Embraer 170 FLIGHT TUTORIAL

Berlin EDDT to Vienna LOWW

The E-jets Series is developed by Feelthere and Wilco Publishing and available for purchase at www.wilcopub.com

CONTENT 2

INTRODUCTION 3

Welcome to this tutorial of Wilco Embraer 170!

This is my second piece of work on the Embraer series after the very popular Embraer 145 complete tutorial still available for download on www.flytutorial.com

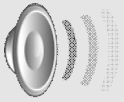
The Embraer 170 is a very recent aircraft and one the latest entrants into the top end of the regional jet airliner market, with seating capacities spanning from 70 to 108. Embraer announced the ERJ-170 in 1999, and formally launched the program on June 14 that year at the Paris Air show.
The 70 seat Embraer 170, rolled out on October 29 2001 and first flew on February 19 2002. Six aircraft were being used in the flight test program.

For more information about Embraer and the 170, visit Embraer's website: http://www.embraercommercialjets.com/english/content/ejets/emb_170.asp

Read through this tutorial that will take you on a short European haul from Berlin, Germany to Vienna, Austria and you will soon be enjoying the state of the art Honeywell Primus Epic EFIS avionics!

This tutorial is consistently divided into two parts, with the illustrations/screenshots on the left, and the texts/references on the right.

When complex and long configuration is required, such as FMS programming, the starting point will be illustrated with a screenshot on the left of the first page, the instructions will be explained on the right of the same page, and the results of these instructions will be displayed onto the next page with a new screenshot.
Please report any typing errors or mistakes – contact@flytutorial.com

	**Red boxes** are pointing at highlights on a screenshot, for example on the EFIS screen to monitor or execute particular actions
	**This sign is drawing your attention to a specific command / action to undertake.** For example open or close the doors, set the parking brake, etc…
	**Sequences of numbers** also shown on screenshots are referring to a set of ordered actions , for example to power up the aircraft.
 **TAKE OFF - OK**	This logo and font and color will be used to refer to an aural message from our aircraft computer system.
	This icon illustrates a specific configuration / tweaking of the aircraft or the simulator to get the desired result, for example configuring the EMB configuration utility.
	This icon illustrates a warning or important step that requires special attention.

This tutorial has been written and published for recreational usage for Microsoft Flight Simulator and should **never be used for real flying situations**.

This tutorial is freeware and thus free or charge for any private users who wishes to enhance their experience flying the E-jets Series from Wilco Publishing.

This tutorial cannot be distributed, hosted, modified, and copied even partially without the agreement or consent of the author.

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The author can be directly contacted at contact@flytutorial.com

Private users are highly encouraged to contribute to the work of the author on a volunteer donation basis using either Paypal accounts or the International Call charge system available and explained on the website of the author www.flytutorial.com

Thank you!

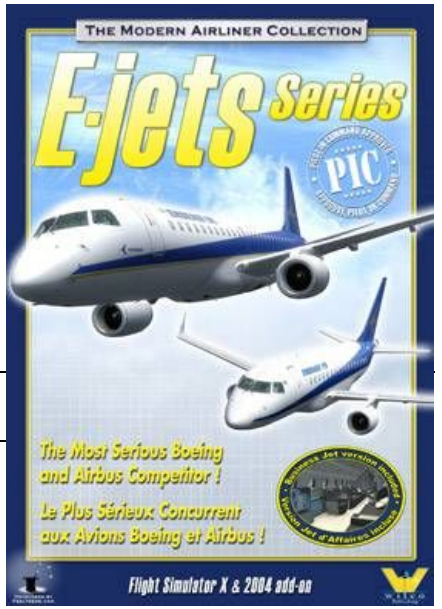
Please contribute!

Below is a list of configuration, references and add-ons that were used to complete this tutorial. You may want to use exactly the same configuration to run though this tutorial or try your own settings. If you experience any technical issue, please contact Feelthere forum @ http://forum.iemit.com/

I recommend running your PC under **Windows XP Service Pack 3**

REQUIRED

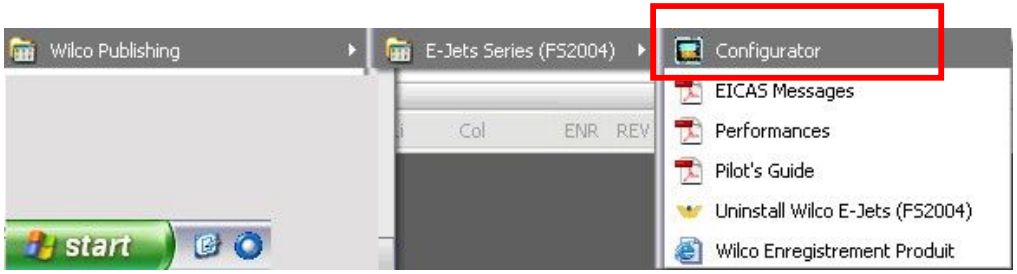
Microsoft Flight Simulator 2004 with 9.1 patch	**www.microsoft.com/games/pc/flightsimulator.aspx**
Wilco E-jets series / base pack **with Service Pack 4**	**www.wilcopub.com**
Route Finder: flight plan calculation	**http://rfinder.asalink.net/free**
Vroute flight and weather planning	**www.vroute.net**
Berlin Tegel chart package (included in this tutorial)	**www.vacc-sag.org**
Vienna Schwechat chart package (included in this tutorial)	**www.vacc-austria.org**

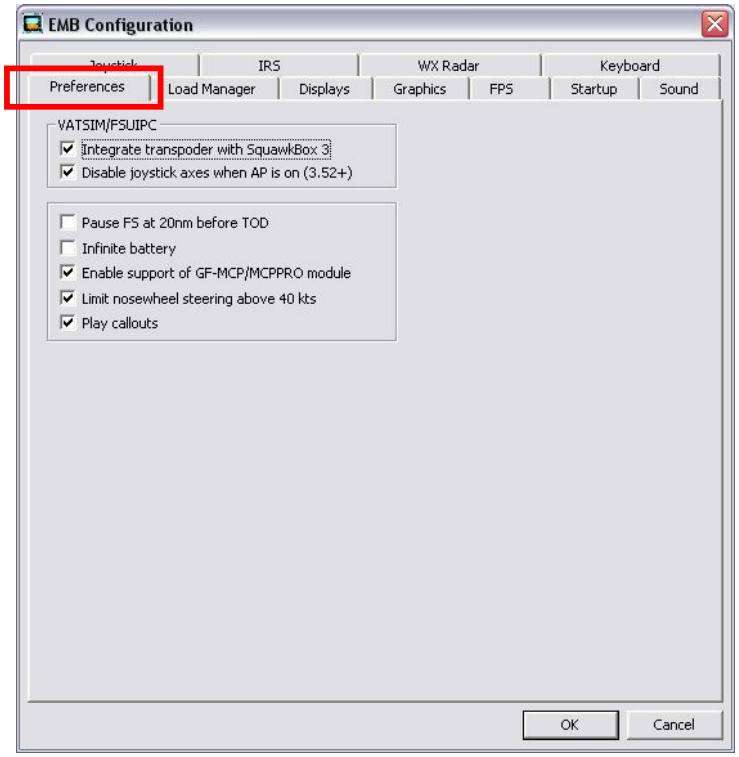


OPTIONAL

AIRAC updates – **this tutorial is using cycle 0808**	**www.navigraph.com**
Flytutorial white textures & modified Wing views	**www.flytutorial.com** / Maintenance area
Airport Enhancement Services from Aerosoft + E170 Configuration File	**www.aerosoft.com** **www.avsim.com,** [feelthere_pic_e170.zip]
Berlin Tegel Scenery / Aerosoft German Airport #3	**www.aerosoft.com**
Vienna Schwechat scenery	**www.flytampa.org**

Let's start working!





The first step is to configure our aircraft using the **Configurator** tool available from the Windows start button as illustrated.

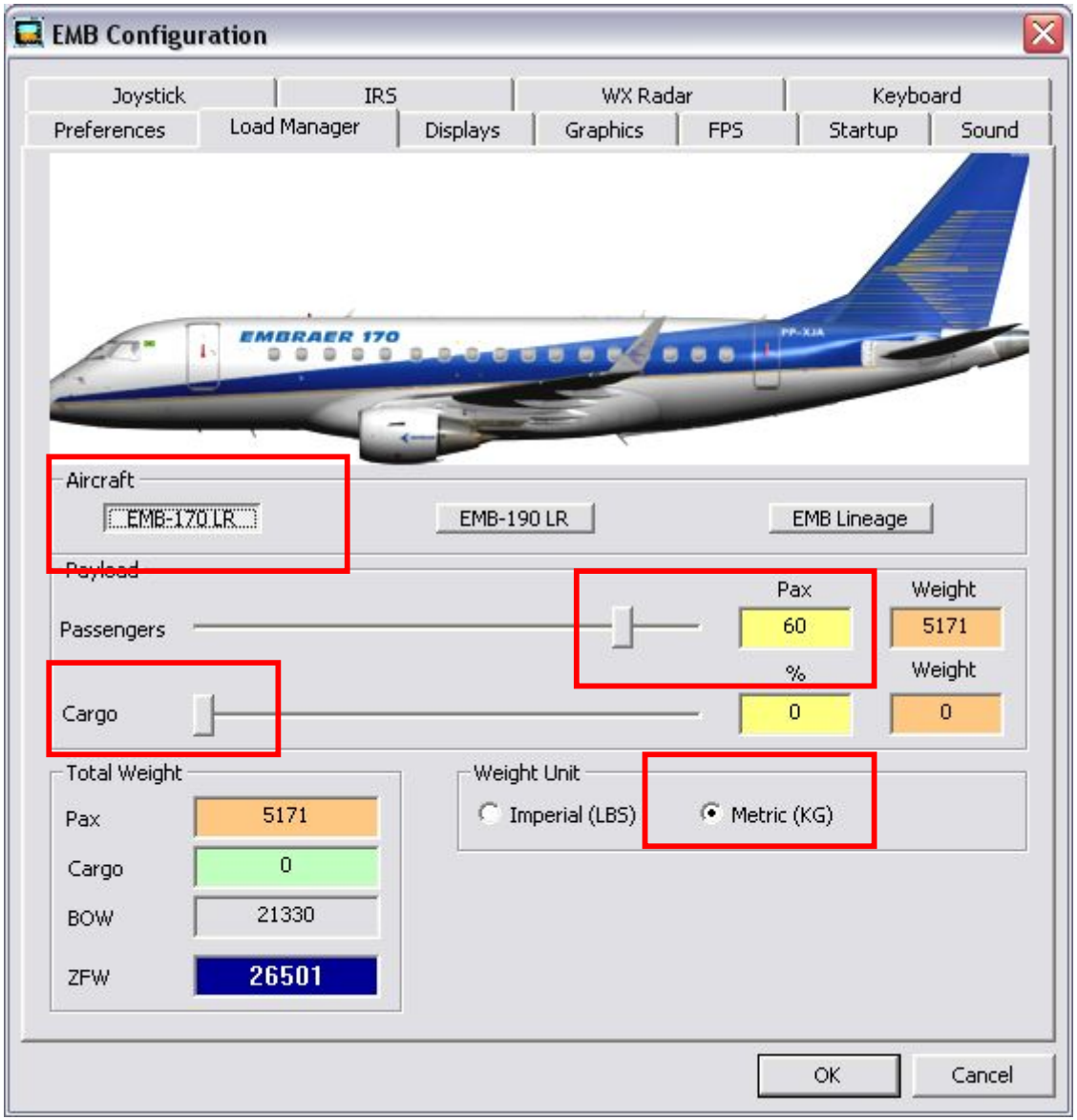
If you cannot find the entry under All Programs, you can manually retrieve the Configurator at the following location (default installation):

C:\Program Files\Microsoft Games\Flight Simulator 9\FeelThere\E170\EmbSetup.exe

Let's have a look at the different tabs and make the necessary changes for our tutorial.

Preferences

Nothing to change here. Leave everything as default



Load Manager

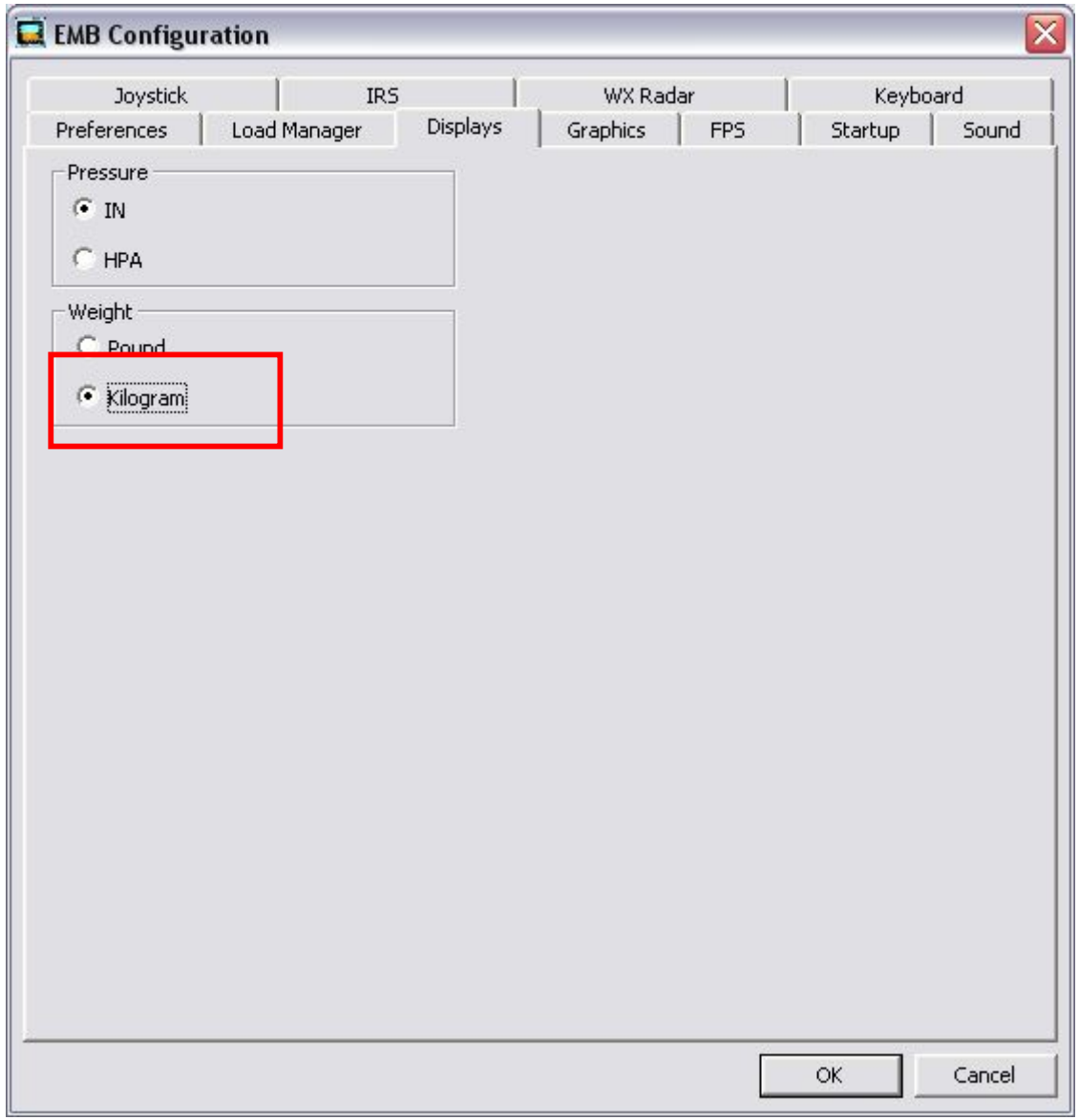
This tutorial is using the Embraer 170 LR so make sure to select this model.

