FS ACTIONS menu gives you access to various sub-systems that will allow you to adjust aspects of your flight in order to realistically simulate an operational airplane environment.



From the FS ACTIONS menu, you can adjust the FUEL, PAYLOAD, DOORS, PUSHBACK, GROUND CONNECTIONS, SERVICE VEHICLES, GROUND OPERATIONS, GROUND MAINTENANCE, CABIN LIGHTS and AUTO CRUISE functionality.

**Fuel Menu:**

The FUEL page allows you to manually set the aircraft's fuel load. Preset level functions on the lower left side of the display set the load to LONG, MEDIUM or SHORT RANGE levels. The fuel quantity may also be set as a percentage of total quantity or as a total numeric value directly.



In order to set the fuel quantity as a total or percentage, type the relevant number in the scratchpad, and then line select it to the TOTAL LBS (or KGS) LEVEL line. The simulator will automatically distribute the fuel quantity properly between the tanks.

On this menu the current gross weight, takeoff center of gravity location, zero fuel weight and maximum taxi weight values are displayed for your convenience.

INTRODUCTION

Payload:

The PAYLOAD menu allows you to change the aircraft loading as desired right from within the simulator.



You can update the passenger load on your flight by manually line selecting in the number of passengers seated in the first, business and economy class cabins.

You can also manually up select the cargo weights to the forward and aft cargo holds.

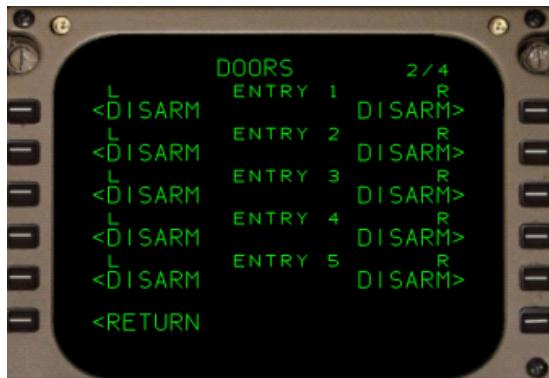
Conversely you can up select the percentage load factor you would like to carry to the LOAD LEVEL line on the right side of the display.

You may also establish your total payload using the SET FULL, SET EMPTY, SET RANDOM prompts, or by altering the ZFW by line selecting a value over top of it. The system will perform an automatic load distribution and assign passenger and cargo loads in a way that an optimum CG is achieved.

On this menu the current gross weight, takeoff center of gravity location, zero fuel weight and maximum taxi weight values are displayed for your convenience.

Doors:

The DOORS menu allows you to open and close all of the doors on the aircraft from a single access menu.



You can open, close, and arm/disarm all the doors from this menu.

Additionally, on the following pages you can open and close the cargo doors, the forward access door and the electronics and engineering bay external access door.

INTRODUCTION

Pushback:

The PUSHBACK menu allows you to manage the pushback process from within the simulator.



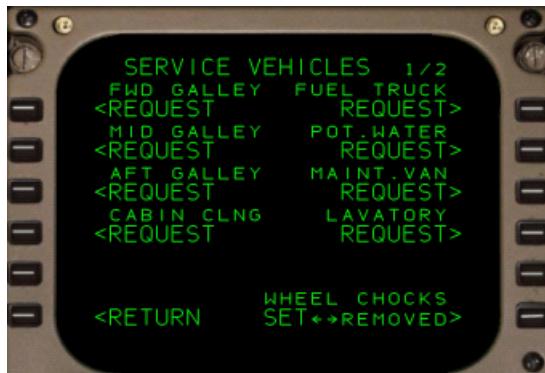
The pushback functionality allows you to set the parameters to be used during the pushback from the gate. Using this menu, you can set the units to FEET or METERS, enter the total pushback distance, the direction the nose will be turned and the number of degrees that will be used in the turn.

Additionally, you can determine whether you will hear voice communication only during pushback, a combination of voice and text, or text only via the P3D adventure text process.



Service Vehicles:

The SERVICE VEHICLES menu allows you to select which ground service vehicles are available and servicing your aircraft.



NOTE: It is important to note that all ground service vehicles require that the airplane be chocked in place, with the engines off before they will be made available to you by the ground crews. For this reason, you must select the CHOCKS SET and turn the engines off before you will be able to make any selections.

INTRODUCTION

Ground Connections:

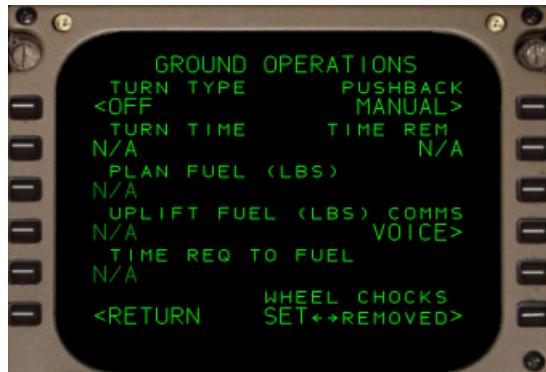
The GROUND CONNECTIONS menu allows you to determine which ground services are currently available to your aircraft.



From the GROUND CONNECTIONS menu, you can choose whether ground power is available as well as an engine air-start unit, cabin air conditioning unit, wheel chocks and/or pitot covers.

NOTE: It is important to note that all ground services require that the airplane be chocked in place before they will be made available to you by the ground crews. For this reason, you must select CHOCKS SET before you will be able to use any other ground services.

If you have other ground services selected and you remove the chocks, the ground crew will also remove the ground services.

Ground Operations:

The GROUND OPERATIONS menu allows you to control specific ground operations such as turnaround times, uplifting of fuel based on flight plan, refueling time, pushback and time to pushback.

- Turn Type: You can choose between the following turn types:
 - Short: In this mode turn time is 55 minutes, and pushback can be set to either Manual or Auto.
 - Long: In this mode turn time is 01hr 30mins (90 mins), and pushback can be set to either Manual or Auto.
 - Custom: In this mode you can enter your own desired turn time using the scratch pad. Pushback can be set to either Manual or Auto.
- Turn Time: This is the total time it will take for your aircraft to be serviced, refueled and ready to push back.
- Plan Fuel: Use the scratch pad to enter the total amount of fuel required as per your flight plan.
- Uplift Fuel: This is the current amount of fuel on board, and will increase once fuel upload starts, until such time that the Plan Fuel amount is reached.
- Time Required to Fuel: This is the amount of time left/required for the uplifting of fuel to be completed.
- Pushback (Type): Here you can choose between the following pushback types:



INTRODUCTION

- Manual: In this mode you need to manually initiate the pushback. This is useful for people who need some extra time before pushback, or for people who are using a pushback function that is unrelated to PMDG.

- Auto: In this mode, the pushback is going to launch on its own using the internal PMDG pushback process. Shortly after the turn time has expired, you will get a call from the ground crew advising you that pushback is about to commence.

- (Pushback) Time Remaining: Shows the amount of time left before Pushback. This feature is only operational in Short, Long or Custom Turn Type modes.

NOTE: If you are still on ground power as the remaining time to the end of your ground turn winds down, *the ground crew will not disconnect ground power and leave you sitting in the dark*, even though this is what happens in many cases in the real world – especially if your ground crew doesn't like you!

1) *If you have the APU Generator available and the auto logic of the electrical system is able to do so, the ground power will disconnect and the APU will take over both sides of the airplane.*

2) *If you do NOT have the APU generator available (for example - if it is deferred, or your APU itself is INOP) then the clock will stop at 10 seconds prior to expiration of the turn. This will give you time to start the APU, or conversely, if you have a deferred APU and need to start an engine on the gate, it will allow you to do so before losing ground power.*

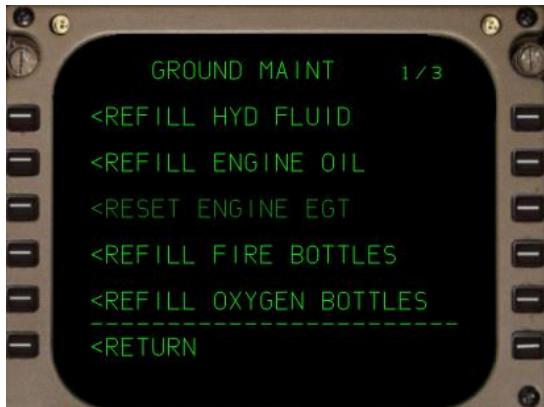
This is just one of the many ways that PMDG Ground Services makes pilots' lives easier.

NOTE 2: It is important to note that *all ground services require that the airplane be chocked in place before they will be made available to you by the ground crews*. For this reason, you must select CHOCKS SET in the GROUND CONNECTIONS menu before you will be able to use any other ground services.



Ground Maintenance:

The GROUND MAINTENANCE menu allows you to request the maintenance crew to perform specific maintenance tasks on your aircraft.



You can request the following maintenance to be performed:

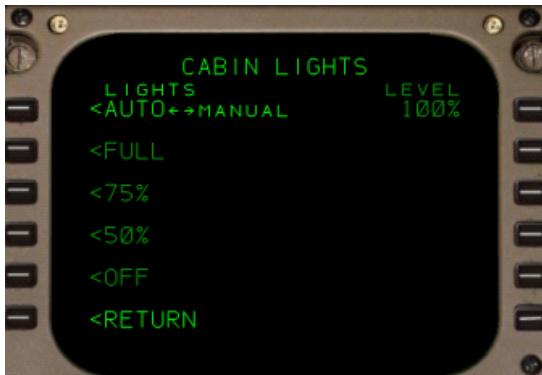
- Refill Hydraulic Fluid
- Refill Engine Oil
- Reset Engine EGT
- Refill Fire Bottles
- Refill Oxygen Bottles
- Cool Brakes
- Replace Brakes
- Replace Tires
- Close Press RLF Doors
- Reconnect IDGS
- Store RAT
- Service APU SCU Motor

NOTE: It is important to note that *all ground services require that the airplane be chocked in place before they will be made available to you by the ground crews*. For this reason, you must select CHOCKS SET in the GROUND CONNECTIONS menu before you will be able to use any other ground services.

INTRODUCTION

Cabin Lights:

The CABIN LIGHTS menu allows you to control the lighting that will appear in the cabin when viewing the external model.



If set to AUTO, the airplane's internal logic will determine the brightness that should be used given the current phase of flight and lighting conditions.

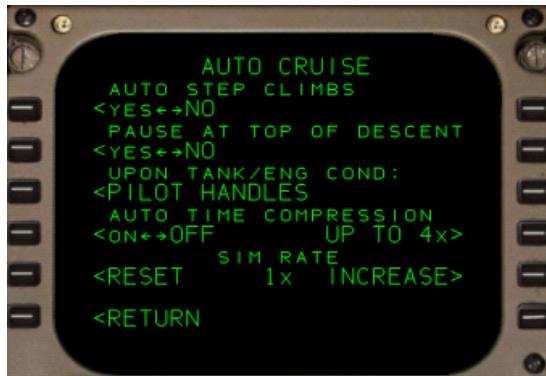
When set to MANUAL, you can choose the desired brightness level desired.

NOTE: You may occasionally see some texture artifacts in the cabin during dusk/dawn and certain cabin lighting settings. This results from certain driver sets and certain hardware configurations, but we thought you would like to see this capability in the simulation.



Auto Cruise:

The AUTO CRUISE menu allows you to set up various cruise related items in your aircraft.



From the AUTO CRUISE menu, you can choose to enable Auto Step Climb, Pause At Top Of Descent, and the behavior at the TANK/ENG condition.

You can also set the Auto Time Compression option to On or Off and specify the time compression ratio. You can select between 2X, 4X, 8X and 16X.

The Sim Rate can be increased without having to access the P3D menu. To reset the Sim Rate, press the <RESET LSK and the rate will be set back to 1.



