PMDG

BOEING 737-800

TUTORIAL FLIGHT 1

Contents

Getting Started

Welcome to the first in a series of tutorial flights for the Boeing 737-800. This tutorial can be used for any simulation platform or any add-on of the 737-800, however it has been optimized for the PMDG Boeing 737-800NGX for Microsoft Flight Simulator X.

The Boeing 737-800 is the most popular variant of the Boeing 737NG (Next Generation) line of short haul aircraft. The -800 variant entered service in 1998. The -800 is designed to replace the 737-400. It can seat 162 passengers in a 2-class layout or 189 passengers in single class layout. The 737NG series competes directly with the Airbus A320 series of passenger aircraft. Due to the efficiency of the 737-800NG, it is the preferred aircraft for low cost carriers (LCCs) such as Ryanair.

The first tutorial is designed to get one started on the Boeing 737-800. It will be simplified with the aim of getting into the air and flying a route as quickly and easily as possible. Future tutorial flights will increase the complexity and realism.

Prior to doing this tutorial it is encouraged that you read the other documentation supplied with the product and familiarise yourself with the aircraft. This tutorial also assumes that one has a basic knowledge of automation, such as the autopilot.

It is recommended that you have the latest navigation data installed in your aircraft for this flight. Updated navigation data can be purchased from Aerosoft in the form of their NavData Pro product or from Navigraph.

Flight Planning

The route for today's flight is a short intra-European flight. It will take us from Nice, France to Vienna, Austria. Vienna is one of Europe's grandest and most culturally rich cities. It is a short flight and there will be some scenic views!

Professional Flight Planner X (PFPX) has been used to generate the route. PFPX is an advanced flight planning tool developed by FlightSimSoft and available to purchase from Aerosoft.

The route is the following;

LFMN-IRMA5M-IRMAR-UN853-BLONA-UY11-KUMIN-UM730-TESTO-UQ712-VOG-UQ984-NESTI-UM985-NIMDU-NIMD1W-LOWW

The SID (Standard Instrument Departure) is IRMA5M and the STAR (Standard Terminal Arrival Route) is NIMD1W.