☑ Ajust Pax number to **60**

☑ Move the Cargo selector to **0**

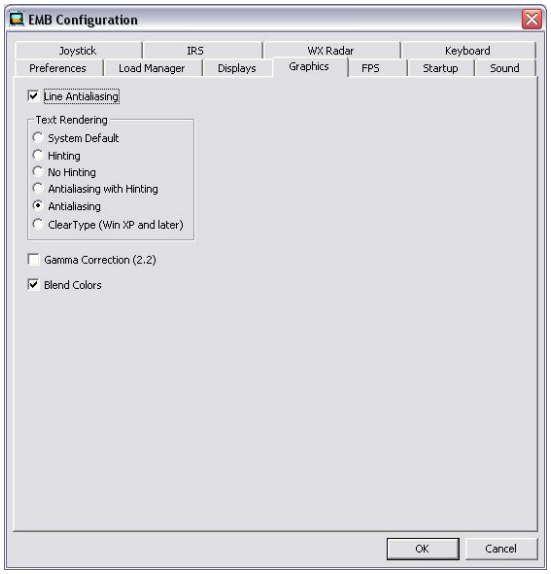
☑ Change the weight unit to **Metric(KG)**

This should give us a **Zero Fuel Weight of 26.5 Tons**.



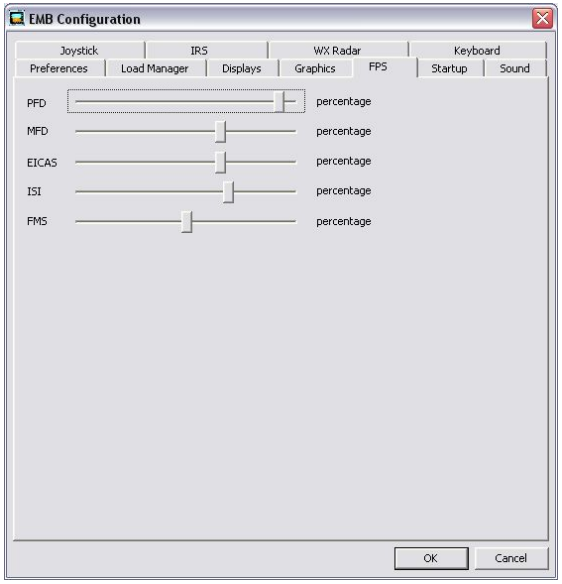
Displays

Change the Weight section to display **Kilogram**



Graphics

Nothing to change here. Leave everything as default



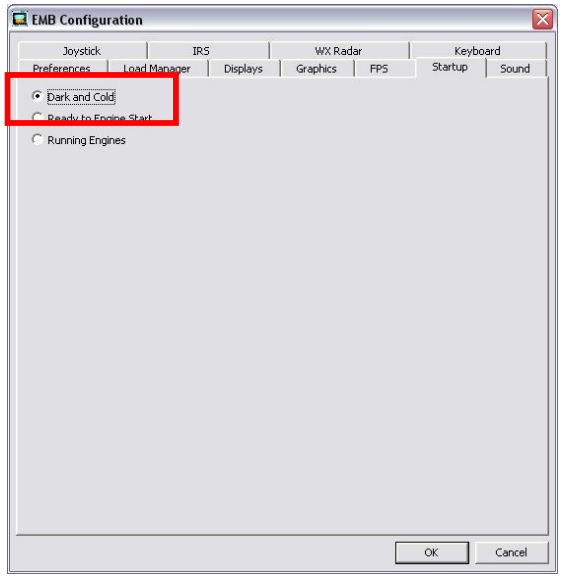
FPS

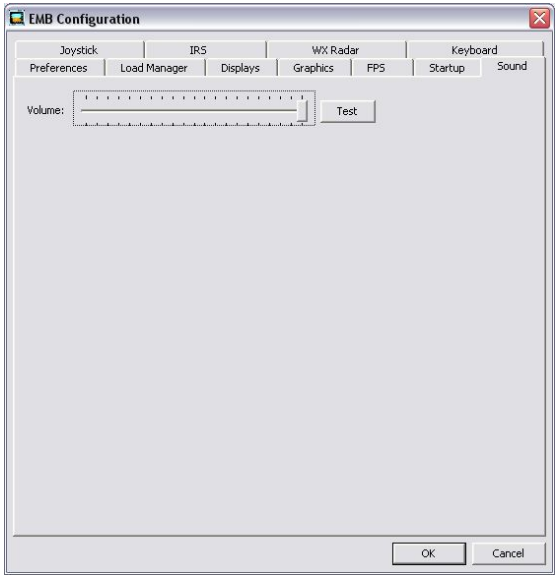
FPS stands for (Picture) **F**rame **P**er **S**econd

If you experience a lack of fluidity when flying with this aircraft, lower the percentage of some instruments and check again the performance aspects.

If you have a fairly recent and descent PC, the default values should be OK as this aircraft is not FPS intensive.

Nothing to change here. Leave everything as default



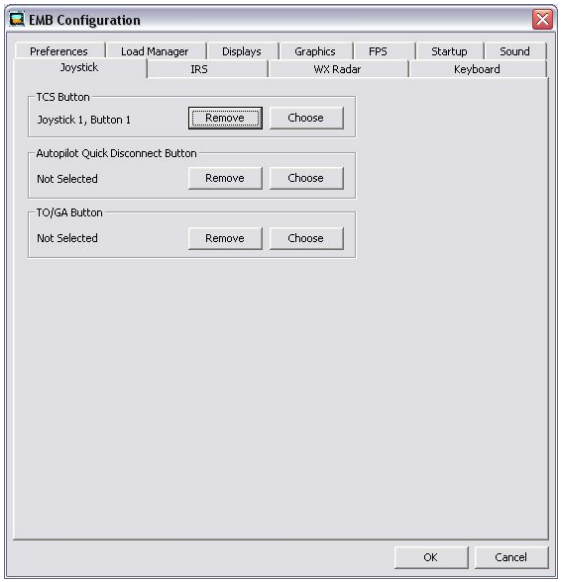


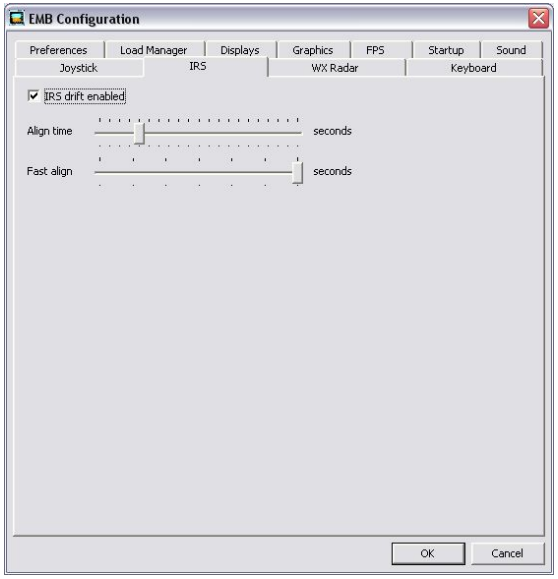
Startup

To increase realism, change the option to **Dark and Cold**

Sound

Nothing to change here. Leave everything as default





Joystick

Nothing to change here. Leave everything as default

To enhance your flying experience, I suggest to use the CH yoke and the CH pedals. These devices work fine with the Embraer and not adjustments in the setting were necessary.

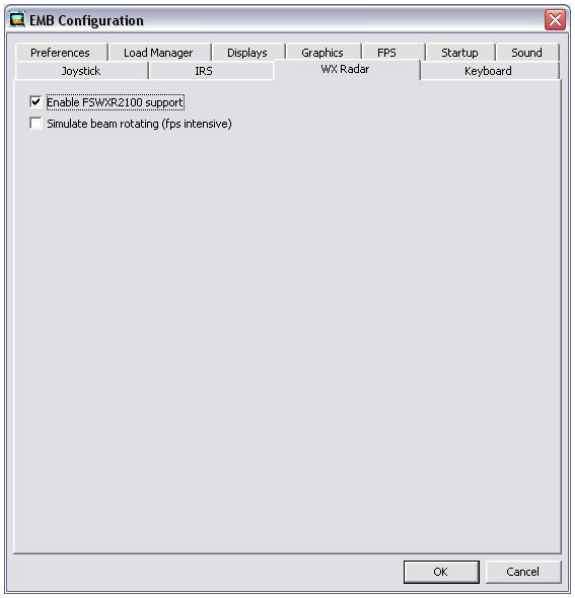
www.chproducts.com

IRS

IRS stands for **Inertial Reference System** and is basically the time necessary for the aircraft to find its position once powered up.

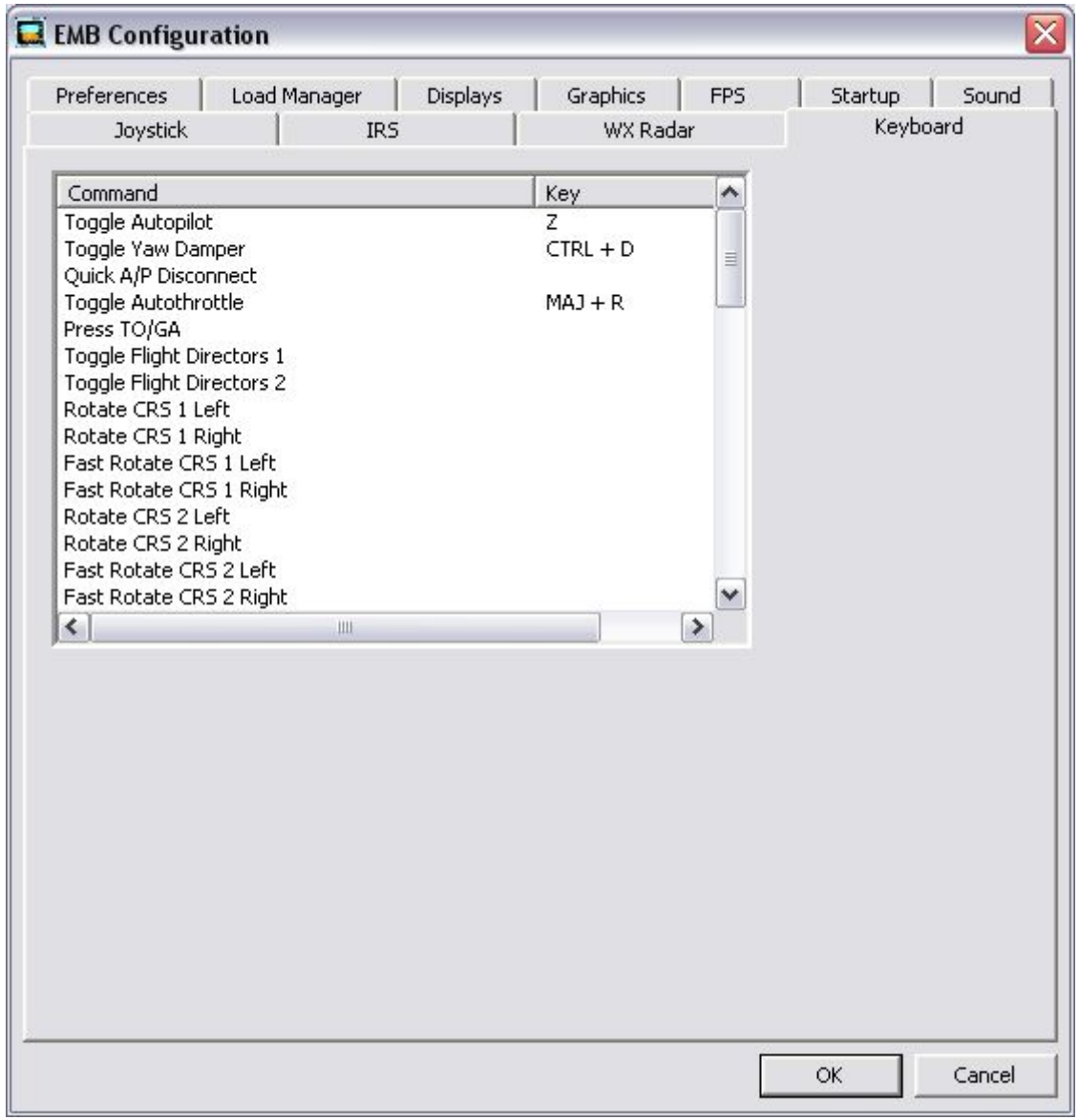
If you have a GPS in your car, then you probably have experienced this when you start your GPS device and need to wait a couple of minutes before it is able to give you an accurate position.

Leave the default settings for now. You can always change these later, especially if you want the IRS to be faster – or slower – in finding the aircraft position.



WX Radar

Nothing to change here. Leave everything as default



Keyboard

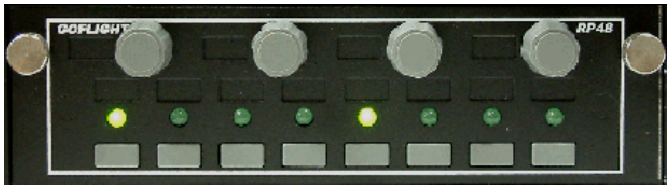
This tab enables you to customize keyboards shortcuts for various systems or functions.

I recommend you leave everything as default here.

This aircraft is by default compatible with **Goflight Modules** which is pretty cool. I recommend using these modules if you want to enhance your simulation experience, I personally have two Goflight modules:

The **GF-T8 8 Toggle Switch/Indicator Module**

The **RP48 Panel Module**



Custom Goflight configuration file is available for free at www.flytoturial.com / Maintenance section.

For more information, visit **www.goflightinc.com**

Welcome to the Briefing Room!

Before boarding the aircraft this morning, we are going to review the latest weather updates, departure and arrival procedures and charts as well as specific details about our flight.

Today we are flying 60 PAX and no cargo from Berlin Tegel EDDT, Germany to Vienna Schwechat LOWW, Austria on a short flight just over 300 nautical miles.

We are operating this flight on behalf of a major airline. Most passengers will transit to Vienna to another long haul to Asia so we must make sure we are not late at LOWW!