INTRODUCTION

GETTING THE MOST FROM YOUR PMDG 747-400

We have collected a few pointers to help you get started with the **PMDG 747-400**. Whether you are a veteran PMDG customer or completely new to flight simulation, these tips will help you get more out of the simulation purchase you have just made!

Virtual Cockpit position and zoom:

Microsoft created an extremely bizarre implementation of “dynamic head movement” in the ESP software that P3D is based on that cannot be turned off (though the negative effects have been mitigated in later editions of P3D Version 3). This system causes the camera’s X, Y, Z position in 3D space to shift depending on set of parameters that shouldn’t play any role in such a feature including the aircraft’s compass heading and physical latitude and longitude on the simulator’s model of the Earth. In addition to this, the effect becomes more extreme the further away the cockpit is from the center of the aircraft’s model. As a result, you are likely to see VC camera viewpoints that do not exactly match what we intended.

All the cockpit view presets were created at EGLL – London Heathrow sitting on Runway 27R. The logic in using this location is that it sits at a fairly representative latitude for northern hemisphere flying and that the due west runway heading is representative of the most common takeoff and approach direction due to prevailing wind flow patterns across the hemisphere.



INTRODUCTION

We recommend using the P3D keystrokes for moving the camera position to account for the P3D engine changing the view away from this proper setting – it may be easier to assign these to a hat switch on your joystick or throttle if you have one available:

Move the view forward: CTRL+BACKSPACE

Move the view back: CTRL+ENTER

Move the view right: CTRL+SHIFT+ENTER

Move the view right: CTRL+SHIFT+BACKSPACE

Move the view up: SHIFT+ENTER

Move the view down: SHIFT+BACKSPACE

A zoom setting of 0.8-1.0 in the main view is most realistic based on our experience in the real-life simulator, depending on your distance from your monitor. Adjust it to your taste but do be aware that extremely zoomed out views where you can see the entire panel and the outside view at once are highly unrealistic. Real pilots develop a “scan pattern” to keep tabs on their instruments and what is going on outside at the same time. The view should look roughly like this and is similar to what your field of view actually is when sitting in the real-life left seat:



INTRODUCTION

Using the Landing Lights:

The Boeing 747 has four landing light switches. To simplify the activation of these lights, a middle/wheel click on any of the four switches will move all four. This simulates the captain reaching up with the side of his or her hand or four fingers simultaneously to move them all at once. The runway turnoff light switches also have similar functionality.

***TrackIR:***

One of the limitations that the P3D world places on you as a pilot is the inability to easily lean back and forth, or to move your body around to more easily facilitate reaching or seeing switches, knobs or displays.

We strongly recommend that you explore the possibility of installing a TrackIR package as this greatly improves the sense of "being there" by allowing you to overcome this limitation within P3D:

<http://www.naturalpoint.com>

For the most part using your mouse to move your head and zoom in/out is perfectly acceptable, but occasionally geometry within the cockpit can impede your ability to enter data into the FMS, for example.

In order to reduce this inconvenience as much as possible, we have made it possible for you to retract the yoke toward the floor of the airplane in order to "free up" a clear line-of-sight to the FMS keyboard from the normal head position.

Alternate TO/GA Click Spot:

When flying the real airplane, the TO/GA buttons are placed quite comfortable under the tips of your fingers at the top of the throttle columns.

Unfortunately, we don't all have fully operable replicas of the 747 throttles to use with our P3D setups, so we have added a few features to help you manage the TO/GA process as if it were right under your fingertips.

First, you can click on the actual TO/GA button if you like, but this is arguably not very convenient, especially when initiating a go-around at low altitude.

Next, you can assign a key combination using the key commands menu. This will give you a simple key command of your choice to use in place of a TO/GA button.

For those of you who are button-assignment savvy, you can also map this key combination to a button on your flight simulation hardware and this will give you the best replica of a real TO/GA button.

As a last resort we have placed a "TO/GA Click Spot" on an uninhabited corner of the MCP for your ease of use. A left click activates TO/GA, a middle click disconnects the autothrottle, and a right click disconnects the autopilot.



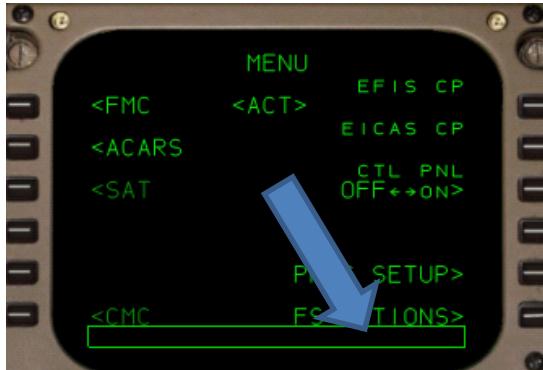
INTRODUCTION

Keyboard Direct Entry to CDU Scratchpad:

To enter characters and numbers into the FMS, you can simply click on the CDU keys with the mouse to simulate your finger.

Conversely, you can also use the Keyboard Direct Entry to CDU methodology that we have included for simplicity.

To activate the Keyboard Direct Entry capability, simply hold down the TAB key, then type on your keyboard as you normally would.



When holding down the TAB key, you will see a green rectangle illuminate around the CDU scratch pad, indicating that direct entry of text is now possible.

If you wish to manipulate the line select keys in this method, simply hold down the TAB key, then press any of the Function keys (F1 to F12) to simulate the 1L through 6R line select keys.



P3D VIEW SYSTEM AND THE PMDG 747-400

Internal P3D Camera: P3D provides a much greater degree of freedom for viewing the aircraft than was possible in previous versions of the simulator. We have included several pre-formatted views for you to use. You can scroll through the view types using the “S” and “SHIFT+S” combination, and then scroll through individual view positions using the “A” and “SHIFT+A” combination.

Pre-Formatted views included with this version are as follows:

- Cockpit Views
 - VC Captain’s Seat Position (called “Virtual Cockpit” by P3D)
 - VC First Officer’s Seat Position
 - VC Upper Overhead Panel
 - VC Lower Overhead Panel
 - VC Pedestal
 - VC and CDUs
- Spot View (scroll though cameras using the “A” key).
- Tower View (scroll through towers using the “A” key).

We have found during our own testing of the aircraft that the Virtual Cockpit is generally easier to use if you can turn your head to look around the cockpit using the hat-switch on a joystick or the mouse while holding spacebar. To reset the view position, simply press “CTRL+SPACE,” to reset the zoom press BACKSPACE.



INTRODUCTION

LIMITATIONS OF THE SIMULATOR

In the process of developing this highly sophisticated simulation, it became apparent to us that many of the default functions are simply not effective for use when producing a realistic simulation of a complex airliner. As such, we have developed a simulation that to that largest degree possible does not use any default functionality.

Systems that have been completely customized for realism and functionality include:

- Autopilot Functions
- Engine Performance Model
- All Mechanical Subsystems

Limiting our dependence upon the simulator has allowed us to use this extremely popular simulation platform as a worldwide operating environment without being severely limited by the original design of the simulation. Occasionally however, this means that we had to accept certain limitations on our simulation in order to accomplish our goals.

The vast majority of limitations we have found will never be experienced by most users. A few should be kept in mind however, as they are essential and important to the simulation:

Time Acceleration Limit:

- Time Acceleration should be limited to 16x to ensure proper autopilot function.
- Time Acceleration should be limited to 16x to ensure proper fuel system function. (The mathematical iterations required for damping and control law become prohibitive for most desktop machines when run at speeds at greater than 16x, so we have not tuned the autopilot or fuel system for operation at acceleration rates faster than 16x.)

External Load/Fueling Programs:

- Do not use any non PMDG product to alter the aircraft.cfg file.
- Do not use any non PMDG product to alter the fuel load of the airplane.
- Do not use any non PMDG product to alter the loading of the airplane. (PMDG uses actual manufacturer data to model the Cl/Cd, moment influence and drag models for our aircraft. Using



INTRODUCTION

this data, the aircraft's reference point is placed realistically ahead of the nose of the airplane as per the manufacturer's specifications. Most addon aircraft use the erroneous concept of placing the model's reference point at the center of the airplane. This results in reduced realism and impacts the accuracy of the airplane's behavior negatively.)

Do not use non-PMDG external models:

The **PMDG 747-400** has more than 1000 animated parts. With the exception of a few basic functions, all part animations are controlled by PMDG's internal simulation code and are not controlled by the simulator. If you attempt to replace the **PMDG 747-400** visual model with a non-PMDG model, you will lose nearly all animation and function for the external model.

Flight recording and playback issues:

Because of the aforementioned custom coding of the airplane animations, the default P3D flight recorder functionality is not able to track and play back most of the animations present in the simulation. Many users have had success using a free utility called FS Recorder, which is able to track and record most of the custom animations we use.

You can download it here:

<http://www.fs-recorder.net>

Hardware toe brakes:

If you use hardware toe brakes such as those created by CH Products, we would like you to be aware that in order to implement the proper "tripping off" of the auto-brake system, we had to put some limitations in place in order to prevent the inherent P3D logic from inadvertently taking over the autobrake release logic inappropriately:

To release the autobrake with your hardware toe brakes you must:

- Apply the brakes twice, quickly; and
- Apply greater pressure than the autobrake is currently applying.

This is different than the brake-directed disengage function on the airplane, but it was unavoidable.

External route export programs:

Flight plan .rte files created with external flight planning programs or websites will have the runways, SIDs, STARs and approaches contained



INTRODUCTION

within them stripped when importing into the FMC, resulting in just the enroute portion being entered. Routes saved with the FMC itself will still retain these items.

This was done because these programs in many cases insert nonsensical terminal procedure data that will either crash the FMC or cause general weirdness in the route. In addition, COROUTES do not contain runways and terminal procedures in real life because they often change with the prevailing winds and the day's departure routing. The runways, SIDs, STARs and approaches are manually entered by the crew when assigned by ATC even if a COROUTE was used for the enroute portion of the flight.



THE COLLINS WXR-2100 WEATHER RADAR

The 747 includes a simulation of the Collins WXR-2100 unit commonly found on the 747 and other airliners. Most of the major functions are simulated including manual tilt, auto tilt, gain, WX+T turbulence detection mode, and the Predictive Windshear System (PWS).

Active Sky Next or Active Sky 2016 requirement:

The WXR-2100 simulation in SP1 requires the most recent version of the Active Sky Next (ASN) or Active Sky 2016 weather engine by HiFi Simulations (for simplicity, the following text will refer to both software versions as 'ASN'). ASN is the first weather addon to output an external 3D precipitation model, which we have used to accurately model the operation of the radar. The weather radar does not currently function with default P3D weather or with any other weather addon. We will evaluate supporting other weather addons on a case-by-case basis if they can provide similar 3D precipitation data output.

Active Sky 2016 can be purchased here:

<https://hifisimtech.com/as16/>

Many simmers are under the assumption that radar shows the locations of clouds and could not understand our insistence for many years that realistic radar wasn't possible in P3D, mainly due to the presence of other products on the market that showed the position of clouds or used cloud positions to make guesses about precipitation levels. This ASN-based radar system is not showing cloud positions, and this is immediately apparent in the sim.

Basic radar concepts and theory:

Though it's become a word in its own right in the seven decades since its inception, radar is actually an acronym standing for **R**adio **D**etection **A**nd **R**anging. Radars pulse waves in the radio band of the electromagnetic spectrum out into space where they reflect off objects and return to a dish that collects and focuses them. By measuring the precise timing and signal strength differences between the pulses and their returns, the radar can calculate and display information about what's in front of the aircraft. In the case of a weather radar, the objects it is looking for are precipitation returns – essentially rain, snow, or ice (hail).

There are physical limitations inherent in how radar works that you need to be aware of when using the radar in the 747.



INTRODUCTION

Radar beams are emitted from the nose in a 3-dimensional cone shape. The cone is very narrow close to the aircraft and spreads out with increasing distance. Because of this, the radar is showing a larger vertical cross section of the sky depending on the distance the returns are located at. This has important implications for determining precisely where precipitation is vertically in relation to the aircraft. If a return is far away, the actual precipitation could be within a large block of potential altitudes and you will need to make use of the tilt control and/or wait for the range to decrease to determine exactly where the return is vertically.