The flight plan looks like the following on a map:
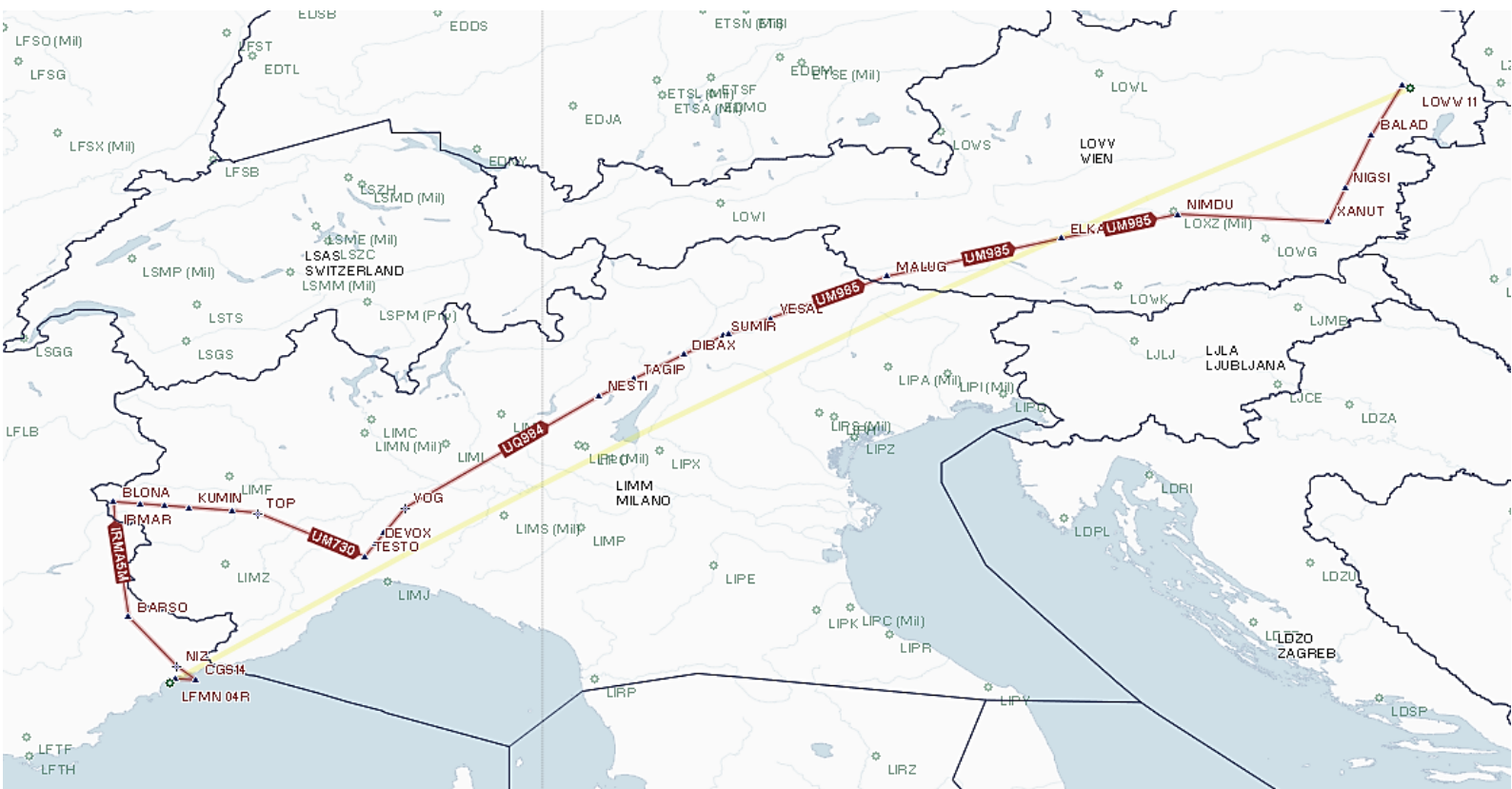
Flight Planning Continued…

At present the route may not make much sense. A route is composed of 4 components, these are:

- Departure airport
- Airways
- Waypoints
- Arrival airport

For the flight today the departure airport is Nice Côte d'Azur (LFMN) and the arrival airport is Vienna International (LOWW). There are several waypoints between the airports such as BLONA or NESTI.

A waypoint is used to assist in navigating the sky. In order to get between different waypoints an airway is used, such as UN853 or UM985. An airway contains several waypoints to within itself which get you from waypoint A to waypoint B. Airways also simplify the programming of the FMC, as pilots do not have to enter every waypoint along the route.

As part of the flight planning process we have to consider diversionary airports in case of an emergency, the weather or the destination airport being closed. There are 4 diversionary airports for the flight today, they are;

- LZIB
- LHPR
- LKTB
- LKNA

The flight today will not feature any failures or circumstances which require the use of diversionary airports.

Flight Planning Continued…

Fuel is the most important thing during the flight planning phase. It is critical that we have the fuel required carefully planned out and checked. This can be a tedious process. For the benefit of simplicity a website may be used for the fuel planning of this flight – www.fuelplanner.com.

The website predicts that 14,516lbs of fuel will be required for today's flight.

Fuel burned en route	8001lbs (3630kgs)
Reserve fuel	6515lbs (2956kgs)
Total fuel on board	14516lbs (6586kgs)

The predicted flight time for the route today is just over an hour and a half.

The aircraft weight and load is also critical. The PMDG 737NGX features a sophisticated fuel and load manger built into the FMS. The procedure to enter this load information will be discussed further down. There will be 149 passengers onboard the flight today.