Our **alternate airport** will be **LZIB Bratislava** airport only 26nm west of Vienna

Computed route from **BERLIN-TEGEL** (EDDT, ED) to **SCHWECHAT** (LOWW, LO): 15 fixes, 319.4 nautical miles

```
Cruise altitude between FL330 and FL330
EDDT (0.0nm) -SID-> GERGA (27.1nm) -UM725-> TUVAK (39.4nm) -
UM725->
GORIG (44.4nm) -UM725-> BESKO (48.7nm) -UM725-> LUROS (69.7nm) -
UM725->
EBASA (75.4nm) -UM725-> KOBUS (93.0nm) -UM725-> BUSIR (116.8nm)
-M725->
HDO (128.5nm) -UM725-> KOMUR (151.9nm) -UM725-> LUMES (162.7nm)
-UM725->
VLM (206.7nm) -UT46-> ASTUT (275.0nm) -STAR-> LOWW (319.4nm)
```

Details:

```
ID      FREQ   TRK   DIST   Coords                Name/Remarks
EDDT            0     0    N52°33'34.87" E013°17'15.76"  B-TEGEL
GERGA           84    27   N52°36'09.01" E014°01'41.28" GERGA
TUVAK          172    12   N52°23'59.23" E014°04'14.73" TUVAK
GORIG          172     5   N52°18'59.64" E014°05'17.33" GORIG
BESKO          172     4   N52°14'43.69" E014°06'10.61" BESKO
LUROS          172    21   N51°53'54.94" E014°10'28.10" LUROS
EBASA          172     6   N51°48'16.08" E014°11'37.28" EBASA
KOBUS          172    18   N51°30'48.23" E014°15'09.38" KOBUS
BUSIR          172    24   N51°07'14.84" E014°19'51.17" BUSIR
HDO     115    172    12   N50°55'41.34" E014°22'07.68" HERMSDORF
KOMUR          159    23   N50°33'44.46" E014°34'53.90" KOMUR
LUMES          159    11   N50°23'33.89" E014°40'44.43" LUMES
VLM     114.3  159    44   N49°42'15.38" E015°04'00.27" VLASIM
ASTUT          144    68   N48°45'48.65" E016°02'52.35" ASTUT
LOWW           151    44   N48°06'37.00" E016°34'11.00" SCHWECHAT
Tracks are magnetic, distances are in nautical miles.
```

```
EDDT SID GERGA UM725 BUSIR M725 HDO UM725 VLM UT46 ASTUT STAR
LOWW
```

Route planning

Connect to **routefinder** - http://rfinder.asalink.net/free/ and complete the required information:

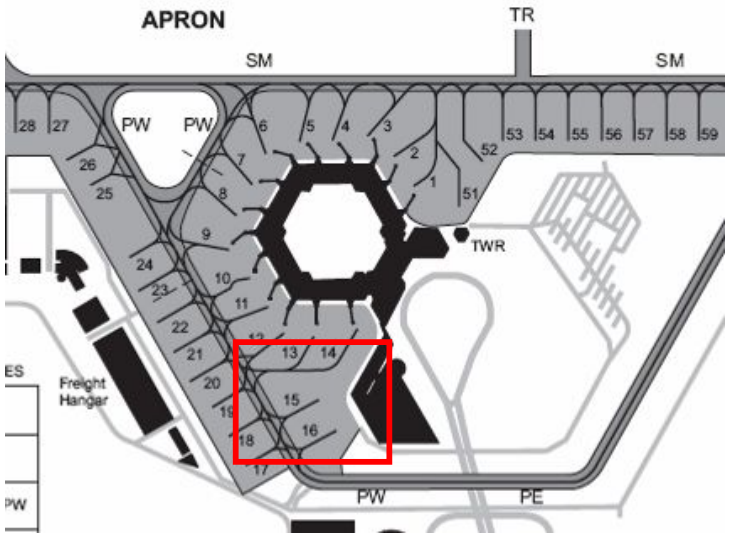
Departure : **EDDT**
Destination : **LOWW**

Database cycle : **0808**

Leave the other options and press Find Route – you should get your computed route such as illustrated on the left. The important information we will need is the line at the bottom containing the waypoints and routes we will manually enter into the FMS of the aircraft.

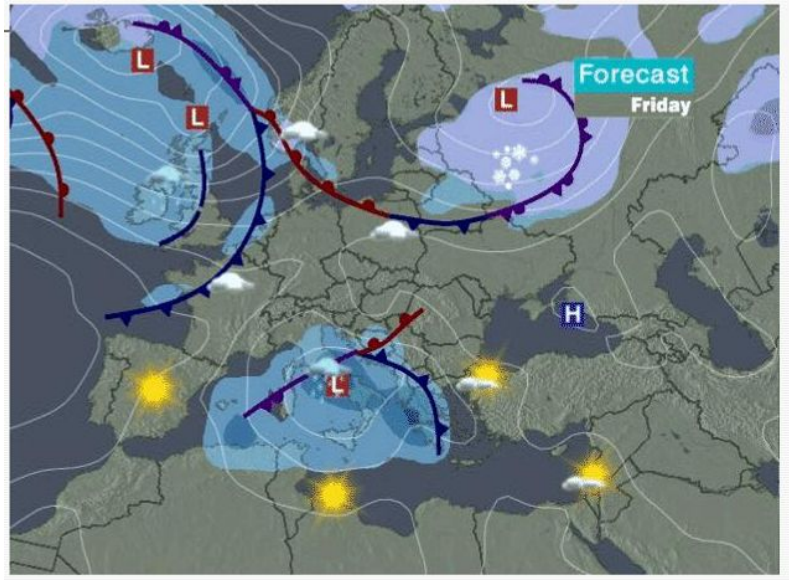
AIRAC cycles change every month. What this means is that you may **end up with a different route** for the same departure and destination airports.
The good news is you can still fly this tutorial even if you don't have the latest cycle.
Just make sure you select the relevant cycle on routefinder and then print or make a note of the route result.

You only need the last line circled in red on the left.



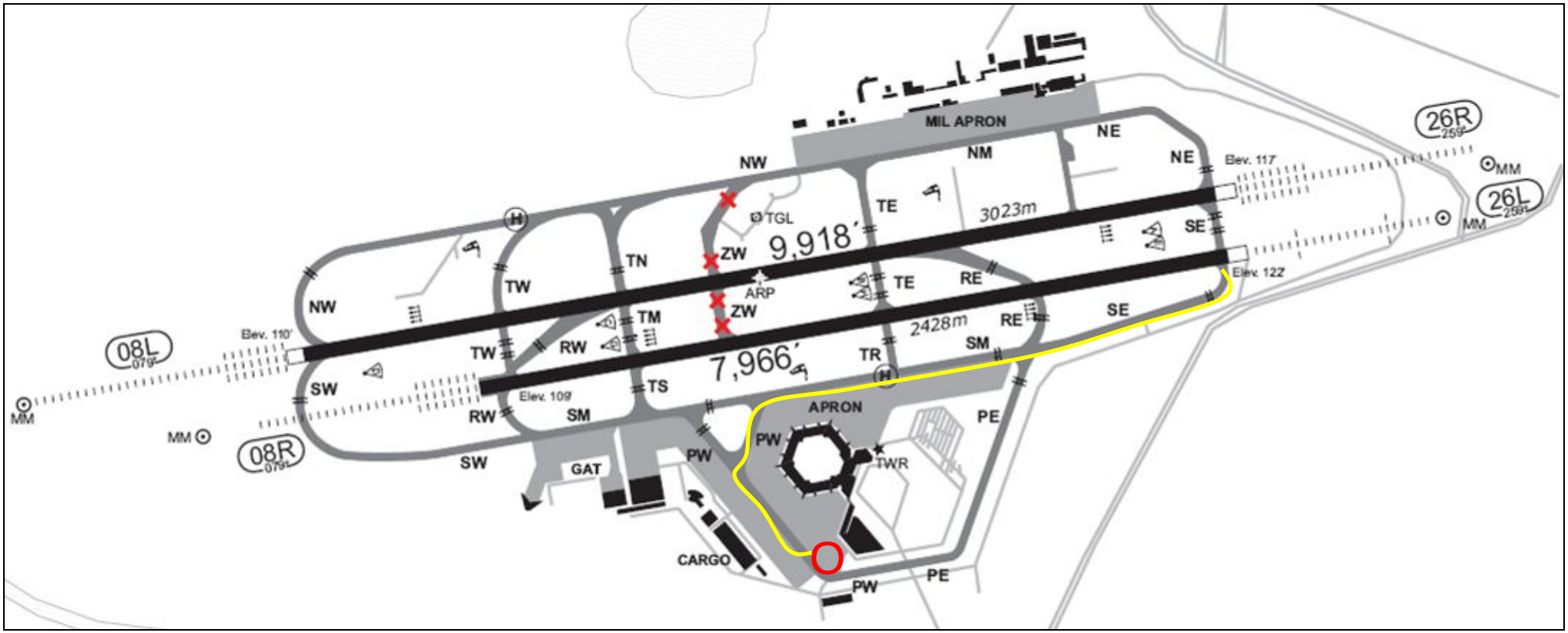
Our parking stand at **EDDT** will be **number 15**.

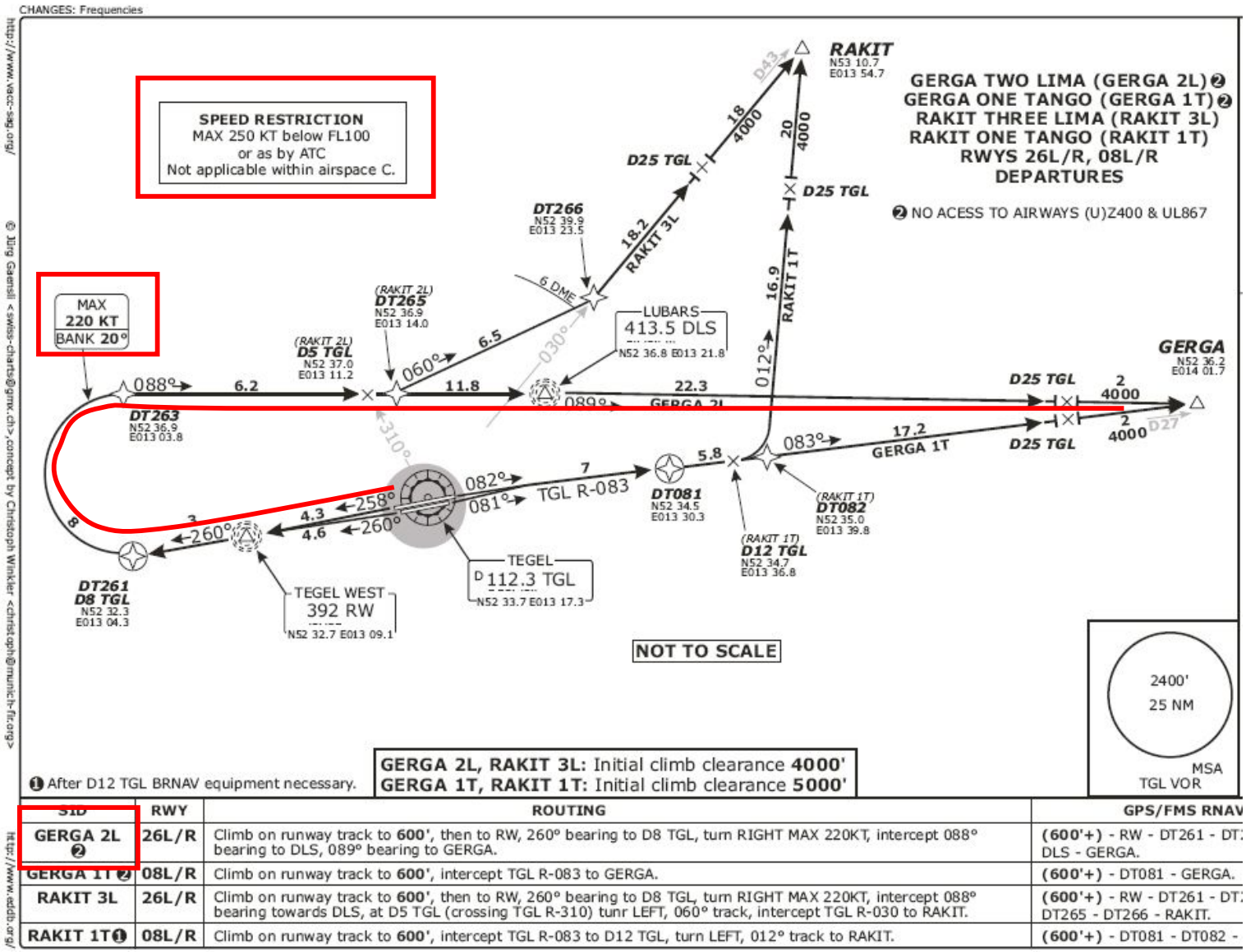
The latest weather bulletin available on Vroute is pretty good. Although a cold front is making its way towards Central Europe, no major weather disturbance is of significant importance for our short haul today.



Connect to www.vroute.net to get the latest weather updates.

Taxiing from our parking stand to runway 26L should be nice and easy and will give us a good overview of the APRON as illustrated below by the yellow line:





SID	RWY	ROUTING	GPS/FMS RNAV
GERGA 2L ❷	26L/R	Climb on runway track to **600'**, then to RW, 260° bearing to D8 TGL, turn RIGHT MAX 220KT, intercept 088° bearing to DLS, 089° bearing to GERGA.	**(600'+)** - RW - DT261 - DT DLS - GERGA.
GERGA 1T ❷	08L/R	Climb on runway track to **600'**, intercept TGL R-083 to GERGA.	**(600'+)** - DT081 - GERGA.
RAKIT 3L	26L/R	Climb on runway track to **600'**, then to RW, 260° bearing to D8 TGL, turn RIGHT MAX 220KT, intercept 088° bearing towards DLS, at D5 TGL (crossing TGL R-310) tunr LEFT, 060° track, intercept TGL R-030 to RAKIT.	**(600'+)** - RW - DT261 - DT DT265 - DT266 - RAKIT.
RAKIT 1T❶	08L/R	Climb on runway track to **600'**, intercept TGL R-083 to D12 TGL, turn LEFT, 012° track to RAKIT.	**(600'+)** - DT081 - DT082 -

EDDT SID

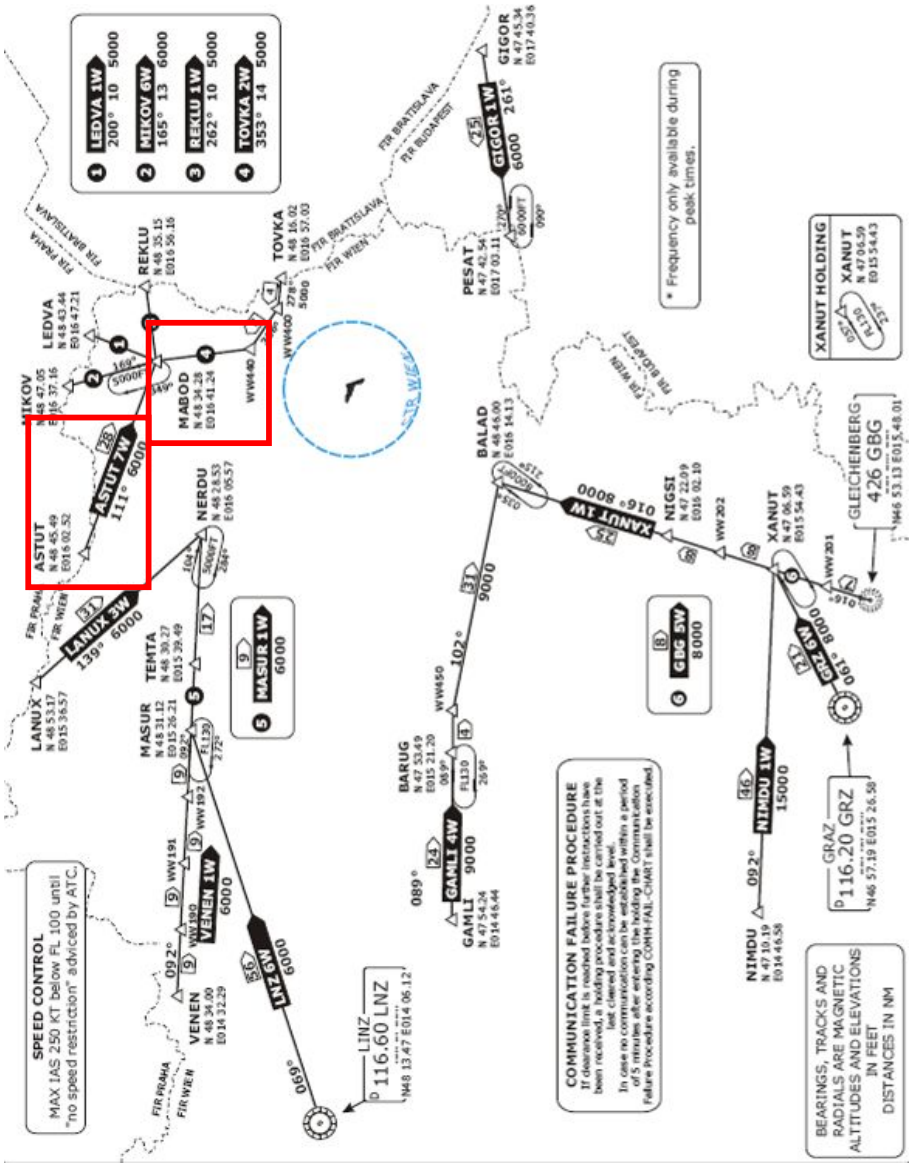
We expect a departure on **runway 26L** with a **GERGA 2L** SID to the west to our first waypoint **GERGA**

We have **two speed limitations,** one is **220KT** when turning to DT263, the other **250KT** until we reach FL100