The physical locations of the radar controls are described in detail in the FCOM on pages 11.10.14 to 11.10.18 (pages 1220-1224 in the PDF file).

Tilt:

Antenna tilt is one of the key parameters you have control over with the radar system. Tilt controls the vertical angle that the radar beam pulses are sent out at by physically pivoting the transmitter and dish in the vertical plane.

The WXR-2100 is equipped with an auto tilt function that is engaged by default. For most users, this will be sufficient, but in real life some pilots like to set their tilt manually. In general, here are some guidelines for manual tilt settings:

Before takeoff and lower part of the climb: +2 to +5 degrees.

The idea here is to see heavy precipitation that you may be climbing into since you're gaining altitude so rapidly. You want to keep the tilt high enough to avoid ground clutter (in real life, clutter is not yet modeled in the sim version).

Mid to high altitude climb: -2 to +2 degrees.

Here you're more concerned with storms that are in the in general straight-line path of the aircraft as it climbs at a slower vertical speed up higher.

Cruise: -5 to 0 degrees.

In cruise, you will most often be looking at precipitation that's either at or below your current altitude. A storm is still extremely dangerous even if there's not precipitation from it at your current altitude due to powerful updrafts and turbulence in the core. Pilots will often scan with a downward



INTRODUCTION

tilt at cruise in order to see down into the precipitation area of a storm, which makes it visible for avoidance.

Descent: 0 to +10

In the descent phases, the nose is pointing at the ground so you're going to need to have the radar tilted even more than it was during the climb to avoid ground clutter and see the main precipitation core of a storm, which may be thousands of feet above you.

Gain:

"Gain" is a term that essentially means amplification of the radar's return signals. As the gain is turned up, lighter areas of precipitation (green color) will show on the radar display. Think of it like a radio's squelch control – you're setting a "noise floor" where nothing below the setting gets through. Since light precipitation isn't generally dangerous to an airplane, the standard practice is to set the gain so that only the more severe yellow and red areas show. The default 0 setting generally accomplishes this and should be sufficient for most use.

WX vs. WX+T modes:

The WX mode shows only precipitation returns. WX+T overlays magenta areas of suspected severe turbulence over the precipitation returns by using the Doppler capability of the radar to see areas where the precipitation is moving quickly (suggesting strong updrafts, downdrafts or windshear). You will generally only see these magenta areas near the core of heavy thunderstorms. Many pilots use WX+T mode exclusively because there's no downside to having it on vs. the standard WX mode.

Predictive Windshear System (PWS):

The PWS uses the Doppler radar information from particulate matter (dust, water vapor, etc.) in the air just in front of the airplane when in the terminal area in an attempt to detect windshear activity. If such activity is detected, a symbol appears on the ND showing the approximate magnitude and direction of the windshear and the EGPWS calls out "WINDSHEAR! WINDSHEAR!" Full TOGA power should be immediately selected, and the airplane flown through the event with careful attention paid to airspeed and pitch. ASN is capable of simulating windshear and microburst events and you should be prepared if one happens.



INTRODUCTION

Limitations:

Active Sky Next range settings:

The radar will technically work out to a maximum range of 250 nm depending on how high you have the ASN Minimum cloud draw distance and Maximum cloud draw distance sliders set (note that this does not imply that our radar is actually showing clouds – the clouds have to be there for the precipitation to be there).

Please be aware that setting these sliders above their default values can drastically affect P3D performance on even the highest end computers. There's unfortunately nothing we can do about this. It isn't coming from the radar itself but rather from the sim's graphics engine processing and rendering cloud sprites out to such extreme distances. In real life, the weather radar is rarely useful for making course deviation decisions beyond around 100 nm and we feel this is a reasonable level to leave the maximum range set at.

Future features:

The weather radar is currently considered an “in-progress” feature and certain functions are not yet simulated. We intend to keep developing it over time and more features will be added.

Among these planned are:

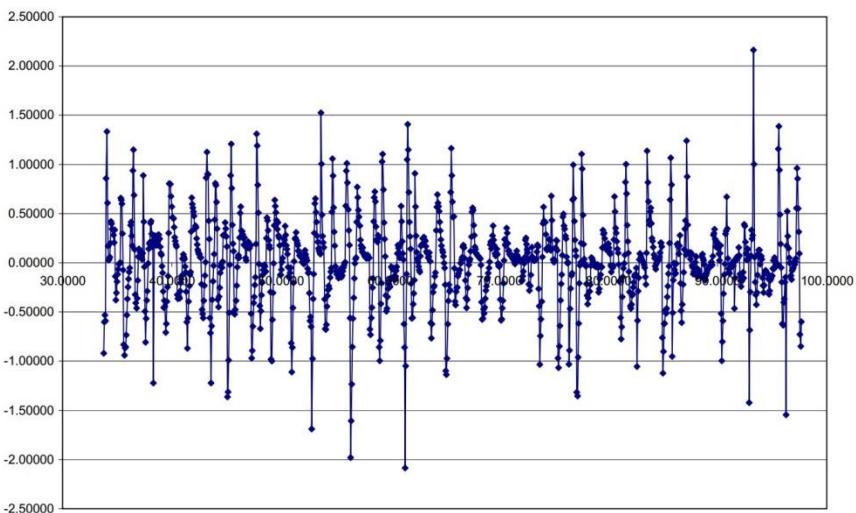
- Simulation of radar shadows and the path attenuation compensation (PAC) feature that alerts pilots to the possible presence of shadows.
- More realistic depiction of longer-range radar returns. (beam spread/loss of resolution)
- Simulation of ground clutter in the WX and WX+T modes and simulation of returns from the ground MAP mode.

THE 747 AND TURBULENCE IN P3D

With the inclusion of the weather radar, many users will probably seek out heavy weather to fly through. It is important to understand the limitations of P3D's modelling of turbulence and the likely side effects you'll experience if you choose to do this. (It's worth pointing out that real life pilots go out of their way to avoid flying through such weather!)

What P3D turbulence does:

Below is a graph recorded over a few minutes of standard turbulence in P3D. On the Y axis is G-load and on the X axis is time.



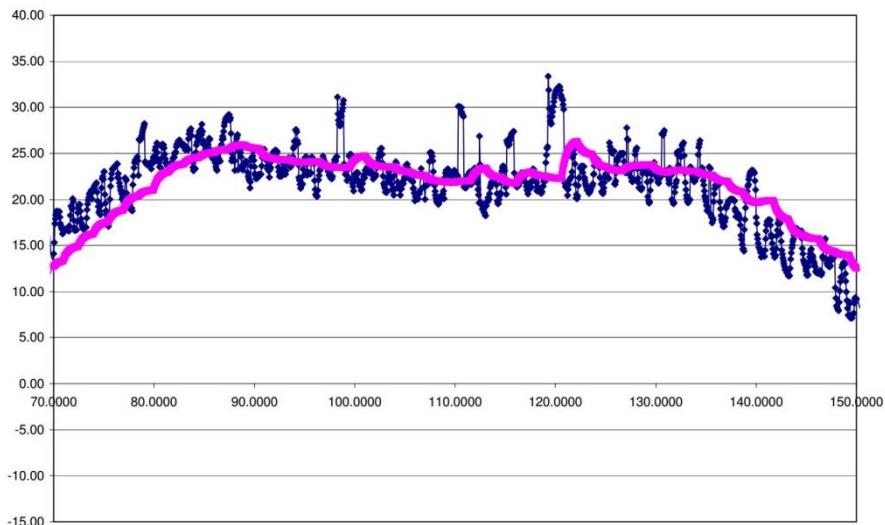
P3D is constantly hitting the airplane with G-loads in excess of 2.0 Gs in both the positive and negative directions. What's more, the magnitude of these "hits" actually remains the same regardless of the level of turbulence happening – the only thing that changes is how frequently they occur. 2.0+ Gs is extremely excessive and would constitute incredibly severe turbulence or windshear in real life. No real-life autopilot system could possibly compensate for this. The PMDG 747's autopilot is programmed in the same way the real life one is and naturally, it has issues with these kinds of instantaneous forces jarring it out of its "comfort zone" so to say.

INTRODUCTION

The biggest side effect you are likely to see is an inability for the flight director to precisely maintain speed with pitch while such turbulence is occurring. The reason is highly technical and involves esoteric concepts such as the relative contribution of PID controller gains, but the real-life autopilot would react in the same way if put into a situation like this.

Turbulence filtering:

Despite the above description, we have attempted to average out P3D's frenetic G-load hits and make the airplane react better to them. Below is another graph, this time with the Y axis showing instantaneous tailwind component resulting from the turbulence and the X axis again showing time over the course of a few minutes.



The magenta line is the result of a sophisticated mathematical filtering algorithm we developed to try to deal with the P3D turbulence. This line is what the flight director and autothrottle are actually “seeing” and reacting to instead of the wild raw fluctuations. This makes things better, but it is not (and cannot be) perfect. Always remember that you are the pilot, not the computers. If you do not like what the flight director or the autopilot are doing, take over manually and make it do what you want it to.



AP/AT TURB MODE TRIGGER option:

The above filtering algorithm is activated when an average tailwind component threshold is measured. We have included a new option accessible at MENU > PMDG SETUP > OPTIONS > SIMULATION on page 2/10 that allows you to set the exact threshold for the activation of this filtering mode in knots. We have set it to what we feel is a happy medium with the 1.0 knot default, but if you are not happy with its performance you can play with this setting and tweak it to your liking. Valid values are 0.5 to 5.0 knots.

Other ways of mitigating turbulence effects:**P3D turbulence settings**

In the P3D weather options there is a setting called “Disable turbulence and thermal effects on aircraft.” This (despite its name) doesn’t actually disable those things but has helped users in the past with control issues in turbulence and seems to help tamper down the wild effects described earlier.

In the P3D.cfg or P3D_SE.cfg file there is a line under the [Weather] section that reads TurbulenceScale=1.000000

This setting can be decreased and does seem to lower the severity of the turbulence “hits” P3D applies to the airplane.

Weather addon settings

Virtually all the commercial weather addons on the market have a setting or slider for turbulence level or strength. If you are having difficulties, try lowering this option – it has likely defaulted to P3D’s 100% setting and may be excessive.



INTRODUCTION

FMC SAVED FLIGHT PLANS AND COMPANY DATALINK

Flight plan file management:

Flight plan files for all PMDG products are saved in the PMDG.rte format and are located in the <P3D Root Folder>\PMDG\FLIGHTPLANS folder. In the original release of the **PMDG 747-400**, flight plan files were located either in this folder or in a subdirectory (<P3D Root Folder>\PMDGFLIGHTPLANS\747) that is created automatically.

Since SP1, the system can load or save flight plans from any folder in the PMDG\FLIGHTPLANS folder. This includes subfolders already created by other PMDG products (such as the **PMDG 737NGX**) or folders created by the user. You can create any number of additional folders to arrange your flight plan files in any way that is convenient, for example, by airline routes, short or long range, destinations, local or international, and so on.

Loading flight plan files

Loading an FMC route is accomplished through the FMC CDU's RTE page, using either the CO ROUTE (LSK 3R) or the REQUEST SEND/RTE SELECT (LSK 3L) prompt.

CO ROUTE is used to directly load a route for which you already know the file name. Enter the name into the scratchpad without the extension and press LSK 3R. Initially, the PMDG\FLIGHTPLANS\747 folder is searched and if the file is not found, the root level PMDG\FLIGHTPLANS is searched.

REQUEST SEND / RTE SELECT will allow you select a flight plan file located in PMDG\FLIGHTPLANS or any subfolder within it. If ACARS datalink is already active this prompt displays REQUEST SEND and once a flight plan file is selected the route will be loaded by simulating the FMC datalink procedure used to load routes on the real-life aircraft. If ACARS datalink is not active this prompt displays RTE SELECT and once a flight plan file is selected the ORIGIN DEST and FLT NO fields of the FMC's RTE page will be filled in, but the flight plan will not be loaded. In this case, will have to first activate the ACARS datalink and once the LSK 3L prompt changes to REQUEST SEND you will be able to uplink the flight plan.