Passengers	149
Cargo	6532kgs (Loaded by default)
Total Weight	66,300kgs

Flight Setup

Everything has now been prepared, so it is time to fly!

Setup the flight with the following options:

- Select a livery of choice (Recommend Austrian Airlines)
- Park the aircraft at gate A14 at Nice Airport (LFMN)
- Select the 'Fair Weather' theme
- Set Time/Season to Day and Summer

The aircraft should start at the gate with engines running. This is not realistic, however the aim of this tutorial is to get one flying as quick as possible. Full engine start-up procedures will be discussed in a future tutorial.

Flight Setup – Fuel and Payload

Prior to beginning this tutorial it is important to make sure the aircraft has been loaded with the correct amount of fuel and payload.

1. Open/navigate to the FMS. Press the button beside FS ACTIONS, then press FUEL. Depending on how the simulator is setup, fuel will either be displayed in pounds (LBS) or kilograms (KGS).

2. Enter a value of 14516LBS or 6585KG into the TOTAL field at LSK (Line Select Key) 1L (One Left). Press RETURN to go back to the main FS ACTIONS menu.

3. Now press the button beside PAYLOAD (LSK 2L). Enter a value of 7 into the FIRST CLASS field and a value of 142 into the COACH CLASS field. The aircraft has now been loaded with 149 passengers. Press RETURN to go back to the FS ACTIONS menu and then press MENU (LSK 6L) to go back to the main menu page.

Aircraft fuel and payload has now been loaded.

Preparing for Departure

This tutorial begins with the fuel and passengers already loaded and the twenty second system initialisation completed. Set Parking Brake.

1. Open the FMS (Flight Management System) and press LSK 1L, <FMS, to access the FMS configuration pages. An error may appearing saying NAV DATA OUT OF DATE. Ignore this error by pressing the CLR (Clear) button on the FMS. Press POS INIT (LSK 6R). This will allow the programming of the FMS to commence.

2. The REF (Reference) AIRPORT is LFMN, which is Nice airport. Enter this into LSK 2L. Now press the ROUTE (LSK 6R). The ORGIN is LFMN, which should already be in the Scratch pad. Simply press LSK 1L to enter this. The DEST (Destination) airport is Vienna, so enter LOWW into LSK 1R. The FLT NO. (Flight Number) is OS738. Enter this into LSK 2R. According to the flight plan, the runway which will be used for departure today is 04R. Enter this into the RUNWAY field (LSK 3L). The first page of the RTE page is complete.

3. A SID must be selected. Do this by pressing the DEP/ARR button. Select DEP (LSK 1L). The select the runway, 04R, LSK 2L. Keep pressing the NEXT PAGE button until the SID IRMA5M has been found. It should be on page 3 and LSK 4L. Select it. Then press the ROUTE button which is LSK 6R. This should take one back to the RTE page. Press the NEXT PAGE button, which will allow the flight plan to be entered.

VIA	TO
UN853	BLONA
UY11	KUMIN
UM730	TESTO
UQ712	VOG
UQ984	NESTI
UM985	NIMDU

Preparing for Departure continued...

4. Once UQ712/VOG has been entered it will be necessary to press the NEXT PAGE button to continue entering the flight plan. Once the flight plan has been entered, as above, press the ACTIVATE button which is LSK 6R.

5. It is now time to enter performance information about the aircraft. Once the route has been activated, it should appear as a pink line on the ND (Navigation Display) and on the FMS the LSK 6R should turn from ACTIVATE to PERF INIT. Press LSK 6R to enter the performance information.

6. Press LSK 3L to automatically fill out the ZFW (Zero Fuel Weight). Press it again to enter the information in the scratch pad. The GW (Gross Weight) will have been automatically entered as well, after entering ZFW. The reserve fuel for this flight is 2.9, so enter that into LSK 4L. The planned fuel to be burnt en route also needs to be entered. Enter a value of 3.6 into LSK 2L. The Cost Index (CI) determines how efficiently a pilot/airline wants the aircraft to fly. The lower the CI, the more efficient the flight will be. For this flight, a value of 80 will be used for the CI. Enter this value into LSK 5L. Enter 35,000ft into LSK 1R for the cruising altitude. Press EXEC to confirm. The PERF INIT page is now complete.