EDDT SID **GERGA** UM725 **BUSIR** M725 **HDO** UM725 **VLM** UT46 **ASTUT** STAR **LOWW**

Review and download full PDF charts from VACC SAG

VACC-SAG
Virtual Area Control Center of Switzerland and Germany



LOWW STAR Arrival

Our arrival at LOWW will be **ASTUT 1W** taking us from our last waypoint **ASTUT** to **MABOD**

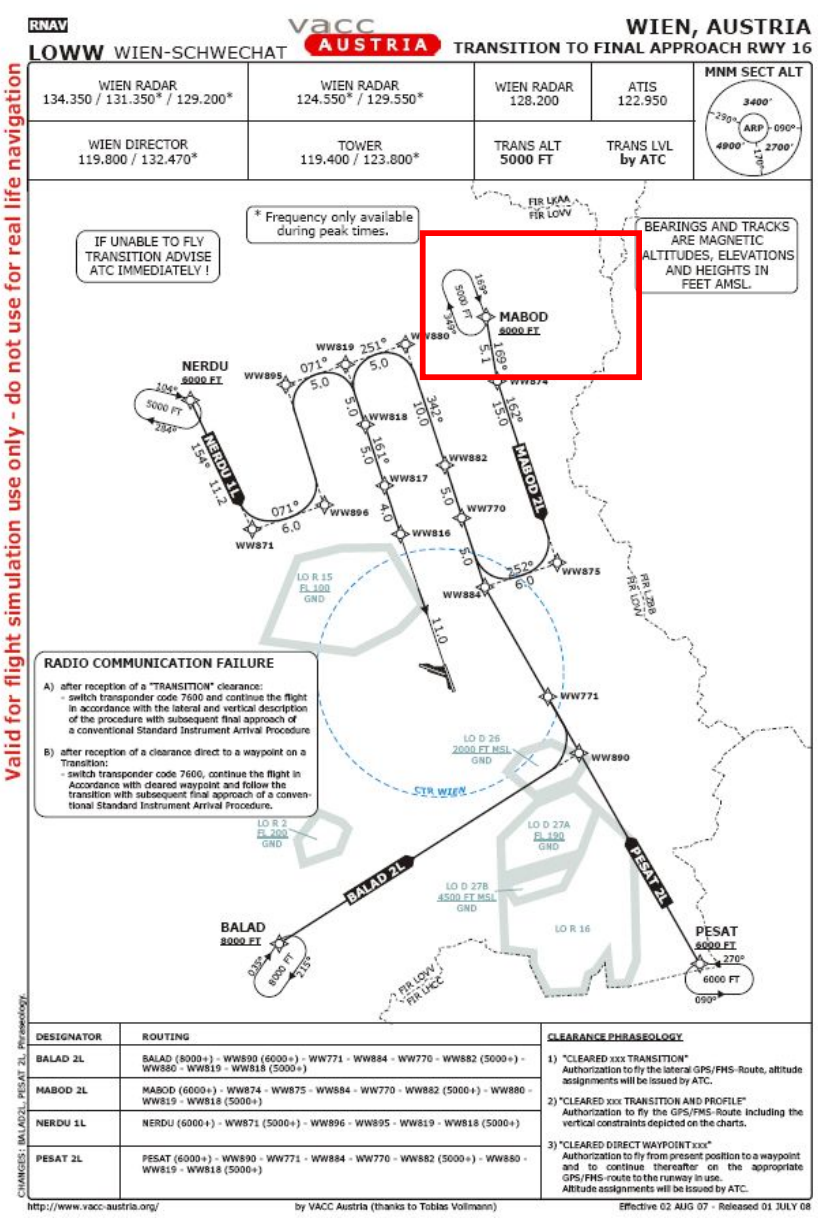
We have one speed restriction which is **250KT** below FL100 and one altitude constraint which is **6000FT** at MABOD

Should we hold at MABOD, we can only do so at **5000FT**

EDDT SID **GERGA** UM725 **BUSIR** M725 **HDO** UM725 **VLM** UT46 **ASTUT** STAR **LOWW**

Review and download full PDF charts from VACC Austria

vacc AUSTRIA

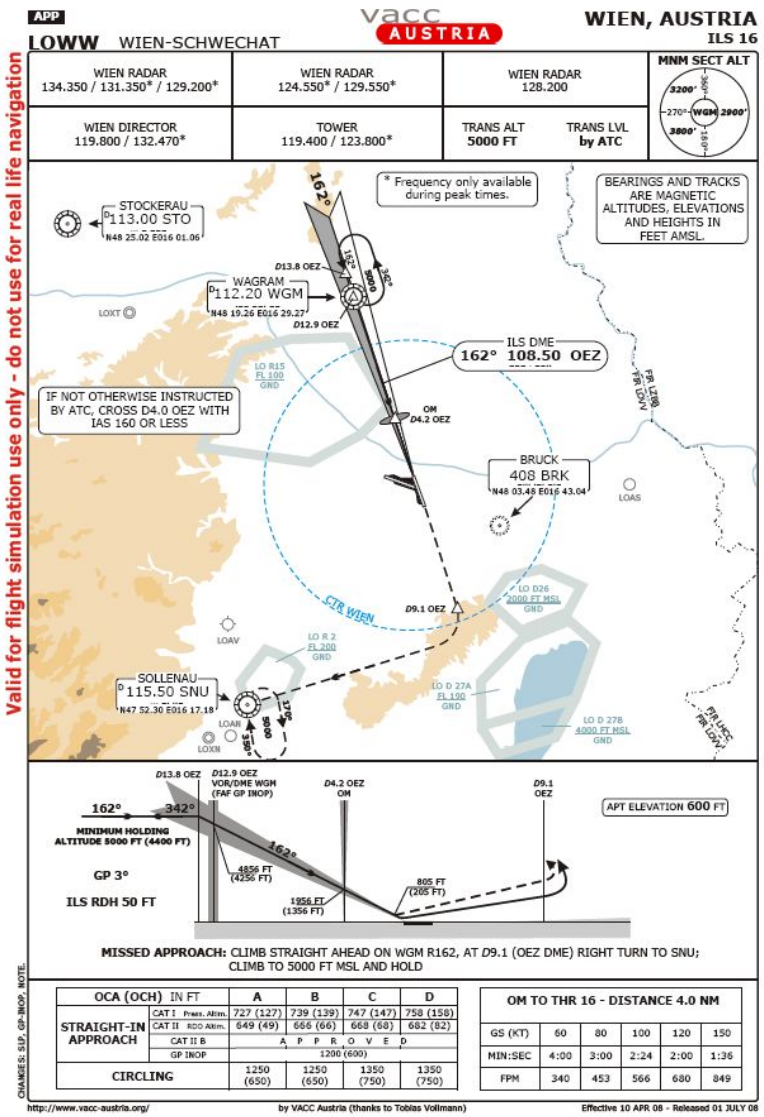


LOWW Transition to final approach Runway 16

From **MABOD**, we expect a runway 16 landing –although the runway in service may change by the time we get there - so we expect to follow transition **MABOD 2L**

Review and download full PDF charts from VACC Austria

vacc AUSTRIA



ILS Landing

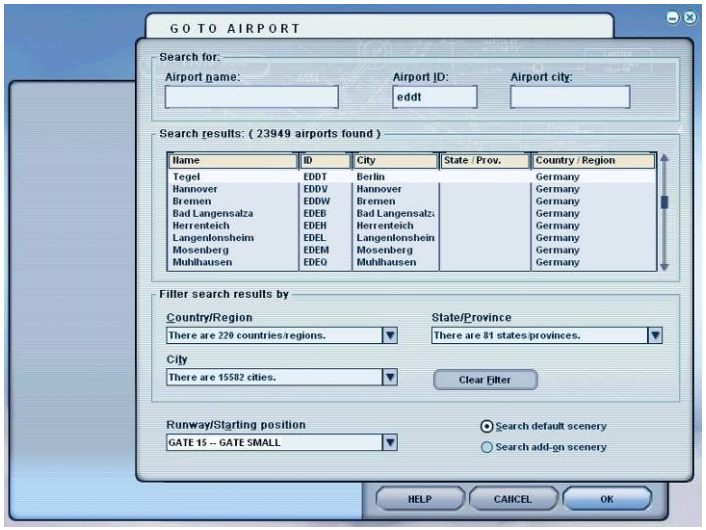
Should we land on runway 16, we must remember to set the ILS to a course of 162° and set the frequency to 108.50 OEZ.

Otherwise, we have the full set of maps for LOWW with us in the cockpit.

Our briefing is now complete!

Review and download full PDF charts from VACC Austria

vacc AUSTRIA



Now the serious stuff begins!

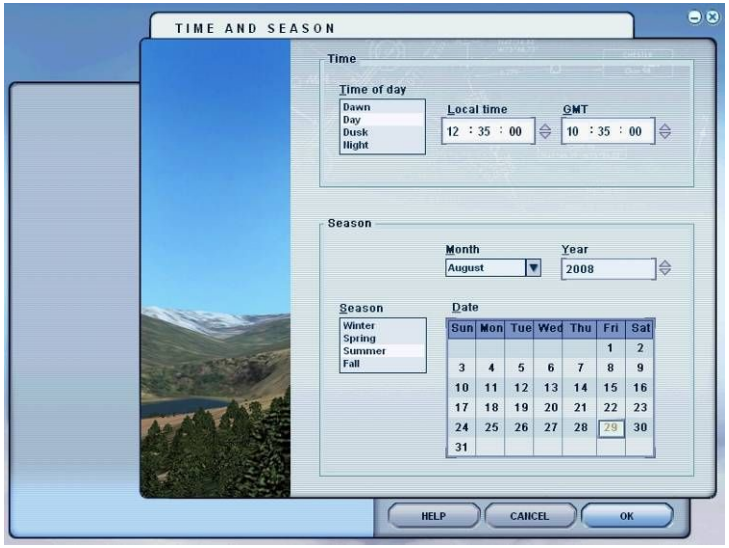
Start Flight Simulator as usual then create a new flight.

Step 1 is select aircraft – Choose **Embraer – feelthere Wilco** and the **Embraer 170** – If you downloaded and installed the **Fly Air** variation from flytutorial.com / maintenance area, select this one otherwise select any aircraft variation you like.

Step 2 is select the airport

Choose **EDDT** or **Tegel** as the airport name and select **Gate 15 – Gate Small**

Remember it is recommended that you install the freeware scenery for Tegel.



Step 3 is selecting the **weather**.

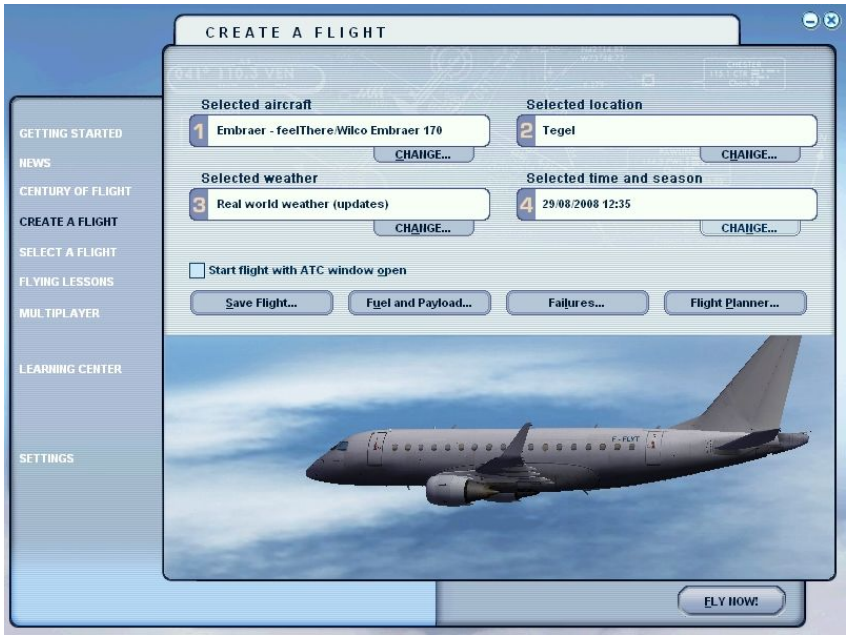
We will fly this tutorial using the **real-world weather conditions** which should give us a more realistic situation. Make sure you have an Internet connection to use this weather mode, otherwise you will get regular annoying error messages from Flight Simulator.

If you are not familiar with flying with potential bad condition or just want a more calm flight, choose Fair Weather from the Weather Themes.

The real-world weather option is making the weather changing all the time, especially the winds so bear in mind that your flight may not be exactly the same as this one demonstrated in this tutorial.

Step 4 is **Time and Season**

This flight was made on the **29th of August 2008** at **12:35** local time.



Final result should look like this, with all 4 criteria populated, **aircraft**, **location**, **weather** and **time/season**.

Review your options then press **Fly Now!** to start.

OK, we are now sitting in the cockpit into the left captain seat.

The cockpit should be cold and dark, no noise and nothing lit. The first good news is that you will find this cockpit easy to familiarize with, Embraer has made life easy for you and unlike older birds such as the MD82 for example, everything here is rational and information is kept to a minimum, the Embraer 170 cockpit is certainly not a Xmas tree!

First thing you should notice is the **small click-spot panel** located on the top left part of the screen. **We will mostly use the first three of these handy buttons**, **O**verhead panel, **P**edestal and **C**omputer or FMS

One thing to remember:

DARK AND QUIET COCKPIT

The concept used to design and operate the airplane was based on the assumption that while in flight, all systems are normal when:

- Overhead, main, glare shield and control pedestal panels have no lights on.
- No aural warnings are being issued.
- The selector knobs are positioned at twelve o'clock.

A white striped bar illuminates on any button to indicate that it is not in its normal position.

Make sure your parking brake is set.

Open the PAX doors– Shift + E – and the **cargo doors** – Shift +E + 2

If you have AES installed – which I strongly recommend especially for this aircraft – switch to the external view to admire your aircraft at its parking stand.

Unlike most of its competitors, the Embraer 170 is not fitted with a retractable stair, so this is where the AES from Aerosoft comes useful to provide all the assistance around this aircraft.

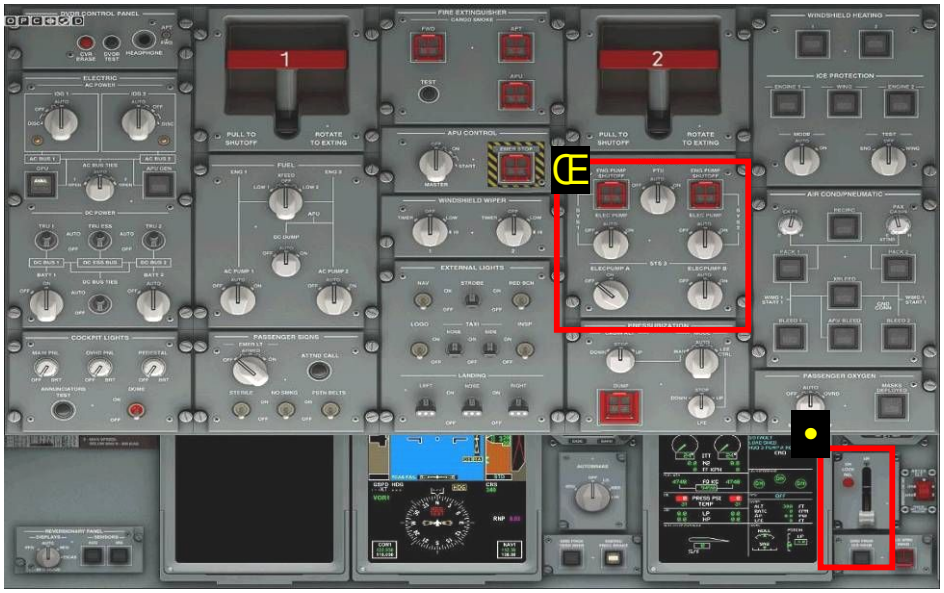
FLIGHT 1 SOFTWARE

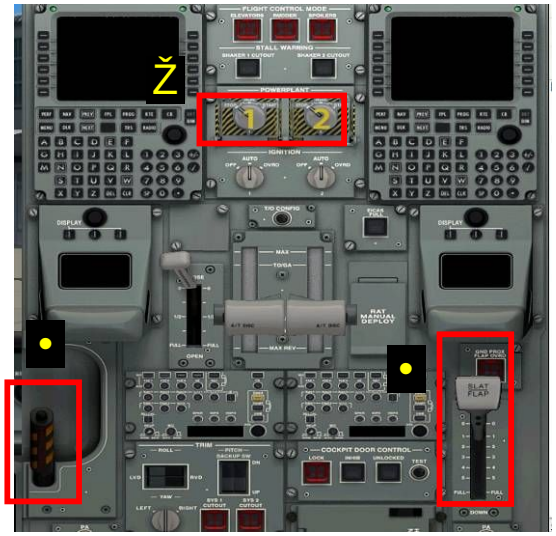
Flight1 view – a great free tool!
http://www.flight1.com/view.asp?page=library
This small module installs into FS2004 and supplies simple mouse-based movements, panning, and more, using the center mouse wheel/button. You can also move past the default view limits of FS2004 (good for strolling through virtual cabins). After you download, please make sure you read the full instructions included.