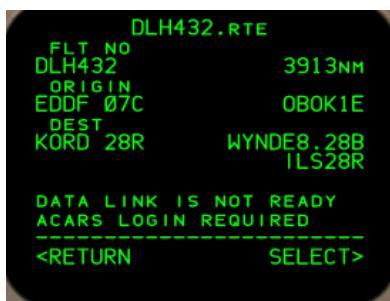
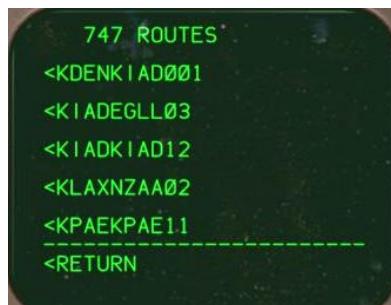
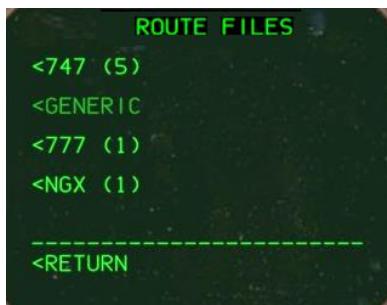
The ORIGIN (LSK 1L), DESTINATION (LSK 1R) and FLT NO (LSK 2R) fields of the RTE page are used to define the flight plan selection. If you press REQUEST SEND/ RTE SELECT with these 3 fields empty you will



INTRODUCTION

be able to select any flight plan file manually. If you have already filled in the origin field, both the origin and destination fields, or the flight number field the FMC will filter the available routes it displays based on the criteria you have entered.

Initiating a REQUEST SEND/ RTE SELECT at LSK 3R will bring up a new page titled "ROUTE FILES" that lists all the subdirectories that include flight plans meeting the selection criteria and also indicate how many flight plan files were found in each subdirectory. The PMDG\FLIGHTPLANS folder is listed as "GENERIC". Selecting one of the subfolders will bring up a new page listing all the relevant flight plans in it. Once you select one of the flight plans, a new page displaying the details of the selected flight plan (route length and origin/destination runways, departure, arrival and approach procedures if available). A REQUEST> or SELECT> prompt will appear in 6R, depending on ACARS datalink availability. Pressing LSK 6R will return to the RTE page, fill in the selected routes the ORIGIN DEST and FLT NO and initiate the uplink procedure if ACARS datalink is available and active.



If there is only one flight plan file matching the RTE page selection criteria (origin + destination or flight number) the flight details page is directly displayed without going through the ROUTE FILES page directory selection process.



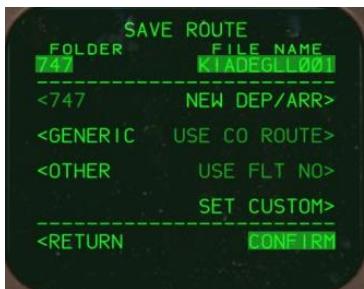
INTRODUCTION

This opens up a lot of interesting methods of organizing your flight plans – you could make a folder with routes organized by flight number, simply enter that number into the FMC and press ROUTE REQUEST and the datalink simulation will load the correct route automatically.

NOTE: See the ACARS & PMDG Global Flight Operations section of the PMDG 747-8 SUPPLEMENT of this document for an explanation of how to activate the ACARS Datalink

Saving flight plan files

You can save the current flight plan from the ROUTE SAVE prompt on the FMC RTE page. Pressing LSK 5L will bring up a page named "SAVE ROUTE", where you can set the name and the location of the flight plan file.



The top line fields (1L and 1R) show the folder and file name that will be used to save the flight plan.

On the left side of this page you can select the desired folder:

<747: The file will be saved in the PMDG\FLIGHTPLANS\747 folder

<GENERIC: The file will be saved in the root PMDG\FLIGHTPLANS folder

<OTHER: Brings up a new page on which you can select any of the other folders that may exist under the PMDG\FLIGHTPLANS directory.

On the right side of the page you can select the desired file name:

NEW DEP/ARR>: The file name will be constructed from the ICAO codes of the origin and destination airports followed by a 3-digit index, selected so that there is no conflict with any other existing flight plan file for the same origin-destination pair.



USE CO ROUTE: The file name will be determined by the CO ROUTE field of the RTE page. In case the flight plan was originally loaded from a file (by CO ROUTE or ROUTE REQUEST) this will be the name of the existing file. Selecting this option will result in overwriting the original flight plan file.

USE FLT NO: The file name will be determined by the FLT NO field of the RTE page. Flight plan files saved using a flight number can be retrieved by filling the required flight number in the RTE page FLT NO field before selecting ROUTE REQUEST.

SET CUSTOM: A custom user entered file name will be used. Type the desired file name in the scratchpad (with no extension) and press 5R.

Selecting a folder and/or file name option will update the fields in 1L & 1R. Pressing the EXE key will save the flight plan file.

Weather Forecast Data

For all weather-related uplink requests, (WIND DATA, DES FORECAST and ALTN WX for the 747-8 only) weather data is retrieved either directly from P3D or from third party weather addon applications.

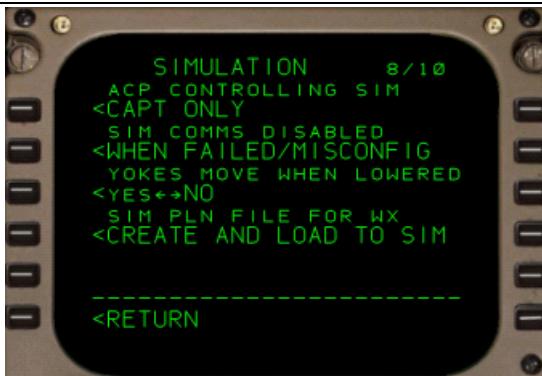
When there is no weather addon application running, data is retrieved from P3D directly. If P3D weather is used, you must be aware that although you will receive forecasts that will correspond to the weather that you will encounter along the route, themes apply the same weather globally and will usually contain wind data only for a couple of low altitude flight levels.

If you are running a 3rd party weather add-on application, there will be some actions you must take in order to retrieve the correct weather data from the add-on application using the datalink simulation.

The PMDG 747 looks in the <P3D Root Folder>\PMDG\WX folder for a file named XXXXYYYY.wx, where XXXX and YYYY are the active route's origin and destination airport ICAO codes. This file should contain wind and temperature data for the waypoints along the route in a specific format.

Depending on the weather addon application, this file will be created automatically or by manual action. The MENU > PMDG SETUP > OPTIONS > SIMULATION page 7 provides two options at LSK 3L and LSK 4L that can help to automate the process and reduce the required user actions.

INTRODUCTION



The following 3 steps are required:

1. Create a flight plan file

Create a flight plan file in P3D format (.pln). This file may be created by any means. (flight planner applications, waypoint-by waypoint entry in P3D, a file downloaded from the internet etc.)

You can skip this step if you set the P3D PLN FILE FOR WX option (3L) to either CREATE FILE (WX.PLN) or CREATE AND LOAD TO P3D. In this case the PMDG 747 will automatically export the active FMC route into a P3D format .pln file. This file is named WX.pln and is saved in the default P3D flight plans directory (My Documents\Prepar3D v3 Files). This file is created and subsequently updated each time the user selects a CDU page that contains a weather data related REQUEST prompt (RTE DATA, DES FORECAST and ALTN pages for the 747-8 only).

Note that, in the 747-8, if you want to be able to access weather data for the 4 alternate destination airports (displayed in the ALTN CDU page) these alternate airports must be included in the created .pln file as waypoints and be placed anywhere between the origin and destination airports. In case the option for automatic P3D .pln file is selected, you may also set the INCLUDE ALTN IN PLN option on to automatically include the alternates in the exported flight plan file.

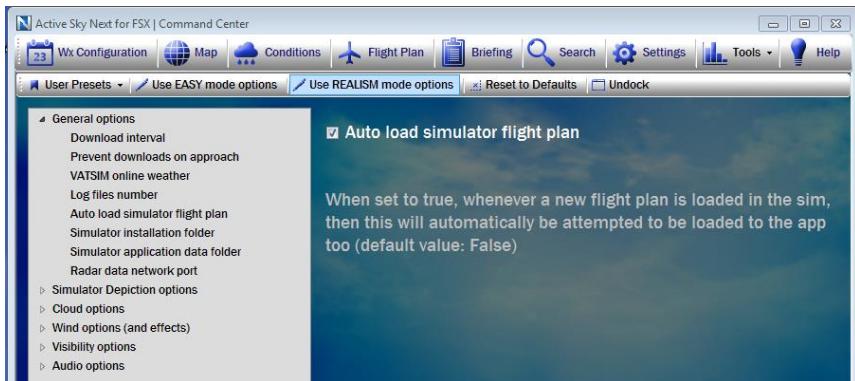
2. Load the flight plan file into the add-on application

Once the .pln flight plan file is created, either manually or automatically, it must be loaded into the weather add-on application so that weather forecasts are produced for each waypoint of the flight plan.



INTRODUCTION

You can automate this process if you are using Active Sky Next. Set the P3D PLN FILE FOR WXR option at LSK 3L to CREATE AND LOAD TO P3D and at the same time set the Active Sky Next "Auto load simulator flight plan" option in Settings > General Options (screenshot on the next page). In this case the PMDG 747 will automatically create the .pln file and then load it into P3D triggering an automatic loading of the P3D flight plan into Active Sky Next. This may work with other add-on weather applications if they provide a similar option for automatically loading the simulator flight plan.



3. Create the WX file in PMDG\WX folder

Most of the add-on applications (currently confirmed for Active Sky 2012, Active Sky Next, PFPX, Opus P3D, and FS Global Real Weather) will automatically create the WX file in the required format and place it in the [P3D]\PMDG\WX folder. In this case you are now ready to make the REQUEST from the relevant CDU page and the data will be retrieved.

NOTE: If you have an add-on application running but the required WX file is not created because you have not followed properly followed the steps described above, the 747 PMDG will try to retrieve weather data directly from P3D. Since the add-on applications generally only set the P3D weather for an area of 60-100 NM around the current aircraft position and clear the weather in the rest of the world, you will get wind data only for a few waypoints ahead, some of the alternate destinations (depending on distance) and, unless the destination airport is in range, no data at all for the DESCENT FORECAST (you'll get an INVALID FORECAST UPLINK message on the CDU).

Tip:



INTRODUCTION

When you request waypoint winds or descent forecast data for the first time (the relevant CDU pages contain no data), wind data will be retrieved for a predefined set of 4 altitudes depending on the cruise level.

Subsequent requests will update the wind data for these altitudes.

If you want to get data for a different set of altitudes, you can delete the altitude rows that you are not interested in and enter new desired altitudes without making any wind data entry. On request, wind data for these altitudes will be retrieved.



UPDATE SUPPLEMENT

HDR Adjustment Function:

One of the features that was added in the earlier versions of Prepar3D was the high-dynamic-range (HDR) function in the lighting settings. This function gives the simulator rendering a more natural feel when showing highly contrasted environments – the external environment gets washed out when you look down at the darker flight deck environment, for example. The unfortunate side effect early on, however, was that the effect would also wash out the colors of the flight deck. The familiar Boeing Brown flight deck was too pale without significant adjustments to the HDR settings. The updated version of the 747 includes a function to compensate for this color washing side-effect, while still allowing you to use HDR.

Data Functions:

In preparation for the changes required for **PMDG Global Flight Operations**, the data functions previously modeled (e.g. Datalink) have been altered slightly. In the past, these functions were always available, as there was no simulation of ACARS or other datalink functionality.