Preparing for Departure continued...

7. It is now time to select and enter information which will be used for take-off. Press LSK 6R on the PERF INIT page. LSK 6R should be N1 LIMIT. For this flight today, a derated take-off will be used. A derated take-off is when the aircraft does not use full power for take-off and climb. A derated take-off reduces fuel burn, engine wear and saves money. The runway at Nice Airport is quite long and the aircraft is has a relatively light load so a 22K DERATE will be used. Select this by pressing LSK 4L. Now press LSK 6R to go to the TAKEOFF page.

8. Flaps are used during take-off to increase lift at low speeds. A flap setting of 5 will be used for the take-off today. Enter 5 into LSK 1L. Press LSK 3L to automatically calculate the CG (Centre of Gravity) and press it again to enter. The V-speeds will have been automatically calculated for LSK 1R, 2R and 3R. V-Speeds are defined below:

V1	Point of no return. Committed to take-off.
Vr	Point of rotation. Smoothly pull the yoke back to lift off the ground.
V2	The slowest safe speed to continue climbing on only one engine.

9. Press LSK 1R, 2R and 3R to automatically enter and confirm these speeds. The TAKEOFF REF page is now complete. Make sure to set the aircraft trim according to what it recommended by the FMS.

10. There is only one final thing left to do in the FMS. It is to check the route for discontinuities. A route discontinuity is when there is a 'gap' in the route between two waypoints. To check, press the LEGS button and press NEXT PAGE to scroll through the legs. There should be no ROUTE DISCONTINUITY errors.

Preparing for Departure continued...

11. Now it is time to setup the autopilot. Enter the cruising altitude, 35000ft, into the ALT window. Enter the runway heading into the HDG window, which is 043. Finally, enter V2+10 into the SPD window, which is 154KNOTS.

12. Go to the overhead panel and enter the FLT ALT into the Cabin Pressurisation panel.

13. Turn on TCAS (Traffic Collision Avoidance System) by going to the lower pedestal and switching the TCAS knob to TA/RA. Finally, press the ENG button above the engine display twice to bring up information about N2, oil pressure etc. This is done so that during the take-off roll, the pilot does not need to look down to view this information.

The aircraft has now been configured for taxi.

Taxi, take-off and climb out

The aircraft should now be fully configured to begin taxiing.

1. Turn on the Fasten Seatbelt sign on the overhead panel. Also, turn on the logo light.

2. Release the parking break and press SHIFT+P followed very quickly by 2. This tells FSX to taxi the aircraft to the right. The aircraft should now be pushed back from the gate followed by a right turn.

3. Once pushback is complete and the aircraft has been pushed to the right, press SHIFT+P to stop pushback. Put the parking brake on. Deploy flaps to 5 and turn on the taxi light by going to the overhead panel.

4. Release the parking brake and smoothly push the throttles forward to maintain approximately 20KNOTS. It is important not to exceed 10KNOTS during turns when taxiing. Taxi to and hold short of runway 04R.

5. Once holding short of the runway, turn on the landing lights, anti-collision lights and strobe by going to the overhead panel. Set the autobrakes to RTO. Turn on the F/D (Flight Director) and the A/T (Auto-throttle). Press the LNAV button. This means that magenta bars will appear on the PFD (Primary Flight Display) after take-off which will guide the pilot.

6. Check to see if the runway is clear from approaching traffic, and if so taxi onto the runway and then stop once lined up.

Taxi, take-off and climb out continued...

It is recommended that you read the follow section about take-off prior to performing the procedure. The take-off happens very quickly and there will be quite a lot going on.