For instructions on how to use AES and configure its options, refer to www.aerosoft.com

These are other views of the AES benefits, after calling for catering and cleaning services as well as the fuel truck.

Our aircraft truly deserves the best!





COCKPIT SAFETY INSPECTION

☑ Open the overhead panel by pressing **O**

Check the Hydraulic Panel Œ and verify that :

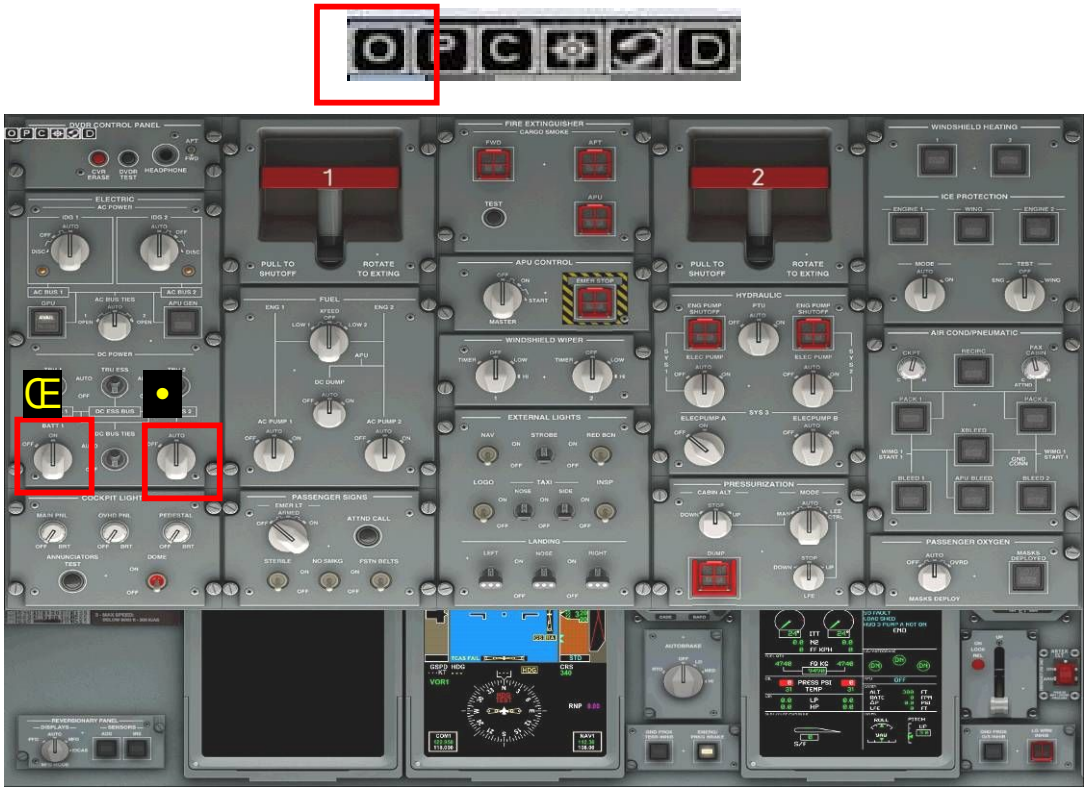
- SYSTEM 1 and 2 Electrical Pumps ..... AUTO
- SYSTEM 3 Electrical Pump A ..... OFF
- SYSTEM 3 Electrical Pump B ..... AUTO
- PTU ..... AUTO

On the main panel, Check that the landing gear level is DOWN •

☑ Close the overhead panel by pressing **O** again

☑ Open the **P**edestal and check the following items:

Start/Stop Selectors	STOP Ž
Slat/Flap Lever	VERIFY POSITION •
Parking Brake	SET •



POWER UP

Let's get back to our 2D cockpit view.

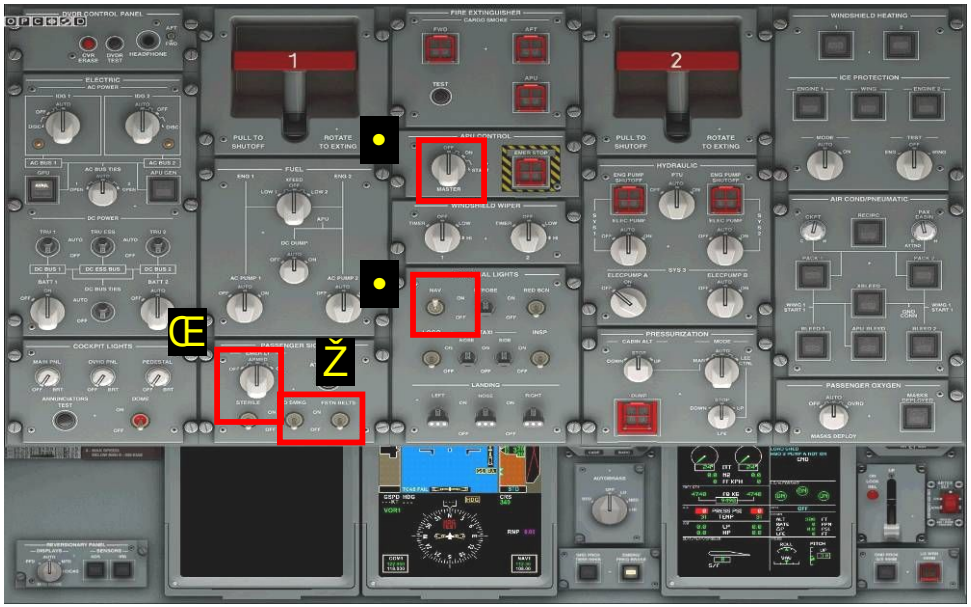
It's time to power on the aircraft.

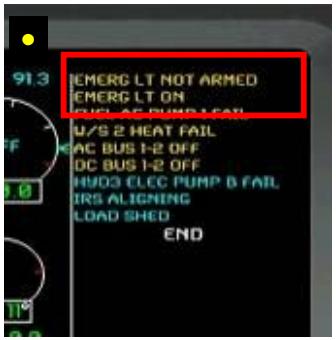
☑ Open the overhead panel by pressing **O**

☑ Switch **Bat 1** and **Bat 2** to ON

You will hear a nice welcoming voice which says **AURAL UNIT OK**

You will also hear a repeated bell alarm that you should not worry about at this stage. To cancel the alarm, return to the main panel by closing the **O**verhead panel and press the yellow flashing button as illustrated below:





Turn the **Emergency Light** knob to **ON**.

Close the Overhead panel and check the two flashing yellow messages: **EICAS for EMERG LT NOT ARMED** and **EMERG LT ON**

Turn the **Emergency Light** to the middle ARMED position

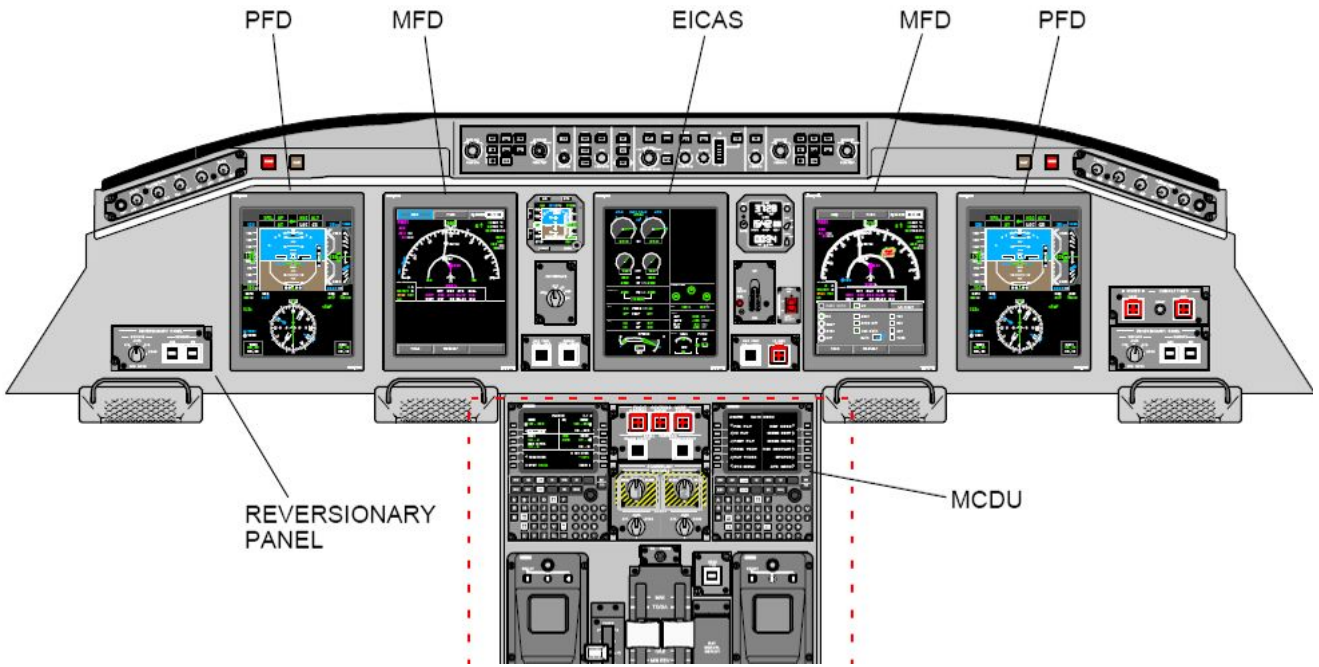
Turn the **Non Smoking** and **Seat Belt** signs ON

Turn the position lights **ON** to indicate there is life in the aircraft

Start the APU by rotating the knob to the **START** position. The knob

Check the EICAS for correct APU ignition. APU should display 100% green as illustrated below:

At this stage, all systems are powering up and it may take a while before the aircraft is fully operational. Amongst other things, the IRS system will need some time to align. Let's take advantage of this time to quickly go through the main systems of our flight deck.



The PRIMARY FLIGHT DISPLAY (PFD) displays information such as airspeed indicator, altitude indicator, ADI, HSI, vertical speed indicator, radio aids, autopilot, flight director and radio altitude data. They are displayed in two sections, top and bottom, each one presenting a group of information.

The MULTI FUNCTION DISPLAY (MFD) presents map and plan navigation formats and various systems synoptic formats selectable by the flight crew. The MFD provides redundancy to display both the PFD and EICAS formats using the **REVERSIONARY PANEL**. It also has the ability to display maintenance information.

The ENGINE INDICATION AND CREW ALERTING SYSTEM DISPLAY (EICAS) displays engine and system parameters such as flap, gear, spoilers and trim positions, total fuel quantity, APU and environmental information. The EICAS also displays crew awareness messages.

The MULTIFUNCTION CONTROL DISPLAY UNIT (MCDU) and FLIGHT MANAGEMENT SYSTEM (FMS) allows radio tuning, PFD radio tuning display setup, manual engine rating selection, engine takeoff data set and avionics display setup and test.

Systems not yet initialized:

Systems initialized:

Make sure all systems have been properly initialized and IRS aligned, your main panel should look like the left bottom illustration:

- Captain PFD is now powered up

- **ATT Fail** and **HDG Fail** red indications on the PFD and MFD are now gone

- Limited crew awareness messages on the EICAS (white colour only):

IRS must be aligned before computing a route

Once powered up, It is very important to wait for the aircraft to properly align the IRS so that the FMS can be used to start programming our route.

INITIAL SYSTEM CHECKING

It Is time to check our systems and ensure everything is OK before starting boarding the plane.

Systems are checked using the MFD

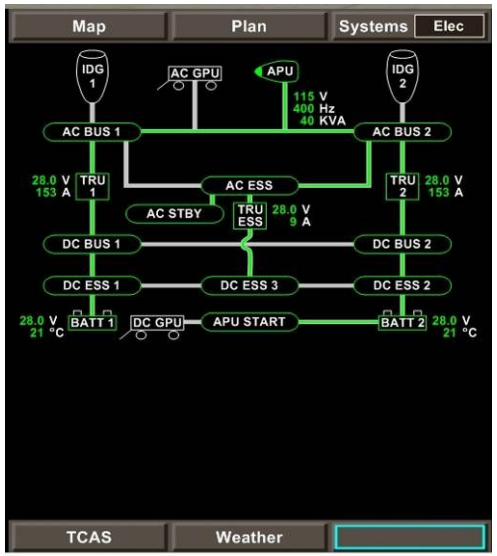
Right click anywhere on the MFD to expand it. You will notice that the current page is displaying the aircraft with exits marked as green when closed and red when opened.

The MFD is presented with five different sections: **Map**, **Plan**, **Systems Status** on the top and **TCAS** and **Weather** on the bottom area of the screen.

Click on **Systems Status**: you will see a sub menu appearing with a number of options available. Note that **Status** is the default option being displayed.

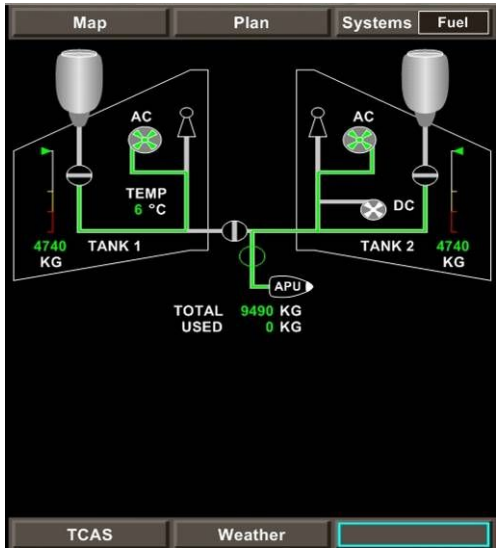
Enlarge the MFD before using it!

I strongly recommend to enlarge the MFD window before changing display options, the small contextual menu will respond much better if the window is enlarged first. **To enlarge the MFD, right click anywhere on it. Right clicking again will normalize it**.