Now, data functions require logging into the appropriate datalink, by filling out flight information on both the RTE and ACARS/DLINK pages. In the 747-400, this is the <ACARS prompt on the CDU MENU page. In the 747-8, the same prompt is labeled <DLINK. The steps are as follows (regardless of participation in **PMDG Global Flight Operations**):

- On any CDU, enter the Origin, Destination, and Flight Number (in ICAO format: AAANNNN, where AAA is the airline 3-letter identifier, and NNNN is the flight number) on the RTE page.
- On the center CDU, click on <ACARS or <DLINK, as appropriate, and then <PREFLIGHT. Fill out any information that has square brackets: Airline ID (in IATA format: AA, using the airline 2-letter identifier), ETD, and ETE. If the flight is near the UTC date change, you may edit the day number at the top right. This is helpful if you are setting up a flight at 2345, but the ETD is 0030.
- As the logon is occurring, the bottom right of the <PREFLIGHT page will show *CXN SYNC. Once logged in, you will hear a chime, and an accompanying EICAS message, and the prompt on the <PREFLIGHT page will also show *DLINK ACT.

INTRODUCTION

Route Handling:

Related to the Data Function changes, the route handling has been altered to accommodate flights both participating and not participating in **PMDG Global Flight Operations**.

For convenience, the prompt and the page to select a saved flight plan in the FMC RTE page have changed (on both 747-400 and 747-8 products). When not logged into datalink, the prompt will be RTE SELECT instead of REQUEST SEND. In both cases the ROUTES FILES page allows you to select a flight plan as in previous versions but now upon selection a confirmation page will be displayed containing additional information for the selected flight plan (runways, SID/STAR/APPROACH information and total distance). If ACARS is ready there will be a REQUEST> prompt on this page for uplinking the route. If ACARS is not available – either because you have not logged in yet, the connection has not fully completed, or you do not wish to – the screen will show a message stating that ACARS logon is required and there will be a SELECT> prompt in place of the prompt to uplink the route. Selecting the route will populate the ORIGIN, DESTINATION and FLT NR fields on the RTE page, but will not load the actual route itself. You can either logon into ACARS and when ACARS becomes available request the route, or if you prefer to skip the ACARS logon, load the flight by entering the file name in the CO ROUTE field.

Setting the Payload:

The way the aircraft payload is set from the FS ACTIONS - PAYLOAD page has been improved. When you set the total aircraft payload using the SET FULL, SET EMPTY or SET RANDOM prompts or if you directly enter the desired ZFW, the system will perform an automatic load distribution to achieve an optimum CG.

In previous versions the load was distributed in a uniform way. For example, if you asked for 50% payload, all cargo zones would be loaded at 50% of max weight. Now weight is distributed in a way that an overall 50% load factor is achieved but it may differ in individual zones in a way that an optimum CG will be achieved.



PMDG 747-8 SUPPLEMENT



During the first decade of the new millennium, Boeing engineers decided that it was time to bring new technology to the aging 747-400 in order to improve efficiency, increase capability and ensure the future success of their iconic brand.

The result is an incredible aircraft that we have modeled in excruciating detail with the **PMDG 747-8 Queen of the Skies II Expansion**. At first glance, you could be forgiven for thinking "a 747 is a 747" but in the case of the 747-8, you would be wrong to think so. Behind the familiar shape and comfortable Boeing Brown flight deck is an airplane packed with new technology and feature changes carefully engineered to maximize the benefits of the new technology while minimizing distractions for flight crew already familiar with the 747-400.

This supplement will point out a few of the differences to help you get acquainted, but users of the **PMDG 737** and **PMDG 777** products will recognize many of these technologies from outside of the 747 product line.

Requirements:

To use the **PMDG 747-8 Queen of the Skies II** you must already own and have installed the **PMDG 747-400 Queen of the Skies II**.

The 747-400 serves as the base package for the 747 product line.

INTRODUCTION

Systems:

We could write 200+ pages describing the systems differences that exist between the 747-400 and the 747-8 airplane types. We will leave you to your own sense of inquisitiveness to explore the airplane and the manuals to discover the differences, but in order to whet your appetite, here are just a few:

- Fly By Wire roll channel
- Fly By Wire speed brakes
- Redesigned wing and flaps along with changes to controlling mechanisms and behaviors.
- Greater efficiency in flight.
- Greater aircraft performance changes overall flight/altitude profile, as well as range and payload capability.
- Significantly improved design/information presentation on PFD/ND, similar to 777.
- Airport Map Display showing runway/taxiway layout, along with landmarks and navigation guidance and aircraft position.
- Greater RNAV/RNP flexibility.
- Improved engine start control logic.
- New FMS design
- Greater use of graphic system status displays
- Greater use of EICAS and status messaging
- Fully integrated Electronic Checklist with normal and non-normal checklists including delayed action items, deferred actions and aircraft/switch position and condition sensing, as well as integrated, checklist guided troubleshooting for complex failure conditions.
- Electronic Flight Bag with performance computations, crew support functions.
- EFB capability to show navigation charts (requires Navigraph subscription and will shortly be made compatible with Aerosoft navdata offerings as well.)
- Fuel system design changes to improve wing stability, including full-system fuel temperature monitoring and predictive monitoring for fuel mixing.

GEnx Engines:

Boeing offers the 747-8 with only one engine: the General Electric GEnx. Derived from the GE90s famous from the 777 line, this engine is in the same family as the engine used on the 787, though it is slightly smaller in diameter. The GEnx-2B67 variant has been modeled here.

Avionics:

The avionics, overall, are quite different when compared to the older 400s. Two decades of time has certainly changed both computing power, and interface design.



INTRODUCTION

Electronic Checklists:

The advanced Electronic Check List (ECL) system is included and fully functional for all normal and abnormal modes.



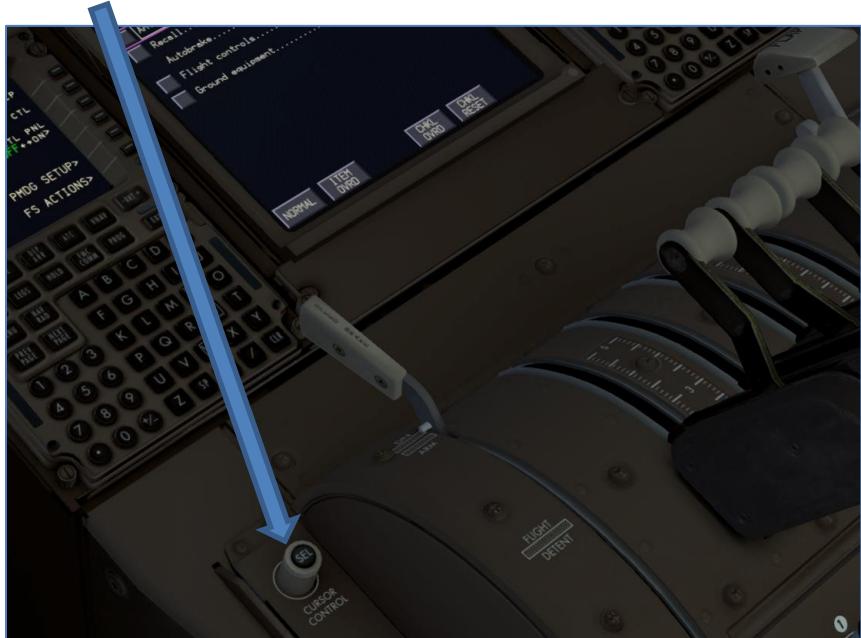
The ECL will walk you very easily through all phases of flight and will provide you with detailed step-by-step guidance to handle any message that appears as a result of mechanical failure, from a failed fuel pump to a complete catastrophic engine failure, the ECL is your friend. Follow those steps and you will have the airplane reconfigured to complete the mission in no time at all.

New with the 747-8 are interactive checklists that will prompt you for deferred items to be accomplished later in a flight if necessary when handling non-normal situations. Additionally, we have modeled all of the trouble-shooting checklists associated with hard-to-nail-down failures in the airplane that may not be immediately obvious to the crew, but that may impact your ability to complete a long-haul flight. Simply follow the

step-by-step instructions and the airplane will make recommendations to help you stay ahead of the strategic decision-making curve.

For those familiar with our 777 aircraft, you will be right at home with the ECL in the 747-8. Like the PMDG 777, we have given you the ability to click on the ECL in order to control movement through the checklists, as this facilitates ease-of-use for a software user. In the real 747-8, the screen is not touch sensitive, and crew interaction is handled through a selector knob/button interface that is located next to the throttles, where the analog trim indicator exists on the older 747-400.

To use the ECL controller device, simply rotate the knob by left/right clicking as usual, and to make a selection click on the black press pad at the top of the knob.



If your mouse wheel is available to be used as a knob scroll, you can also hover the mouse over this selector and scroll your mouse wheel to move through checklist functions.

This simulates rolling the selector between your fingers and is a very realistic way to interact with the Electronic Checklist System.



INTRODUCTION

We strongly recommend turning off the touch-screen interface and using the mouse-wheel to scroll the selector on the center pedestal (through the PMDG SETUP> menu). This will give you a nearly identical feel to how the system operates in the real aircraft and will greatly enhance your realism experience.



Radios and Other Interfaces:

The radios no longer have a rotary-based interface like the older radios, and instead use keypads. The transponder also uses this method of entry. Overall, most users will find that these interfaces are much easier to use and far more intuitive.

Regarding the transponder, for those of you who have gotten used to simply spinning the selector as far as it goes for TA/RA, the newer transponder uses the final selection for ALT RPTG OFF (no Mode C), with TA/RA in the second to last position. If you notice a TCAS OFF notification on the EICAS, this is likely why.

You will find other small differences between the 400 and 8 all over the flight deck, so take care on the initial flights to be sure old habits are not creeping into your workflow.



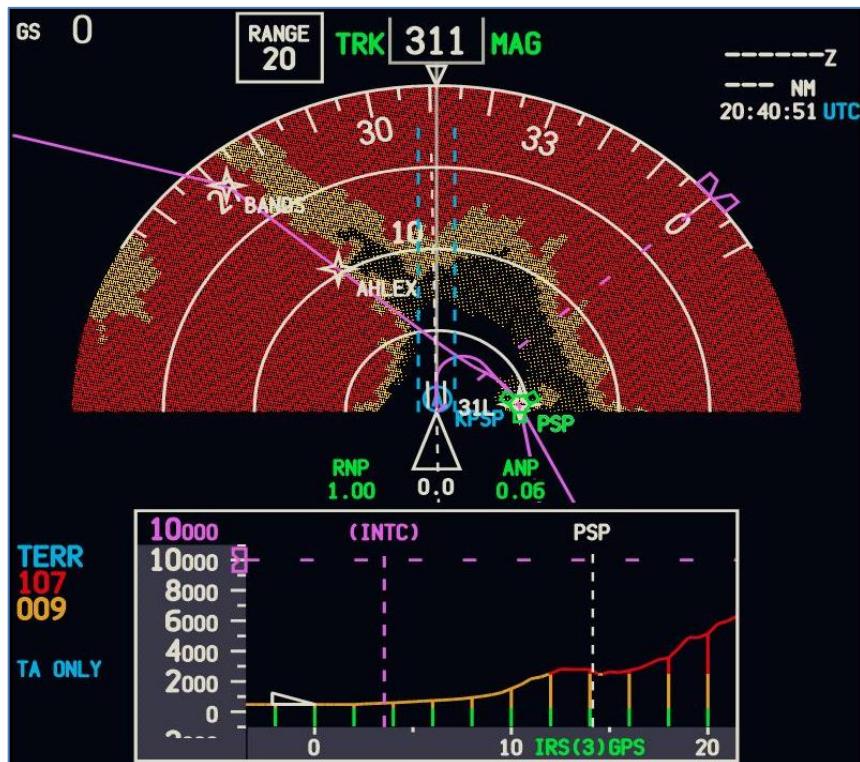
INTRODUCTION

Vertical Situation Display:

New to the 747 family of aircraft is the Vertical Situation Display. This tool is designed to enhance crew awareness of the aircraft's position relative to the vertical profile of their flight.