7. With the parking brake on, slowly push the engine throttles to 40% N1. Let the engines stabilise.

8. Release the parking brake and press the TO/GA (Take-off/Go around) button. This is located on the engine throttles, however for ease of use, the PMDG 737NGX features a hidden clickspot on the 2D panel just to the bottom left of the course knob. The clickspot on the 2D panel is the screw beside the TERR button and to the button left of the course knob. Release the parking brake and press this clickspot. This TO/GA button will push the engines forward automatically to the desired take-off power selected in the FMS.

9. Apply forward press on the yoke until 80KNOTS. Make small corrections to maintain the runway centre line. At Vr, pull the yoke back smoothly until the aircraft is established on a 15° nose up climb. Raise the aircraft gear once a maintained rate of positive climb has been established, usually a few seconds after take-off.

Taxi, take-off and climb out continued...

10. At 500ft, press the VNAV button and press CMD 1 on the A/P (autopilot) panel. Once the autopilot is on, the aircraft will continue to accelerate. No physical control inputs should be required by the pilot.

11. At around 1000ft the autopilot will begin to make a turn to the right. This turn will line the aircraft up with the SID. The aircraft will pitch to maintain 160KNOTS.

12. Once passing through 1800ft, the aircraft will pitch down and continue to accelerate. A green '-1' and '-UP' should appear on the PFD. These indications tell the pilot when to retract the flaps. Passing through the '-1' mark, retract the flaps to a setting 1 and once passing through the '-UP' mark, retract the flaps fully.

13. A few miles after take-off the aircraft will have achieved a speed of 250KNOTS. This is the speed limit for civil aircraft below 10,000ft. Once the aircraft is well established on a controlled climb, press the gear handle to pull it down to the OFF position. Also, set the autobrakes to OFF.

14. Once above 10,000ft turn off the landing and taxi lights. The aircraft should hold an altitude of 10,000ft until passing the BARSO waypoint.

Climbing to cruise

The period of climbing to cruise altitude is pretty quiet and there is a light workload, so set back and enjoy the beautiful French scenery!

1. At 10,000ft the aircraft will accelerate to climb speed. It is recommend to increase the display range of the ND, so more of the route can be seen. A suggested change is to 80NM (Nautical Miles). Do this by turning the display range selector knob (to the left of the autopilot panel). At 18,000ft the aircraft baro pressure setting will need changed to STD. Do this by pressing the BARO knob. Green text saying STD should appear below the altitude tape on the PFD. Also, at 18,000ft turn off the logo light.

2. On the ND, it should now be possible to see green text saying T/C (Top of Climb). The point where this text is located on the ND is the point at which the aircraft will be at cruising altitude.

No further intervention is required by the pilot until cruise.

Cruise and descent preparation

The aircraft should now be cruising high above the Italian countryside. There will be a light workload during cruise, so it is possible to go to the wing view, or if you prefer, look around the VC, and admire the scenery.

1. Once at cruise, turn off the fasten seatbelt sign.

2. According to the planned route, the aircraft will be landing on runway 11 at Vienna International. The STAR will be NIMD1W. This STAR will need to be selected by going to the FMS. Press DEP/ARR, then LSK 2R for the LOWW approaches. Select the ILSZ 11 (LSK 1L). Scroll down to find the NIMD1W STAR which is on page 2 and LSK 4L. Select it. The transition will be BAL3K. Select and then press EXEC to confirm.

3. Now press the LEGS button to check for route discontinuities. In the event of a route discontinuity, press the LSK above the route discontinuity. This will copy the waypoint before the discontinuity. Then press the LSK of the discontinuity. This will enter the waypoint into it. Press EXEC and the discontinuity should be gone. There should be none. Increase the display range of the ND to 320NM.

Cruise and descent preparation continued...

4. At the waypoint MALUG, descent preparation will commence. Once the aircraft is near the MALUG waypoint, the ND display range will need to be change from 320NM to 160NM. Text in green saying T/D should appear just after the NIMDU waypoint. This is the point at which the aircraft will begin descending.