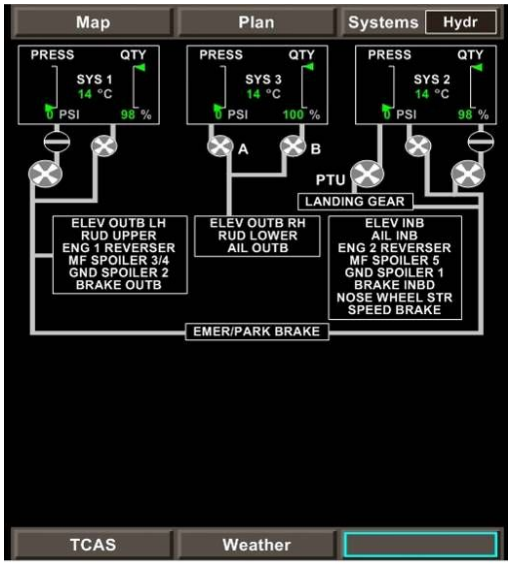
Systems Electric

We can see that APU is running and providing current to most systems (indicated by the green lines, grey lines indicate that current is not provided)



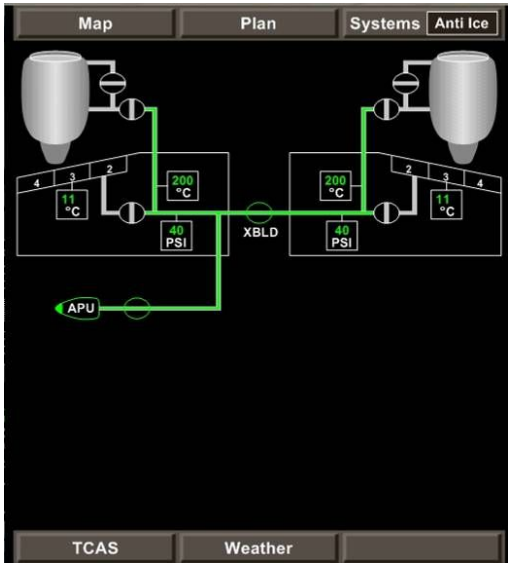
Systems Fuel

This is showing the quantity of fuel in our aircraft at the moment and also the fuel flow between tanks. Cross feed valve is shown as being closed.



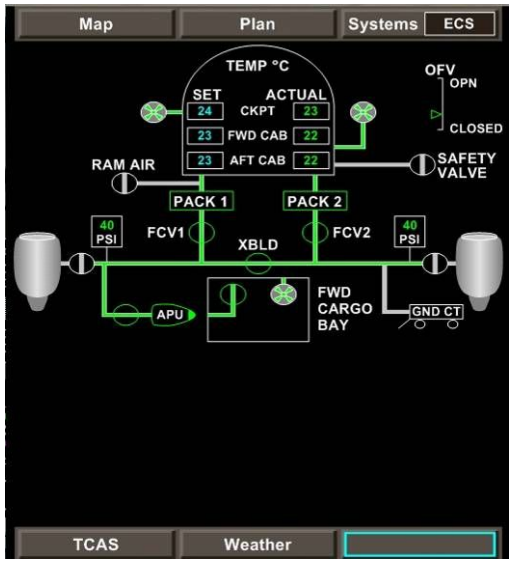
Systems Hydraulics

Check QTY (quantity) values at this stage, they should all be close to 100% Different values could indicate a leak in the hydraulic system. The pressure is 0 PSI at the moment as we haven't powered up the engines yet which provide pressure. Note that all connector lines are greyed which indicates no hydraulic flow at the moment.



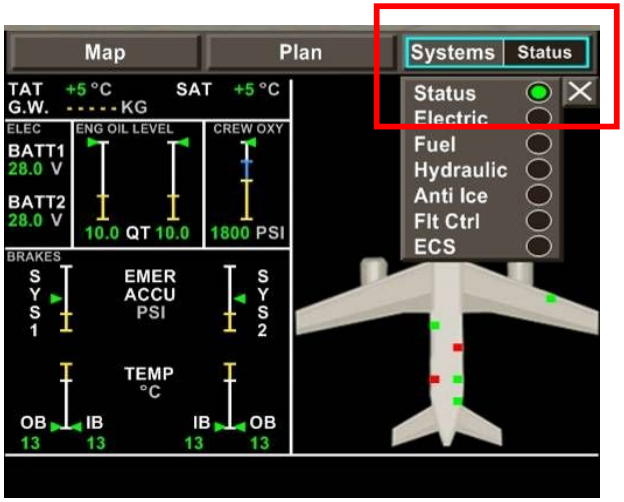
Systems Anti Ice

Here we can check the outside temperature on our wings (11°c). We can also see that the engines are not running at the moment, therefore no temperature indication for them.



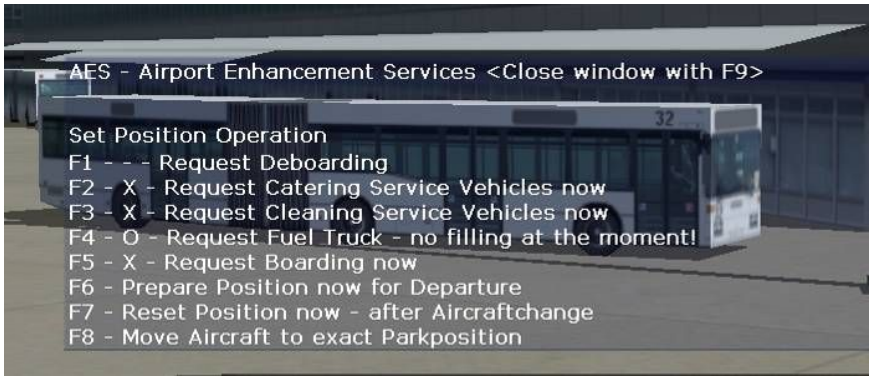
Systems ECS

This is the **E**nvironmental **C**ontrol Systems page showing us the actual temperature for cockpit and the cabin. It is also indicating that the APU is currently supplying power for both air conditioning pack 1 and 2



Before resetting the MFD to its normal view (if you previously expanded it), make sure to reset the default view to Status and close the mini menu by clicking the white cross as illustrated.

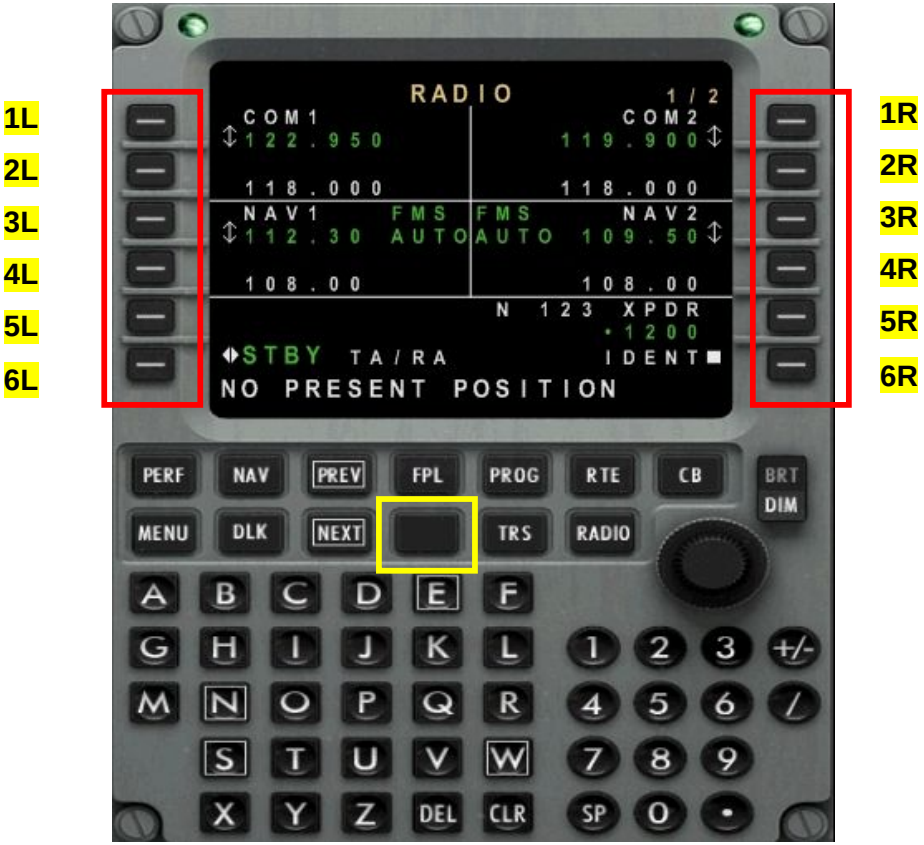
Right click on MFD to return to normal cockpit view



We are now ready for **boarding the passengers**.

Call for AES by pressing the dedicated key (I have configured the F9 key) and choose **F5** option – **Request boarding NOW**

You will soon see buses arriving to our aircraft and hear people boarding the plane. This does not mean we can rest meanwhile as we have to move to one of the most important phase of flight preparation : **FMS programming**.



FMS Programming

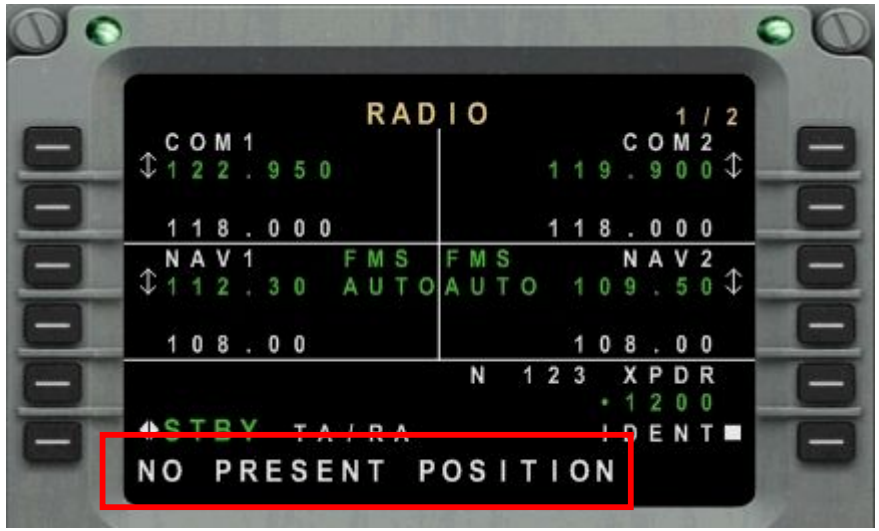
It is now to move to one of the most important phase of flight: FMS programming. Basically, this consists of programming our route from our departure to arrival, including SID and STAR procedures and determining several parameters of flight such as performance, speeds, altitudes and constraints.

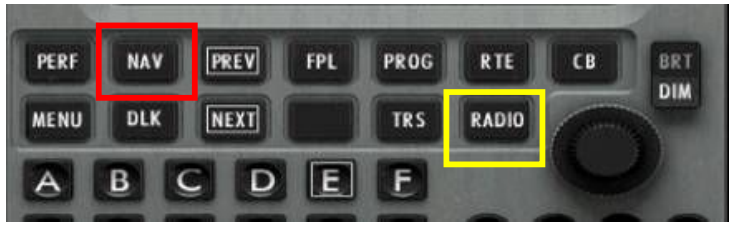
Press the **C** icon to open the Flight Management System

The Embraer 170 FMS is pretty standard, so if you have previously used FMS from Boeing or Airbus, you will quickly find your way round here.

In this tutorial, we will refer to **1L** to **6L** for keys to the **left side**, and **1R** to **6R** for keys to the right side.

The Blank key circled in yellow enables keyboard activation to enter data using your computer keyboard instead of clicking on the FMS keys. **Pressing the blank key will display a little orange k letter** in the top left corner when keyboard is active. Press the blank key again to disable keyboard mode.





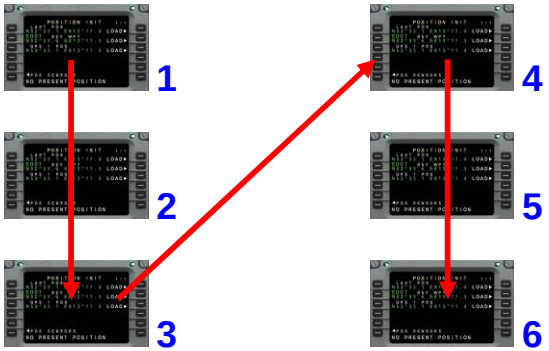
OK, this is the first screen you should see after opening the FMS. This is the **RADIO** screen which can be recalled anytime you need by pressing the **RADIO** key (circled in yellow) from the function keys.

Note that the FMS is currently alerting us on **NO PRESENT POSITION.** This basically means that the computer does not know where we are. We need to enter our location now.

Press the **NAV** function key

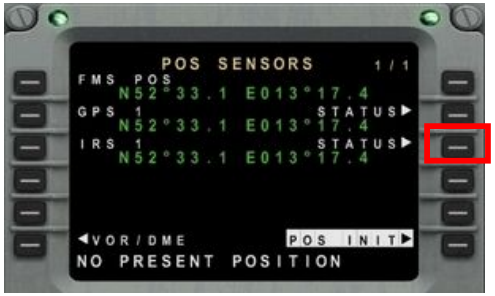
Next FMS section logic / page layout

In order to complete the following steps in the right order, make sure to go through the following pages in this specific order:



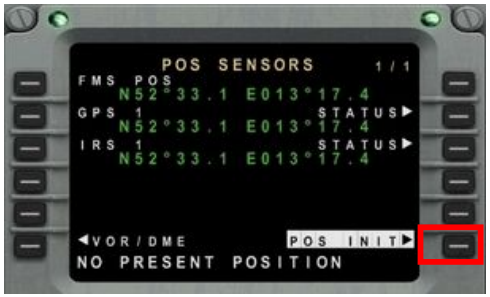
This is the **NAV INDEX** page.

☑ Press 4L **POS SENSORS**

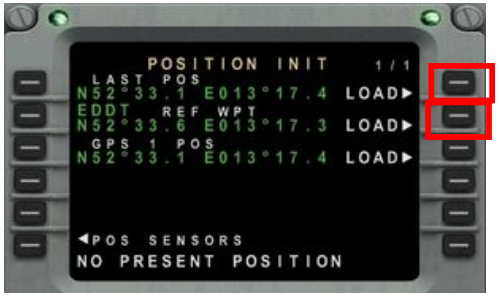


☑ Press 3R to load IRS status

☑ Press 6L **POS SENSORS**



☑ Press 6R **POS INIT**



☑ Press 1R and 2R to load position.

NO PRESENT POSITION indication at the bottom of the screen should now disappear.

If not try pressing 1R or 2R again.

Our FMS knows where we are!

☑ Press 6R to move to the next section (FLIGHT PLAN)

EDDT is already populated under L1 as our ORIGIN airport which is a good thing.

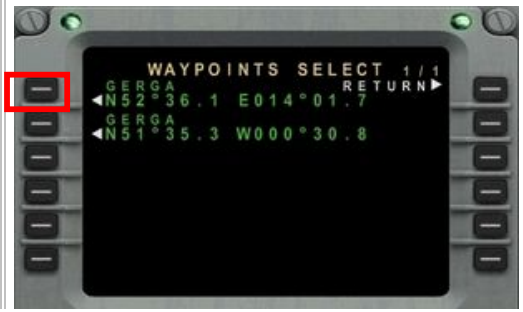
Type **LOWW** on the keyboard of the FMS, it should appear on the scratchpad area as circled then press R2 to insert it as our **DEST**ination.

Destination is now inserted and appears in green.

Remember from page 20 our flight plan. Here is a summary of it:

EDDT SID **GERGA** UM725 **BUSIR** M725 **HDO** UM725 **VLM** UT46 **ASTUT** STAR **LOWW**

Now type our first waypoint **GERGA** then press 2L to insert it in our fligthplan.



The FMS has found two different waypoints with the same name **GERCA**. Ours is located N52 (refer to SID charts for EDDT)

Press 1L to choose the first waypoint.

GERGA now appears in pink as our first waypoint of our flight plan.

Type our next sequence which **UM725.BUSIR** then press **3L**

Make sure to type exactly as appearing on the scratchpad, do not forget the dot between the route and the waypoint.

You can see from this screen that several waypoints have been added automatically and we now have 3 pages of flight plan.

Press the NEXT button to move to page 2 of our flight plan

Now type the next bit of our plan: **M725.HDO** then insert it into our next available line which is 5L in our case.

Having done so, we now have 4 pages of flight plan.