This display, when activated by the crew, will show you indications of the requirements of your vertical path profile, including any altitude restrictions (ABOVE and/or BELOW and/or AT) as well as key decision-making altitudes along the final approach path.

In addition, the VSD will show you the airplane's relationship to terrain along the intended flight path, which will help to provide additional confidence and decision-making clarity when flying into areas surrounded by steep terrain at night and inclement weather.



Airport Map Display:

The Airport Map Display function allows the crew to display the airport environment around the aircraft, with the aircraft positioned on top of the map to aid in situational awareness.

We have modeled all the features of this safety-enhancing tool and we think you will find it to be a tremendous asset when taxiing at unfamiliar, large and complex airports.

We have worked extremely hard to make sure that this feature is dynamic, flexible and provides you with a map that matches what you are seeing out the window in all situations. This was not an easy task, since nearly every sim user will have different selections of scenery within their sim.



To that end, we feel that we have created a highly flexible, easy to use data management process that will allow you to enjoy this technology without having to invest much time in managing the data sources used to



INTRODUCTION

display the maps. Simply run the tool we provided inside the Electronic Flight Bag, and off you go with a worldwide database that exceeds that carried on any 747-8 in the real world!

Be sure to read about this feature in the Electronic Flight Bag Manual document that we have created, as it will show you how to create the database needed for this feature, as well as the simple step you need to take to keep it up to date.

We are immensely proud of this feature and the ease with which it provides you with live data from within your sim. Please note that due to some variances in how scenery developers tackle certain shortcomings in the sim, some designer's airports may show strange artifacts in certain locations (taxiway widths that do not match what is seen out-of-window, etc.) These are rare, in our experience and should not affect the usability of the scenery or the map data. We are working with various designers to correct these shortcomings in their scenery when it is possible to do so without affecting the scenery visually.

AIRPORTS DATABASE FOR OPT AND ND AIRPORT MAP		
MINIMUM RUNWAY LENGTH:	7000 ft (3032 AIRPORTS)	UPDATE
DEFAULT P3D SCENERY (3031 AIRPORTS)	20180916	SCAN
<input checked="" type="checkbox"/> FAST SCAN		
ADD-ON P3D SCENERY (1 AIRPORTS)	20180916	SCAN
<input checked="" type="checkbox"/> FAST SCAN (FOR ORBX FILES)		
SCENERY.CFG	20180915	
ADD-ONS.CFG (APPDATA ROAMING)	20180913	
ADD-ONS.CFG (APPDATA LOCAL)		
ADD-ONS.CFG (PROGRAMDATA)	20180730	

IMPORTANT: Please see the Electronic Flight Bag Manual for full instructions on how to use this feature.

Electronic Flight Bag:

The Electronic Flight Bag (EFB) is a new feature to our product lines, introduced in the **PMDG 747-8 Queen of the Skies II** in order to bring an additional layer of immersion into the sim. The EFB is a central hub for performance calculations, charts, reference documents, and pilot utilities. It also manages the Airport Map Display database function because we felt that this was a convenient place to put the function so that you can still update your data while the sim is running, if necessary.

For more detailed information about using the EFB, please reference the EFB manual.

NOTE: The top part of the EFB screen is used to toggle the pop-up.



INTRODUCTION

CUSTOMIZE YOUR PMDG 747-8 EXPERIENCE:

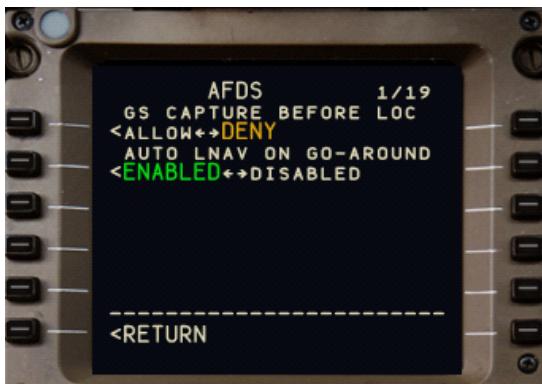
With the **PMDG 747-8** product line we continue to use the methodology that allows you to change just about anything in the airplane without ever having to leave the simulation. From your fuel load to the passenger load, cockpit configuration, external model options, failures, maintenance and cockpit equipment: ***everything can be configured live, in P3D, without having to pull down a menu and without having to leave the immersion of the simulation!***

PMDG SETUP MENU:

Pressing the PMDG SETUP> prompt at will display the following menu:



The PMDG SETUP page is largely the same as in the 400, but the options are explained here as many are new and unique to the 747-8:

EQUIPMENT Option Pages:



PAGE 1/19 - ADFS

- **GS CAPTURE BEFORE LOC:** This option allows you to determine whether the autopilot/flight director will command the airplane to follow the glideslope on an approach even if the localizer has not yet been captured. Airlines generally provide specific policy guidance on this topic, and they will select the equipment option so that the airplane adheres to corporate policy. Generally speaking, the DENY option is the safer, more conservative option.
- **AUTO LNAV ON GO-AROUND:** This option allows the AFDS to automatically engage LNAV on a go-around with a missed approach loaded in the FMC.

PAGE 2/19 - ELECTRICAL

- **APU TR START OPTION:** This determines whether or not a (Transformer Rectifier Unit) TRU is added to start the APU. This avoids stressing the battery if AC power is available. The TRU is also used as a back-up emergency power source.
- **ELEC GEN OFF:** This is an ADVISORY message on some aircraft, but a CAUTION message on others. This setting allows the user to select the message type as desired.

PAGE 3/19 - EGPWS

- **V1 CALLOUT:** Allows you to select the GPWS "V1" callout to ON or OFF.
- **BANK ANGLE CALLOUTS:** This option allows you to select whether or not you will hear aural bank angle warnings if you exceed prescribed bank angles.
- **APPR MINIMUMS CALL:** This option selects the aural callout type that plays when approaching your minimum altitude on an approach. The airplane can issue no warning, or it can call out "Approaching Minimums" or "Approaching Decision Height" or "Plus Hundred."
- **MINIMUMS CALL:** This option selects the aural callout type that plays at your minimum altitude on an approach. The airplane can issue no warning, or it can call out "Minimums," "Minimums Minimums," or "Decision Height."
- **2500 FEET CALL TYPE:** Most airlines use the "Twenty-Five Hundred" call, but some airlines have adopted the "Radio Altimeter" aural advisory instead. You can choose which you wish to hear.

INTRODUCTION

PAGE 4/19 – EGPWS 2

- CALL 2500: Here you can set 3 options for the 2500 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 1000: Here you can set 3 options for the 1000 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 500: Here you can set 3 options for the 500 ft call: YES (always on), SMART (call will be made only if you are established on an ILS glideslope), and NO (call will not be made).
- CALL 400: Set the 400 ft call to ON or OFF.
- CALL 300: Set the 300 ft call to ON or OFF.

PAGE 5/19 – EGPWS 3

- CALL 200: Set the 200 ft call to ON or OFF.
- CALL 100: Set the 100 ft call to ON or OFF.
- CALL 60: Set the 60 ft call to ON or OFF.
- CALL 50: Set the 50 ft call to ON or OFF.
- CALL 40: Set the 40 ft call to ON or OFF.

PAGE 6/19 – EGPWS 4

- CALL 30: Set the 30 ft call to ON or OFF.
- CALL 20: Set the 20 ft call to ON or OFF.
- CALL 10: Set the 10 ft call to ON or OFF.
- CALL 5: Set the 5 ft call to ON or OFF.
- FLARE TONES: Similar to those used in classic 747 aircraft, this option determines whether the automated flare tone is played. The tone provides audible guidance of when to flare.

PAGE 7/19 – FMC DATALINK

- AUTO PREFLIGHT UPLINKS: With this option selected, initiating a ROUTE REQUEST from the RTE page during preflight will automatically trigger in sequence WIND DATA and DES FORECAST requests. The data for each request will become available once data of the previous request in the sequence is loaded and accepted.
- AUTO POS RPRT DOWNLINK: With this option selected, position reports are automatically downlinked during the cruise phase of the flight each time a waypoint is sequenced. This option is simulated by the presence of the REPORTING and REPORT SENT prompts - there is no sending of an actual report to anywhere.



- AUTO ALTN LIST UPLINK: With this option selected, the alternate airports list data (ALTN page 2/2) is automatically updated periodically during the flight.

PAGE 8/19 – FMC DATALINK 2

- COMPANY COST INDEX: This option sets the preferred company cost index that is used in PERF INIT uplink requests.
- ALTN MIN RWY LENGTH: This option is used (in conjunction with the next option) to define company preferred airports to be used as alternate destinations in ALTN (ALTN page 1/2) and ALTN LIST (ALTN page 2/2) requests. Any airport that does not have at least one runway longer than the defined length will not be considered as a valid alternate airport by the FMC.
- ALTN ILS REQUIREMENT: This option is used (in conjunction with the previous option) to define company preferred airports to use as alternate destinations in ALTN (ALTN page 1/2) and ALTN LIST (ALTN page 2/2) requests. With this option selected, only airports that have at least one runway equipped with ILS are considered as alternate destinations.

PAGE 9/19 – FMS

- TAKEOFF THRUST DERATES: This option determines whether or not the THRUST LIM page displays the TO-1 and TO-2 fixed percentage thrust derates for use.
- CLB DERATE WASHOUT TYPE: This option sets the altitudes at which the climb thrust rating returns to its full maximum value when using the fixed CLB-1 or CLB-2 derate.
- CLB1 -> CLB: Shows the altitudes related to the above option.
- CLB2 -> CLB: Shows the altitudes related to the above option.
- CRZ PHASE THRUST LIMIT: This option determines whether the cruise flight N1 limit is CLB or CRZ.

PAGE 10/19 – FMS 2

- FMS DEFAULT ALTITUDES (list of four): These options allow you to customize the default acceleration altitude, default engine out acceleration altitude, default thrust reduction altitude, altitude and default transition altitude in order to comply with the standards typically used by your airline and/or country.

For example, the transition altitude in the United States is 18,000 feet, but in other countries this value will vary. If you live in a country where 5,000 feet is normally used then you can set this value to 5,000 and you will not have to change the transition altitude in the FMS on every flight.

INTRODUCTION

It's important to understand that these values will be overridden by what's saved in a panel state or saved flight due to the way the FMC is initialized. If you wish to have these values in a panel state, load the panel state first, adjust the values, then save the state with a new name such as "(livery name) _CLDDRK" or whatever you'd like.

Also, with respect to the THRUST RED ALT/FLAPS setting – this can be set to a value of 5 instead of an altitude, which causes the thrust reduction to happen when the flaps are moved from 10 to 5, regardless of altitude.

PAGE 11/19 – FMS 3

- **QUIET CLIMB (Q-CLB) OPTION:** This option allows you to ENABLE or DISABLE Q-CLB mode. In Q-CLB the FMC calculates a reduced climb thrust limit (N1) such that in an engine out situation the plane will achieve a minimum climb gradient of 1.7% (that is the regulation for a 4-engine jet). Q-CLB requires AT armed and VNAV engaged. The pitch mode is VNAV SPD.
- **DEFAULT Q-CLB ALT:** Default value in feet AAL (above aerodrome level) that Q-CLB engages (i.e. thrust reduced). Typically, this value is set to 1000' AAL.
- **DEFAULT Q-CLB RSTR ALT:** Default value in feet AAL (above aerodrome level) where normal climb is resumed. Typically, this value is set to 3000' AAL.

PAGE 12/19 – FUEL & WT/BAL

- **WEIGHT BALANCE SYSTEM:** This option determines how many sensors are installed to provide the weight of the aircraft on the PERF INIT page. NONE requires a manual entry – either ZFW or GW – by the crew, whereas SINGLE and DUAL provide a weight value that the crew can verify against the dispatch paperwork and select.

PAGE 13/19 – INSTRUMENTS

- **ADF INSTALLED:** This option determines whether there is an ADF (Automatic Direction Finder) installed in the airplane.