5. Open the FMS and press the INIT REF button. The frequency for the ILS will be displayed in the LSK 4L along with the ILS course. This information will need to be entered into the A/P. Enter the course, which is 112° by using the white know with a yellow cross, which is beside the A/T switch. Keep turning it around until the desired value is shown. Do the same for the F/O (First Officer's) course knob. Enter the ILS frequency into both the Captain's and First Officer's NAV frequency selector. The frequency is 110.30. Press the TFR arrow, between the two frequencies, to active the frequency which has been entered. The course and frequency should not appear above the artificial horizon on the PFD. Change the altitude in the ALT window to 2600ft, as this is the ILS interception altitude.
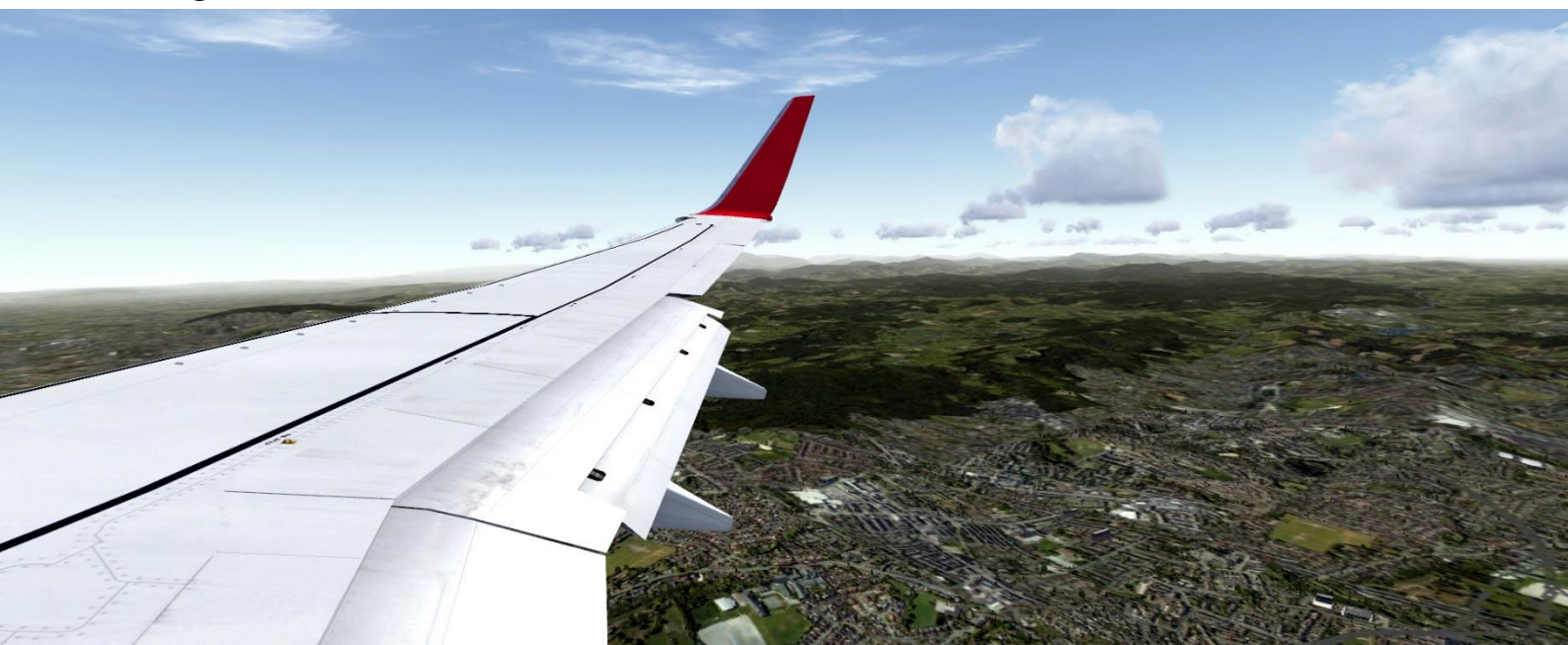
Descent, approach and landing

1. As the aircraft nears the T/D point, it will be necessary to change the ND display range again, this time down to 80NM. Just before the T/D point, the aircraft engines will spool back to slow the aircraft down. An automated descent down to 2600ft will then commence. The aircraft will pitch down. Turn on the Fasten Seatbelt sign.