Press **NEXT** again to move to page 3 of 4

Type **UM725.VLM** then press 1L

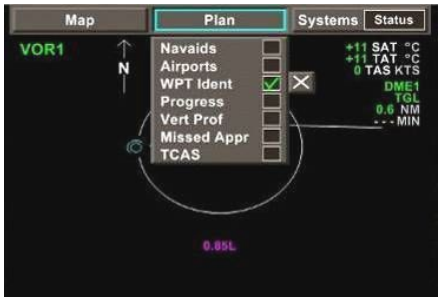
3 extra waypoints added in this step.

Type **UT46.ASTUT** then press 4L

Our flight plan is now complete but we still need to insert the destination airport as our last waypoint.

Type **LOWW** then press 5L

ALWAYS insert the destination airport as the final waypoint of your flight plan

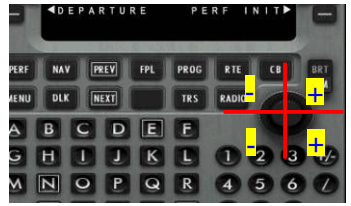


At this point, and before activating it, you may want to review the flight plan on the map of the MFD.

Click on **PLAN** then tick the **WPT Ident** as illustrated. Close the mini menu with the cross

To zoom in/out the MFD plan, use the **TOP section** of the FMS knob. Cyan figure indicates the scale (here 50nm)

To navigate between waypoints, use the **LOWER section** of the FMS knob.



Press 6R to **activate** the flight plan

Our route is now complete.
Next step is to set up the Performance parameters of our aircraft.

Press 6R to **perf init**

Performance Init consists of 3 pages.

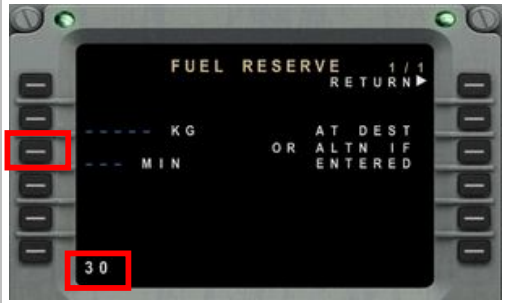
Page 1 enables us to change parameters in blue for climb, cruise and descent.

Our cruise speed is set to **LRC**: Long Range Cruise which will result in a moderate speed. We will change this in flight.

For now press **NEXT** to get to page 2

Page 2 is where we set our fuel reserve.

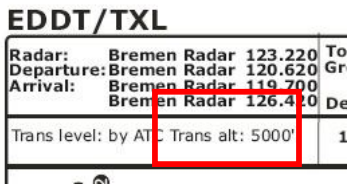
Press 2R to enter it in minutes rather than in kilos.



Type **30** on the FMS keyboard and insert it into 3L

No we are back at page 2/3 with 30 minutes of fuel reserve.

Press **NEXT** to go to page 3



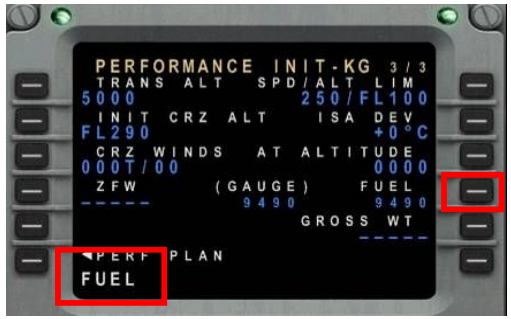
Here we are on page 3 of Perf init. Let's check EDDT SID chart to find the transition altitude which is 5000 feet for EDDT.

Type **5000** on the scratchpad then insert the new transition altitude to 1L

Our cruising altitude will be FL290 or 29.000 feet, required by ATC.

Type 29000 then insert it to 2L

We will not deal with winds so we leave 3L values as stated.



Now we have to enter our Zero Fuel Weight (**ZFW**) in 4L and calculate our fuel for the trip too. This will give us our gross weight in 5R Here, we are going to cheat a little bit

Type **FUEL** then insert it into 4R.

Tada! We now have all weight values automatically calculated for our route, including fuel which has been adjusted.

Note that our Gross Weight is now **30290 Kg** and fuel quantity is **3810 kg**

Let's move to the next section which is **Performance Data** by pressing 6R

We need to remember our Gross weight to compute take off speeds.

PERF DATA consists of 3 pages.

Page 1 is showing us the Estimated Time Enroute (**ETE**) which is 1 hour and 13 minutes to complete our flight. Fuel **REQ**uired and **REM**aining values are also indicated.

Press **NEXT** to get to page 2

Page 2 is giving us an estimate of the fuel remaining at destination which is 1.7 ton.

Press **NEXT** to get to page 3

Page 3 is about fuel reserve.

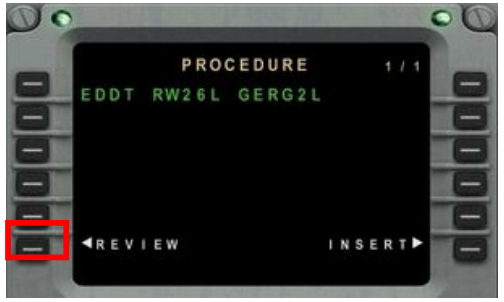
Press 6R to move to **departure** pages

Here we must choose a runway. We know from the previous flight briefing that we will take off from 26L

Press 4L to choose runway

Now we must select our SID. Since our first waypoint is GERGA, it makes sense to choose **GERG2L**.

Press 5L



At this stage, the SID is selected but not added to the fight plan yet.

Press 6L review to review the suggested SID route details.

At this point, switch to Map view of the MFD to actually review the SID. Note that the SID is represented in dotted white line, meaning it is not activated yet.

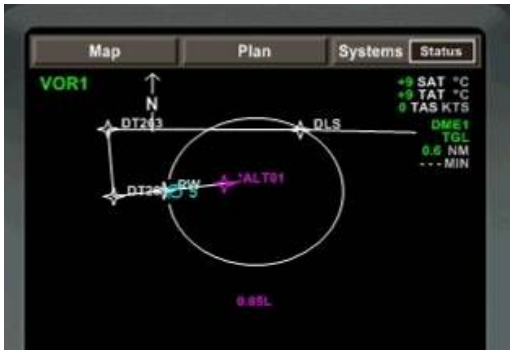
Press Next to see the remaining route

This is page 2/2 of the SID.

Once satisfied with it, press 6R to insert the SID to our flight plan.

Now we are taken back to our flight plan with the SID added but not activated yet.

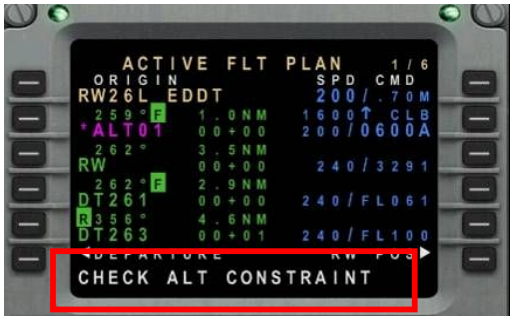
Press 6R to activate it now.



The dotted line has now become solid on the MFD which means the SID is activated.

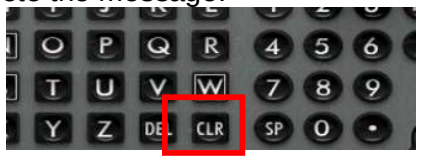
Now take a look at the PFD. MSG in yellow should appear, meaning the FMS is alerting you about something.

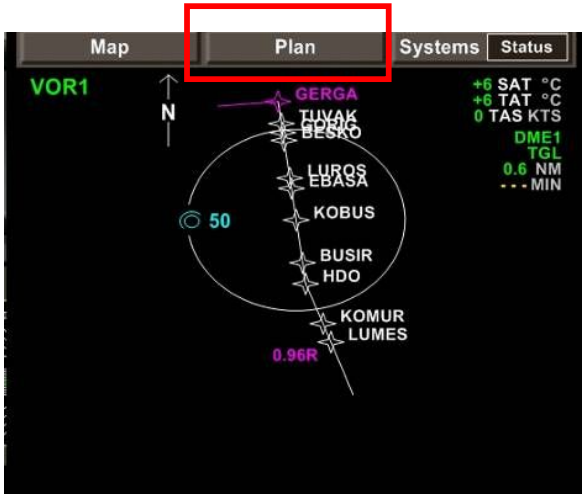
Make sure to always open the FMS when you see MSG on the PFD.



We are not going to worry too much about this message for the moment:

Press **CLR** key of the FMS to delete the message.





Here is our completed flight plan, consisting of 6 pages of waypoints.

Feel free to review it using

and

Switch to **PLAN** view on the MFD and visually check for any inconsistency of the flight plan. All waypoints should be more or less in the same direction until LOWW.

Remember to use the FMS knob to move across your waypoints.

OK, let's go back to the **PERF INDEX** page by pressing the PERF key.

We must now enter our takeoff speeds by pressing 2R

Let's move directly to page 3 by pressing NEXT twice.

Now if you remember from the PERF DATA section, our gross weight today is 30290 kg, which is nearly **30,5 tons**

30500	120	130	136	124	132	136	127	133	136	130	134	136
31000	122	131	137	125	133	137	128	134	137	132	135	137
31500	123	132	138	127	134	138	130	135	138	133	137	138
32000	125	134	139	128	136	139	131	137	139	135	138	139
32500	126	135	140	130	137	140	133	138	140	136	139	140
33000	128	136	141	131	138	141	135	139	141	138	140	141
33500	129	138	142	133	139	142	136	140	142	139	142	143
34000	131	139	143	134	141	143	138	142	143	140	143	144
34500	132	140	144	136	142	144	139	143	144	142	144	145
35000	133	141	146	137	143	146	141	144	146	143	145	146
35500	135	143	147	138	144	147	142	145	147	144	146	147
36000	136	144	148	140	145	148	143	146	148	146	147	148
36500	137	145	149	141	146	149	145	147	149	147	149	149
37000	139	146	150	143	147	150	146	149	150	148	150	150
37500	140	147	151	144	149	151	147	150	151	149	151	151

Referring to the take off speed table included in the manual, work out the speeds for 30500 kilos

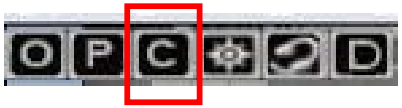
Now enter the speeds :

120 as V1 then 1L

130 as VR then 2L

136 as V2 then 3L

Well done, our FMS programming is now complete ! Close the FMS by pressing



Configuring Map view

Before requesting engine start, let's **configure our Map view** on the MFD. We are going to add vital information to it for our flight:

- add waypoint ident
- activate TCAS
- active weather information
- activate vertical profile / progress display

Click on MAP to expand the mini menu then tick the **WPT Ident, Vert Prof, TCAS and Weather** options.

You will note that a new section is now displayed at the bottom of the MFD, showing the vertical profile, weather information (left) and TCAS information (right)

Note that every time you tick a box, the mini menu is automatically closed so you need to click on its heading to open it again. Also, you cannot switch from one heading to another if you left a mini menu open. Make sure to always close it manually by clicking its cross.

Next, click on **TCAS** at the bottom of the MFD and tick **Range** box.

Although TCAS is not activated yet,. (make sure it is highlighted in green)

BLW = below TCAS (when landing)
NRM = normal TCAS (when cruising)
ABV = above TCAS (when climbing)

select the **ABV** option in preparation for take off

To change this option, you need to position your mouse on BLW / NRM / ABV and scroll your mouse wheel until the option is highlighted in green.

Next, click on Weather and select **WX** and **Turb** as illustrated.

Get clearance from FS9 ATC to taxi

Note : for the purpose of this tutorial; **we will NOT use FS9 ATC** except for requesting taxi clearance from the ground, take off clearance from the tower and landing permission at destination – FS9 ATC will therefore consider our flight as being VFR.

Open AES window and choose **F6 – prepare position for departure**.

Make sure your parking brake is still set.

If you know now switch to external view, you will see retractable stairs moving away from the aircraft.

Close all doors (shift + E / shift + E +2)

Visually monitor on the MFD that all doors are green.

Request **push back to the Left (F1)**

Release the parking brake.

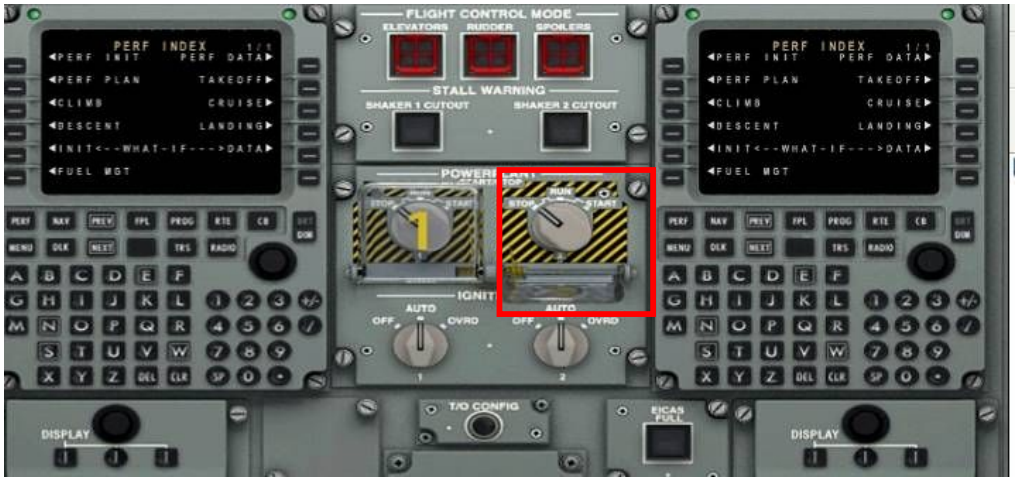
You will hear aural instructions from AES that it is "**ok to start engines"**

You will hear various instructions from AES such as **"release the parking brakes" or "OK to start engine"** before, during and after pushing back.

Make sure to follow these instructions.

Push back in progress….

open the overhead panel and switch **RED BEACON** to **ON**



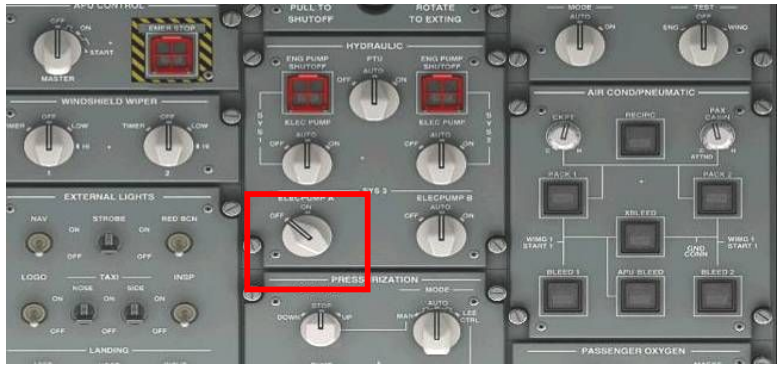
Open the Pedestal and RIGHT click on engine 2 cover to release it, then rotate engine switch to the **START** position. Immediately close the cover by right clicking on it again.

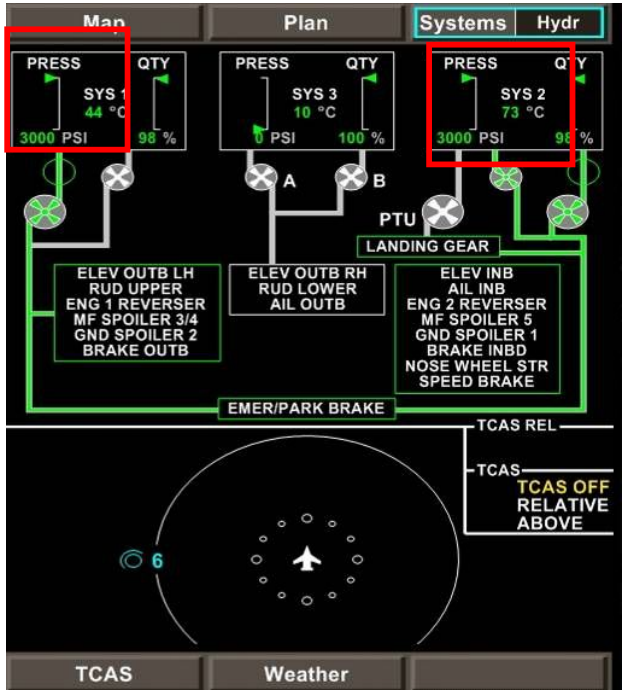
Monitor on the EICAS engine 2 rotation.