PAGE 14/19 – MISC

- **HEADREST - CAPT:** This option determines whether the Captain's seat has a headrest installed or not.
- **HEADREST - FO:** This option determines whether the FO's seat has a headrest installed or not.



- HEADREST - LO: This option determines whether the LO's seat has a headrest installed or not.
- HEADREST - RO: This option determines whether the RO's seat has a headrest installed or not.
- LAV IN COCKPIT: This option determines whether there is a toilet installed in the cockpit or not.

PAGE 15/19 - PACKAGES

- FLIGHT TEST PACKAGE: We have included this package for those who might enjoy seeing the visual aspects of the standard flight test gear carried aboard an airliner during flight testing. This includes a tail drogue and extra air data sensors protruding through red window plugs in the forward cabin area. This is a visual model enhancement only and does not provide any data display anywhere on the flight deck.
- ANTENNAS: This option allows you to decide what type of antenna configuration you want installed in your airplane. The options are:
 - NONE
 - SATCOM2
 - SATCOM2, ELT
 - WI-FI FWD
 - WI-FI FWD, SATCOM1, ELT
 - WI-FI FWD, SATCOM2, ELT
 - SATCOM1, SATCOM2, VHF
 - SATCOM2, VHF, ELT
 - WI-FI AFT
 - WI-FI AFT, SATCOM2
- FIRE DETECT MFG: This option determines whether the fire detection manufacturer is either KIDDE or SYSTRON.

PAGE 16/19 – PACKAGES 2

- CARGO FIRE BOTTLES: This option determines the number of cargo fire bottles installed. Default is 7, and other options are either 5 or 6.
- PACK FLOW ECON MODE: This option determines whether the economy flow mode of the air conditioning packs is enabled or not.
- EFB INSTALLED: This option determines whether this airplane has the EFB (Electronic Flight Bag) option installed or not.

INTRODUCTION

PAGE 17/19 – PANEL OPTIONS

- **MAIN DECK TEMP SELECTOR:** Applies only to the freighter. Determines if the Main Deck Temperature Selectors (FWD and AFT) on the overhead Air Conditioning panel have either a MAN (manual) or an OFF position.
- **MINIMUMS & BARO KNOBS:** This option selects between realistic spring-loaded switches (SLOW/FAST setting) that need to be held and constant rotation rotaries for the MINS and BARO knobs on the EFIS control panel. The SLOW/FAST option is accurate to the real aircraft but may not be as conducive to the simulator environment as the rotary option.

PAGE 18/19 – WARNING SYS

- **RESETTABLE SIREN:** Allows the Master WARNING/CAUTION siren to be reset by pushing the Master WARNING/CAUTION reset switch.
- **AP DISC WARNING:** Here you can select between the WAILER or SIREN Autopilot Disconnect sounds.
- **AP DISC SCHEME:** Provides options for the behavior of the yoke AP disconnect button. “1 PRESS” will disconnect the AP with no warning sound, “2 PRESSES” will disconnect the AP with the first press and immediately silence the resulting warning sound with the second press. If the two presses are fast enough, no sound will play. “2 PRESSES UNSILENCED” always plays a cycle of the warning sound and will not silence until the playback is over regardless of how fast the two presses are.
- **ALT ALERT SETTING:** This option sets the altitudes at which the airplane will trigger the altitude approach alert and the amount of deviation from the MCP altitude necessary to trigger the alert sound and visuals.
- **ALTITUDE APPROACH AURAL:** This option allows you to turn the aural altitude approach “C chord” sound ON or OFF.

PAGE 19/19 – WARNING SYS 2

- **MASTER CAUTION SOUND:** Here you can select between two versions of master caution sounds.
- **CREW ALERTNESS MONITOR:** Use this option to turn the monitor ON or OFF. The aircraft continuously monitors switch action on the MCP, EFIS control panel, display select panel, CDUs, and radio transmitter microphone switches. When a predefined time elapses after the last switch action was detected, the EICAS alert message PILOT RESPONSE is displayed. The



INTRODUCTION

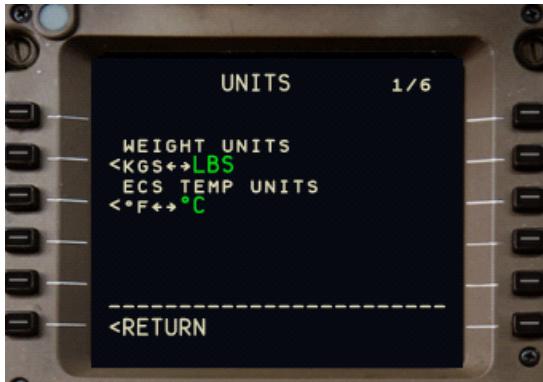
message is inhibited below 20,000 feet, during climb, and when flaps are not up.

- **RAAS INSTALLED:** Enables the Runway Awareness and Advisory System, which plays aural callouts for a variety of situations on the ground or approaching an airport in the terminal area (runway name callouts, warnings if trying to takeoff on the incorrect runway or a taxiway, etc.)
- The RAAS system was developed by FS2Crew and is locked to the PMDG 747 airplanes. If you would like to use the system on all of your other P3D aircraft, purchase the full version here:

<http://www.fs2crew.com/cart/products/FS2Crew%3A-RAAS-Professional.html>

- **TERR: WATER IN CYAN:** This setting allows you to choose whether sea-level bodies of water will appear in cyan on the ND's EGPWS terrain display.
- **TERR: PEAKS MODE:** Peaks mode is a refinement on the original terrain awareness system. The original system only displayed terrain in proximity to the aircraft (from green 2000 feet below, to red 2000 feet or more above). Peaks mode always displays terrain within the filter altitudes displayed on the left side of the ND.

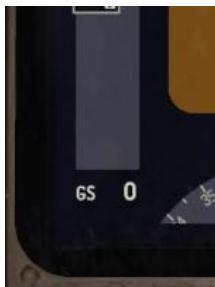
INTRODUCTION

DISPLAYS Option Pages:**PAGE 1/6 – UNITS**

- **WEIGHT UNITS:** This option selects between metric (KG) and imperial (LBS) weight units throughout the aircraft's systems.
- **ECS TEMP UNITS:** This option sets the temperatures displayed on the AIR synoptic to either C or F.

PAGE 2/6 – PFD

- **FLIGHT DIRECTOR TYPE:** Select the style of flight director that will be displayed. The split axis option provides independent pitch and roll steering cues, while the single cue option provides a single chevron shape.
- **GROUND SPEED DISPLAY:** Displays your current ground speed on the PFD as shown here:



- **RISING RUNWAY:** Turn the rising runway symbol on/off for display on instrument approaches.
- **SHOW V2:** Displays the V2 speed on the PFD that has been selected in the FMS for takeoff.



- SHOW LANDING FLAPS: Displays the landing flaps setting on the PFD that has been selected in the FMS for the approach and landing.

PAGE 3/6 – PFD

- RADIO ALT ABOVE ADI: Displays the radio altitude above the ADI.
- ROUND RADIO ALT DIAL: Allows the radio altitude to be shown in round dial format.
- LANDING ALT BAR: Displays the landing altitude bar on the PFD altitude display.
- V/S INDICATOR TCAS: Displays the required ranges for vertical speed on the V/S indicator to resolve a TCAS conflict.
- PITCH LIM IND POP UP: This option determines whether a pitch limit indication will appear on the PFD when pitch is approaching the pitch limit.

PAGE 4/6 – ND

- TRACK UP: This option selects between a track-up navigation display or a heading-up navigation display.
- RANGE ARCS: Display range arcs on the navigation display when appropriate for the selected display mode.
- TCAS 3NM RANGE RING: Display 3nm range ring with TCAS.
- TAS INDICATION: Displays the true airspeed on the ND.
- IRU TIME TO ALIGN: Displays the remaining time to align the IRUs on the ND.

PAGE 5/6 – ND

- MIN RUNWAY LENGTH: Airports with runways below this length will not be shown on the ND.
- SHOW NEXT ALT CONSTR: Displays the next altitude crossing constraint next to the waypoint on the ND without the DATA switch on.
- OTHER TRAFFIC (TCAS): This toggle allows you to choose whether TCAS only shows you proximate traffic (realistic) or shows you all traffic in your vicinity. (Not realistic but convenient for online flying!)
- RANGE: Allows you to manually change the display range for TCAS traffic. (Useful for online fly-ins if you need to limit the number of aircraft displayed on the screen.) We recommend leaving this set to 40nm.
- ALT SEPARATION: Allows you to manually de-clutter traffic that is above/below you. (Useful for online fly-ins if you need to limit



INTRODUCTION

the number of aircraft displayed on the screen.) We recommend leaving this set to 2800FT.

PAGE 6/6 – EICAS

- **SHOW GW ON EICAS:** Displays the gross weight on the EICAS above the total fuel indication.
- **DOOR ARMING INDICATION:** This option determines whether or not the arming status of each entry door is shown on the lower EICAS DOORS synoptic.
- **ECS PAGE SHOWS BULK CGO:** This option determines whether or not the bulk cargo zone will be shown on the lower EICAS ECS synoptic.
- **GEAR PAGE TIRE PRESSURE:** This option determines whether or not the tire pressure will be shown on the lower EICAS GEAR synoptic.
- **APU OIL QTY DISPLAY:** Determines whether the oil quantity is displayed only when the APU selector switch is in the ON position, or always.

PMDG Rain Maker:**What is RainMaker?**

RainMaker is a new feature which we are debuting in the PMDG 747-8i/F. It is a dynamic rain, snow and fog effects generator and visual enhancement system that will show various weather effects on the windows of the virtual cockpit.

These meteorological effects can in turn be affected by the aircraft's systems, including window heat and windshield wipers, as well as by specific meteorological conditions.

RainMaker operates in its own ecosystem and uses the simulator's airplane and meteorological data to generate the various precipitation effects mentioned above.

RainMaker is a cosmetic feature designed to give a "sense" of rain and snow precipitation. RainMaker is not a fluid dynamic simulation of how water reacts to glass under countless physical conditions, but rather a visual rain and snow emulation system that reacts to multiple flight simulation conditions, including the simulator's internal 6 levels of rain and snow intensity, aircraft speed, wiper state, window glass temperature, outside air temperature and dew point.

INTRODUCTION



Current effects included in RainMaker are rain, snow and condensation.



You will even discover some bug splats based on a number of meteorological conditions, for example, seasonal, temperature, altitude and so forth.

For an explanation of the use of the windshield wipers and window heat, please consult the 747-8i/F's FCOM.

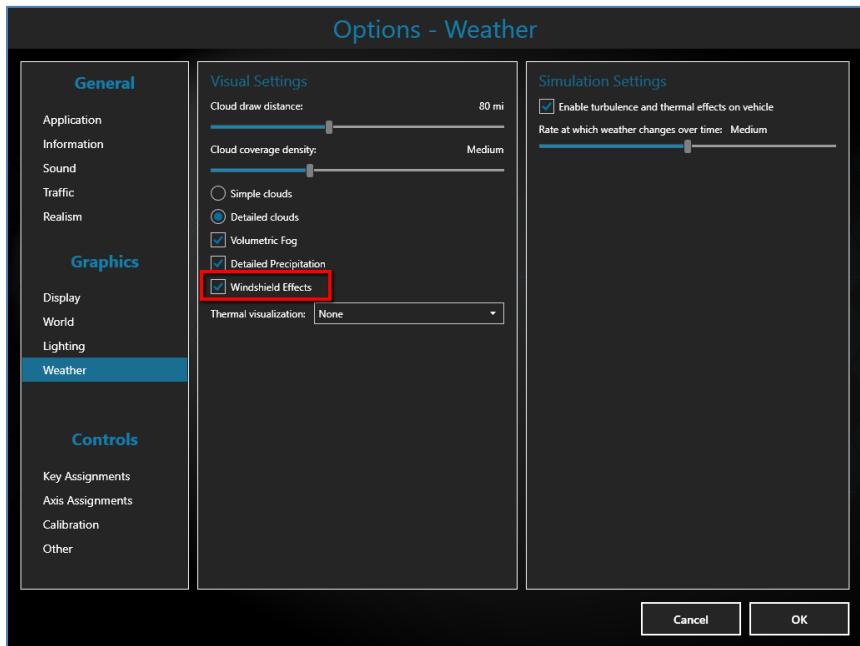


INTRODUCTION

Using RainMaker

RainMaker requires no special setup or configuration apart from ensuring that the 'Windshield Effects' check box is checked in the P3D Weather Options screen.