2. A green curved line will appear on the N/D. This green line shows where about the aircraft will reach the altitude entered into the ALT window, in this case 2600ft. A controlled descent should continue uninterrupted and the aircraft should continue to follow the programmed route.

3. As the aircraft passes through 18,000ft the logo lights will need to be turned back on. The barro needs to be reset to the local value. This can be done by pressing 'B' or pressing the STD button on the BARO knob.

4. At 14,000ft the ND display range will need changed to 40NM. Continue changing the range as appropriate. At 10,000ft the rate of descent will decrease because the aircraft will slow down to 240KNOTS. Also, at 10,000ft the landing lights need to be turned on.

Descent, approach and landing continued...

5. Open the FMS and press the INIT REF button. This will take one to the APPROACH REF page. LSK 1L, 2L and 3L will all feature approach speeds for various flap settings. This aircraft will be landing will flaps 30, so according to LSK 2L, at flaps 30 the approach speed is 143KNOTS. Enter 30/143 into LSK 4L. Set autobrakes to 2.

6. At 8000ft deploy flaps to 1. Deploy the speedbrake to help slow the aircraft down. Once the required speed has been achieved deploy flaps 2. At that point, the aircraft should be making a right turn to line-up with the runway. Once 180KNOTS has been achieved, deploy flaps 5. Once 165KNOTS is achieved, stow the speedbrake.

7. When the aircraft has made the line-up turn, deploy flaps 10. Also, at the point arm the speedbrake by pressing SHIFT+/.

8. At 20NM disengage the autopilot and take control of the aircraft manually. The runway should now be insight. Deploy flaps 15. Turn off the F/D. Press the SPEED button for the A/T and set speed to 150KNOTS. Deploy the gear.

Descent, approach and landing continued…

9. Maintain the ILS by making sure the magenta diamonds on the PFD are both centred. The magenta diamond on the right is for vertical guidance and the diamond below the artificial horizon is for lateral guidance. At 15NM out deploy flaps 25. Set the speed for the A/T to 143KNOTS.

10. At 4000ft deploy flaps 30. This will be the final flap extension because the data entered into the FMS is for a flaps 30 landing.

11. At 100ft turnoff the A/T and bring the engines back to idle.

12. At 30ft, make a gentle flare to approximately 2/3° pitch up. Upon touchdown the speedbrakes will automatically deploy to assist in slowing the aircraft down. The brakes will automatically activate. Deploy reverse thrust.

13. At 80KNOTS, bring the engines back to idle and disable autobrakes by pressing the brake (.) key twice. Apply manual braking and exist the runway as soon as possible. Once of the runway retract the flaps.

Welcome to Vienna!

Enhancing the experience

There are a wide variety of add-ons available from several different developers/publishers which can be used to enhance the flight experience for this tutorial.

Scenery

- Aerosoft Nice Côte d'Azur Airport (LFMN)
- FlyTampa Vienna X (LOWW)
- ORBX FTX Global (Ground textures for the entire planet)
- ORBX FTX Vector (Accurate roads, rivers etc.)
- PILOTS FS Global Mesh 2010 (Accurate elevation data for the entire planet)

Environment

- REX 4 – Texture Direct HD (Cloud, Sky, Water and Airport textures)

FOR USE IN MICROSOFT FLIGHT SIMULATOR X. NOT CERTIFIED FOR REAL LIFE PROCEDURES.