RainMaker can be enabled or disabled by navigating to Prepar3D's options page, selecting Weather, and then checking or unchecking the box labeled 'Windshield Effects.'



NOTE: RainMaker is available only in Prepar3D version 4.1 and higher, and currently it is only implemented in the PMDG 747-8i and -8F.



INTRODUCTION

ACARS & PMDG Global Flight Operations:

Shortly, we will be making **PMDG Global Flight Operations**, our new online component, available for user to experience. As part of this experience, we have greatly enhanced our simulation of the ACARS environment currently contained within the PMDG 747-400 and PMDG 747-8 simulation.

In the past, in order for users to interact with datalink driven functions, such as obtaining winds, flight plan uploads or takeoff performance data, we have simulated the ACARS link in the background without bothering the pilot to actually establish the ACARS datalink prior to using these functions.

Effective with the release of the PMDG 747-8, it is now necessary in the entire PMDG 747 product line to take the steps to activate the ACARS data link in order to receive these services.

Activating the datalink is simple and can be accomplished in two easy steps:

1. Complete the ORIGIN, DEST and flight number fields on the RTE page of the FMS as you normally would during preflight. Your flight number will normally look something like this: BAW1234. It is not necessary to use an actual airline carrier code or flight number if you are operating outside of PMDG Global Flight Operations, so feel free to make one up as you like.
2. On the center CDU, press the ACARS or DLNK line select key, then populate the ETD and ETE fields with your estimated time of departure and estimated time enroute. The datalink will be established, and you will be off and running.

It is important to keep a few things in mind when working with the 747 products and the new simulation of the datalink. For starters, the datalink is dependent upon the VHF radios and/or satellite-based communication. You can learn more about these features if you like to read the manuals, but for now simply know that we have pre-configured the airplane to be able to run the datalink without problem, provided that you take the step to log in.

***What will ACARS / Datalink Do?***

If you are using the airplane by itself, without having access to the upcoming PMDG Global Flight Operations environment, the ACARS and datalink functionality will behave just as you have expected it to for the past 20 years. You will be able to load a flight plan, obtain your takeoff performance data, wind for your route (with an applicable weather program) and your descent, as well as sending mock position reports and reviewing your OUT, OFF, ON and IN times (OOOI) for the current flight. Nothing has changed here except that you must take the step of logging in with the datalink because we want to develop the habit pattern of logging in so that you are already comfortable with it when we launch PMDG Global Flight Operations.

What will PMDG Global Flight Operations add?

When PMDG Global Flight Operations is released, it will open an entirely new connected simulation of the airline operating environment for PMDG pilots. From flight plan selection, route information, PIREPs, weather data, to a myriad of other operational details, PMDG Global Flight Operations will connect you to the simming world and to one another in a way that has not yet been accomplished. Stay tuned to the PMDG forum for more information on this exciting new feature!

Loading a RTE via Datalink

In the past, in order for users to interact with datalink driven functions, such as obtaining winds, flight plan uploads or takeoff performance data, we have simulated the ACARS link in the background without bothering the pilot to actually establish the ACARS datalink prior to using these functions. Effective with the release of the PMDG 747-8, it is now necessary in the entire PMDG 747 product line to take the steps to activate the ACARS data link in order to receive these services.

Activating the datalink is simple and can be accomplished in two easy steps:

- Complete the ORIGIN, DEST and flight number fields on the RTE page of the FMS as you normally would during preflight. It is not necessary to use an actual airline carrier code or flight number if you are operating outside of PMDG Global Flight Operations, so feel free to make one up as you like.

INTRODUCTION



- On the center CDU, press the ACARS or DLNK line select key, then populate the ETD and ETE fields with your estimated time of departure and estimated time enroute. Insert the two letter IATA code of the airline you fly.



You will notice that there are a few fields on this display that are surrounded by [braces]. The [] is your indication that "this field is currently allowed to be modified." For example, you can modify the UTC Departure date on the page above during preflight, but once the flight has begun, this field is locked out and the [] will be removed.

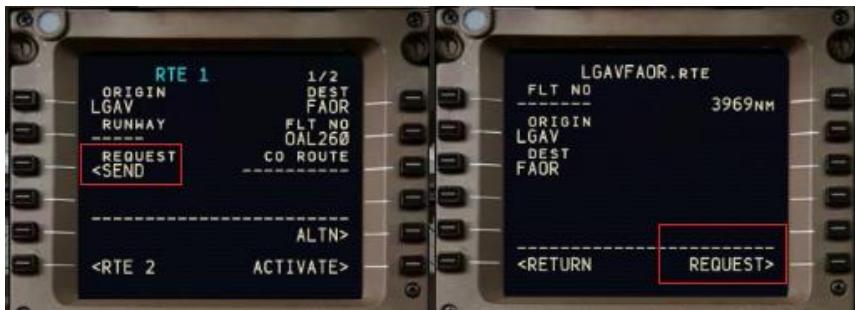
- As the logon is occurring, the bottom right of the <PREFLIGHT page will show *CXN SYNC. Once logged in, you will hear a chime, and an accompanying EICAS message, and the prompt on the <PREFLIGHT page will also show *DLINK ACT.





INTRODUCTION

- As soon as the Datalink is active on the RTE page you can press the Request Send and then the Request for the Route to be fetched.



One topic that sometimes causes confusion, is understanding the difference between a "CO ROUTE" and a "REQUESTED" flight plan. To help you avoid confusion, it is helpful to think of it this way:

CO ROUTE: This is a route stored in the memory database of your FMS unit onboard the aircraft. This was a popular function in the late 1980s and 90s, as it reduced the amount of time crews would spend hand-keying flight plans. Much like the real FMS, using this function will cause the FMS to check and see what flight plans you have stored in the /FLIGHTPLANS directory, and treat them as if they are native to its own memory database for you to select.

REQUEST: Flight plans that are brought in via a datalink request are coming from outside of the airplane. The advent of modern datalink technology has made this by far the most common and useful method to transmit a flight plan to the crew onboard a modern airliner. This functionality is simulated here, by requiring that you have the datalink connected before selecting your flight plan for loading. Watch this function for many more features that will be made available to you with the upcoming release of PMDG Global Flight Operations.

NOTE: Right now, both functions are simulated, but they ultimately rely upon flight plans located within the PMDG/FLIGHTPLANS directory in your 747 installation. When we unveil PMDG Global Flight Operations, users will find that the datalink function will open to a whole new world of connected data that will actually come from "outside the airplane." Stay tuned!

INTRODUCTION

Using the ECL Cursor Control

When the 777 first debuted back in the mid-90s, it was innovative in that it had a touch pad installed for each pilot in order to control the ECL. The touch pad functioned much like the touch pad on a laptop computer, allowing the crew to slew a cursor around on the ECL screen, with push buttons to make selections by clicking.

When we designed the PMDG 777, we emulated this functionality by creating a custom process that allowed you to use your mouse to move the cursor around over the top of the ECL display and click on desired items. This very effectively emulated the function of the onboard touchpad from the pilot's perspective, and also worked very much like a standard Windows interface, so it was really quite handy!

The 747-8 is DIFFERENT:

It is important to understand how this will change your interaction with the PMDG 747-8 ECL system.

If you look to the side of the throttles, you will see that the analog trim gauge from the 747-400 has been replaced with a selector knob. This knob rotates, and also has a push-to-select function that allows a crew member to push vertically downward on the knob to make selections.





INTRODUCTION

If you look at the ECL screen, and rotate the knob, you will notice that the magenta selection box moves progressively through each of the clickable items displayed on the screen. If you rotate the knob by left/right clicking on it, or by rolling your mouse-wheel, the magenta selection box moves in the desired direction. For purpose of this explanation, it is helpful to think of knob rotation as performing the same function as the tab key on your keyboard when moving a selection between options within the Windows operating system.

Once you have the desired item highlighted, simply push down on the knob to click.



The ECL will respond appropriately and move to the next logical place on your checklist, or to the menu you have selected.

INTRODUCTION

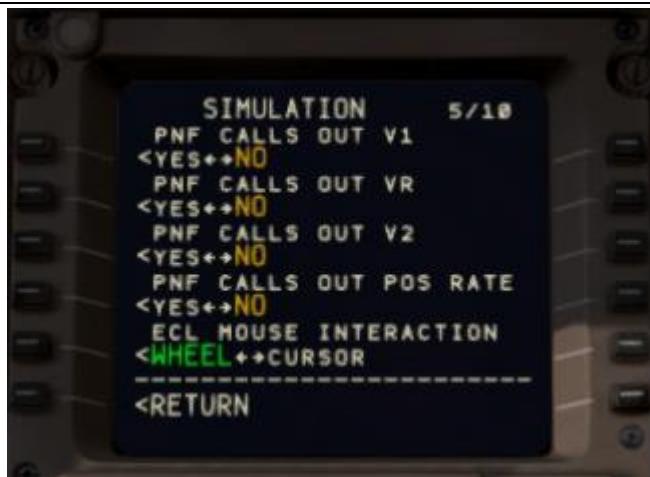


You will find that this function is quite nicely compatible with your mouse scroll wheel, with the scroll wheel serving as the rotating knob, and then clicking to simulate pushing down on the selector knob.

NOTE: Your mouse must be over the ECL screen for this to operate, but it is important to note that the location of your click is the magenta highlighted area and NOT the location of your mouse cursor!

To describe this another way: You can't simply move your mouse to a different item on the display and click. The "click" will be applied to whatever is highlighted in magenta, not to the location of your mouse.

If you find that the new roller knob functionality confuses you, or doesn't work for you because you use your mouse wheel for something else more important, you can easily activate the old 777 style of ECL manipulation by going into the OPTIONS menu within the FMS, go to SIMULATION and on Page 5, change the selection from WHEEL to CURSOR. You can play with this in flight by switching back and forth to see which one you like more; it will not hurt anything.



Common Mistakes:

We mentioned in the beginning that you are inevitably going to hit a moment in your flying in which you think, the ECL is frozen and not responding. When this happens check the ECL screen closely. The checklist has likely reached a sensed switch that requires input from the crew in the FMS to match a handle/selector position, or simply requires a knob/switch to be in a specific position before the item can be checked off the list.



When this happens, use the roller knob to move the magenta box to the other desired item. Remember that the location of your click is the magenta highlighted area and NOT the location of your mouse cursor.

INTRODUCTION



Remember: When in doubt, roll the knob to move the magenta selection box.

Things the beta team wanted you to know:

- Q-Climb: Q-Climb is a VNAV mode. For VNAV to work, it must be armed, v-speeds must be selected, and assumed temperature method (ATM) cannot be applied.
- Clock: The clock is now on the navigation display (ND), and is no longer an analogue clock.
- TCAS: If you are receiving a TCAS message on the EICAS, check the position of your TCAS mode selector. In the past, the final selection was TA/RA. On this version, the final selection is ALT RPTG OFF (Mode-C off). The desired TA/RA is the second from last position.
- Airspeed Bands: Due to an extensive re-design of the wing, the cautionary airspeed bands are a lot closer together at altitude.
- Fuel Management: Switching to TANK/ENG configuration occurs when the total fuel in Main 1 and Res 1 match the total in Main 2 (as is the case with Main 4 and Res 4 equaling Main 3).
- EFIS Range: The range knob on the EFIS does not have detents. Using the mouse wheel will roll it left and right. If you would like to jump between the ranges, use left and right clicks.