Soon after starting, you will hear an alarm.

Disable the alarm by clicking on the yellow flashing button as illustrated below.

Repeat the operation to start engine 1: open the Pedestal and RIGHT click on engine 1 cover to release it, then rotate engine switch to the **START** position. Immediately close the cover by right clicking on it again.



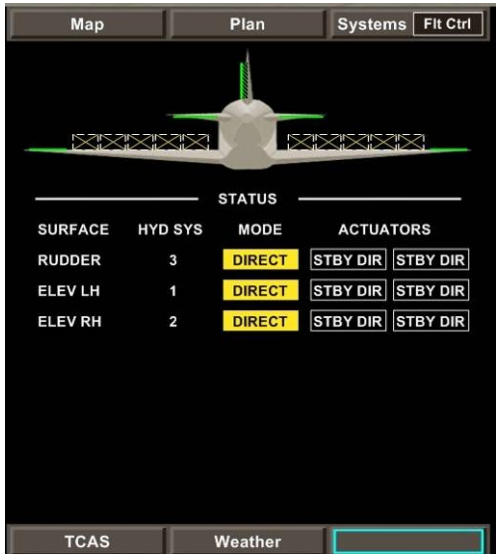


Wait for engine 1 to start.

From the overhead panel, switch **ELECPUMP** A to **ON**

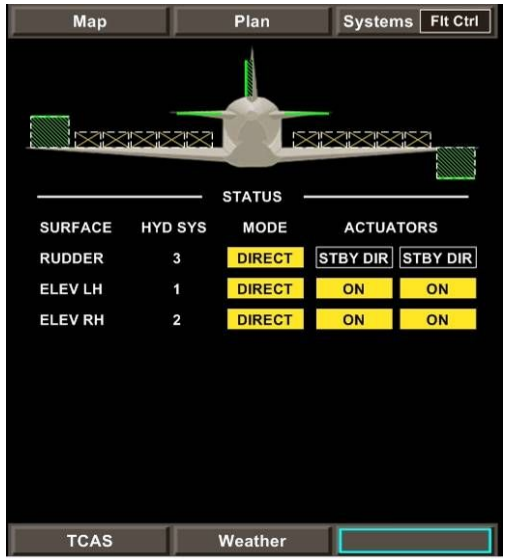
Once both engines have started, open the Hydraulic page from the Systems Status menu of the MFD and visually check that pressure is accurate.

Now activate the Flight Control (**Flt Ctrl**) mode and start controlling your devices, yoke and rudder pedals.



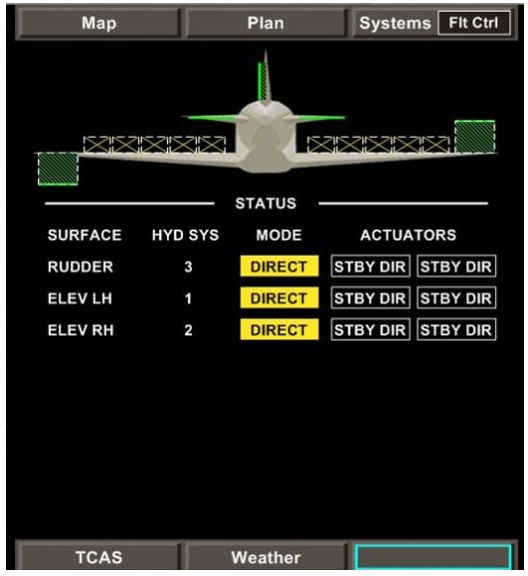
Systems Flight Controls - idle

This page is showing us the state of the rudder and elevator when all are to neutral position.



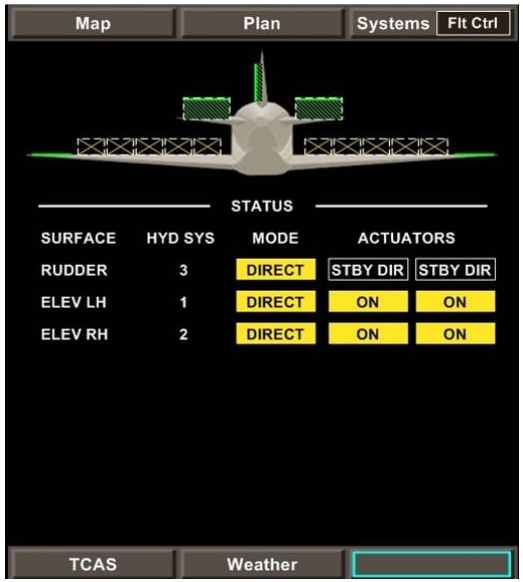
Systems Flight Controls – Yoke full right

Move your yoke full right and you should get this.



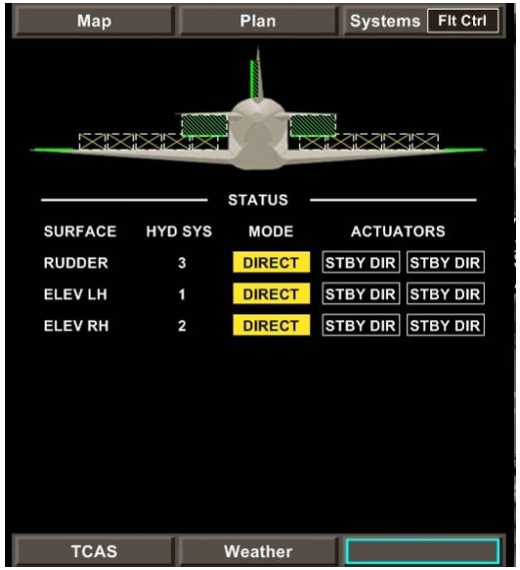
Systems Flight Controls - Yoke full left

Move your yoke to full left position and you should see this.



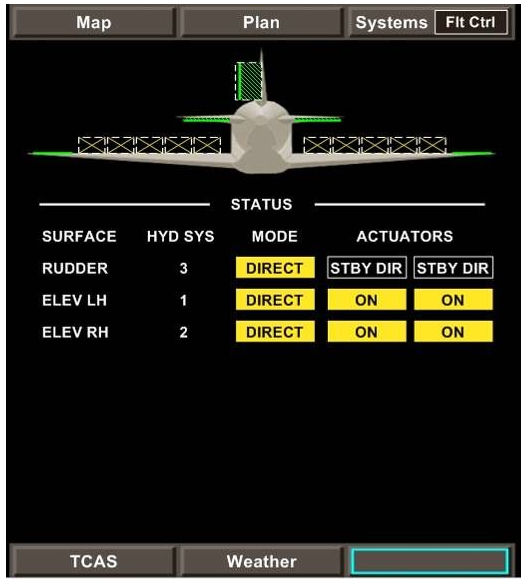
Systems Flight Controls – Yoke pull

Pull your yoke and you should see this.



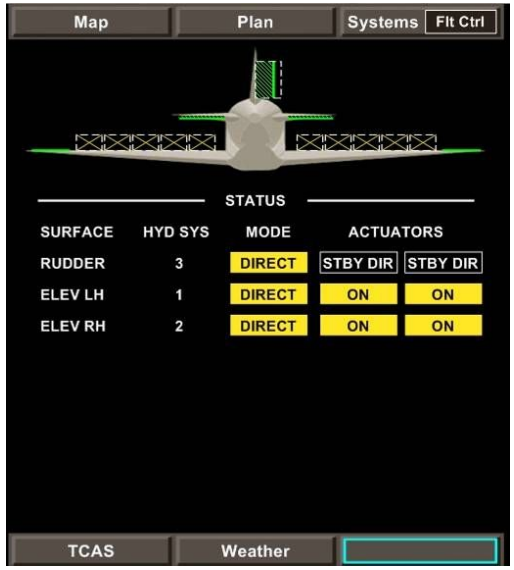
Systems Flight Controls - Yoke push

Push your yoke and you should get this.



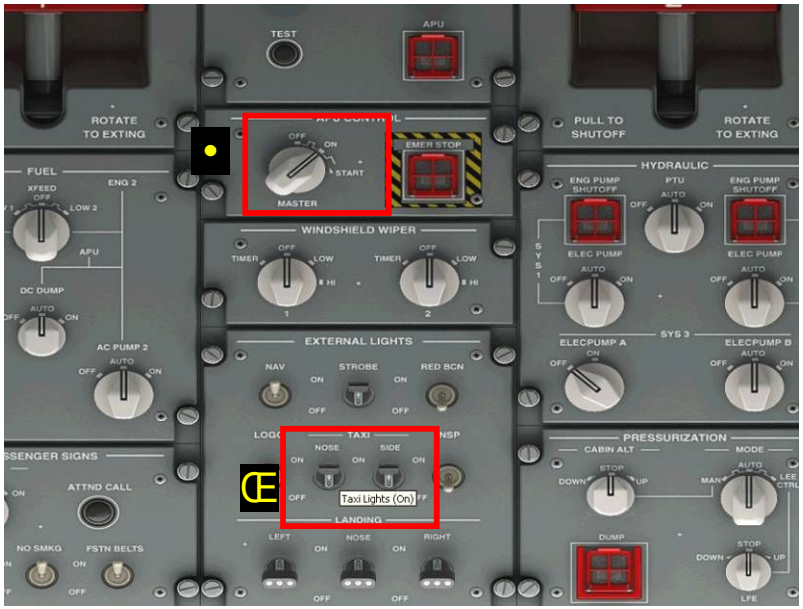
Systems Flight Controls – Rudder pedals LEFT

Now push down on the left pedal and you should see this.



Systems Flight Controls - Rudder pedals RIGHT

Push down on your right pedal and you should see this.

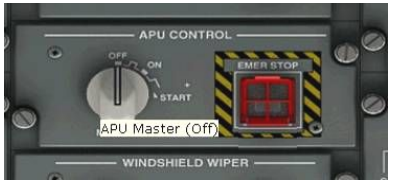


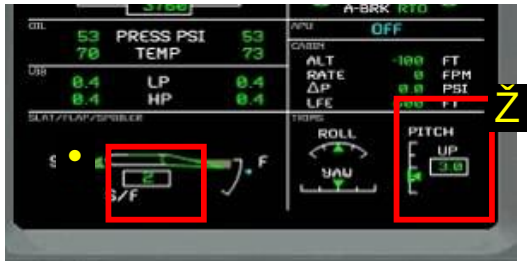
OK, pushing back should now be completed and you have been asked by AES **to set your parking brakes.**

Open the overhead panel and switch **the taxi lights ON (two switches)**

Stop the APU by rotating the switch to **OFF**

The overhead panel should now be in **a black midnight** state, which means all main switches pointing at the 12 o clock position and no buttons illuminated.





- Release the parking brakes
- Œ Increase the throttles gently and start taxiing
- • **Lower FLAPS** to 2 position
- Ž Ensure **Pitch** is correctly configured – green value, here 3 %
- • Rotate the autobrake selector to take off position **RTO** (rotate)

Listen to ATIS to check the pressure of the airport. Tegel informs us to set altimeters to **3016**

- • Adjust both **PFD** and **standby altimeters** using the knobs highlighted here to 3016.
- ‘ Check values on the PFD and standing altimeters.

Continue taxi and follow runway 26 signs

Carefully monitor your ground speed (GSPD) and try not to exceed 15 to 20 knots.

Press **FD** on the FGCP (Flight Guidance Control Panel)

Set initial altitude to 5000 feet by rotating the **ALT SEL knob**

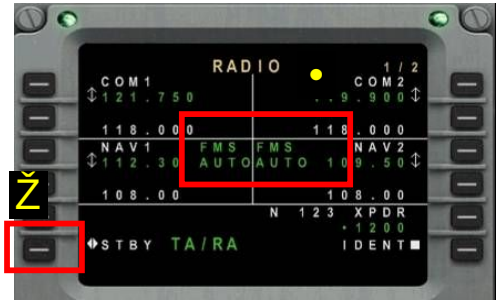
TRACK FPA should appear on the PFD

Note that the **green arrow** is pointing to the left as we will use the captain autopilot, not the first officer one.

Press the **FMS** button to select FMS as the navigation source

Visually control on the PFD that the navigation needle and information becomes pink (was green before)

Align HDG to FMS direction (pointing to runway heading 261) by rotating the **HDG SEL knob**.



You should now be approaching the runway threshold.

Œ Open up the FMS and check **THRUST** mode by clicking the **TRS** button

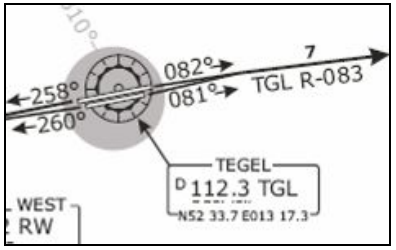
Thrust should indicate **AUTO** with 90.8% power thrust for Take Off [**TO**]

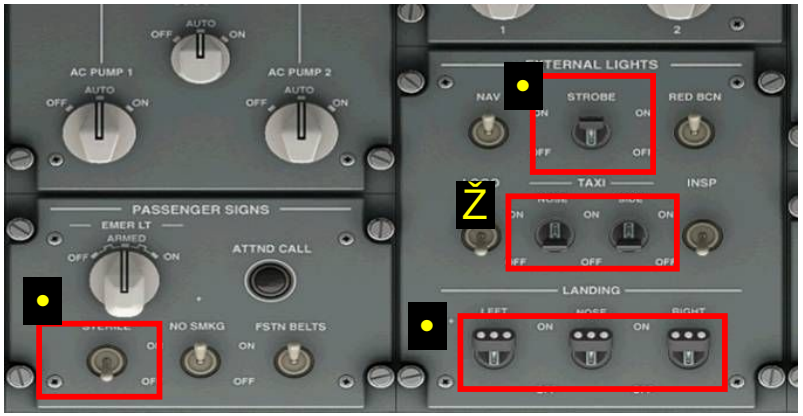
• Click on **RADIO** button to activate **TCAS**.

Ž Press 6L to highlight TA/RA in green. TCAS is now activated.

• Visually check on the **RADIO** screen that **NAV1** and **NAV2** are automatically tuned by FMS

The PFD is displaying NAV1 being tuned on 112.30 DME1 which is Tegel / TGL. On this screenshot, we are at 0.8 nm from the VOR/DME.





We have now finished taxiing and are now entering the runway!

Œ Open the pedestal and press the **T/O CONFIG** button.

You should hear **TAKE OFF OKAY**

Open the pedestal and switch the following:

- **STROBE** - **ON**
- **taxi lights** - **OFF**
- **landing lights** - **ON**
- **Sterile Sign** - **ON** (to indicate to the crew not to contact the cockpit from now)

Activate **TO/GA mode** by clicking the **hidden spot** located just above the A/T button (do not click the A/T button!)

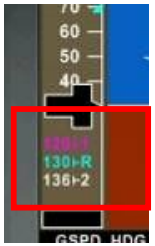
Visually check on the PFD that TO/GA mode is engaged. You should read **TRACK TO** and see the **horizontal pink bar rising to 10** as illustrated here.

Also, the **EICAS** should display **T/0-1** mode with **90.8**% of thrust available when taking off.

Click on MAP to switch to MAP view

Adjust the scale of the map to 5 miles by pointing your mouse cursor anywhere on the map then rotating the mouse wheel. The cyan figure indicates the scale of the map.

Note that you should also see traffic moving around indicated by cyan symbols with their relative altitude.

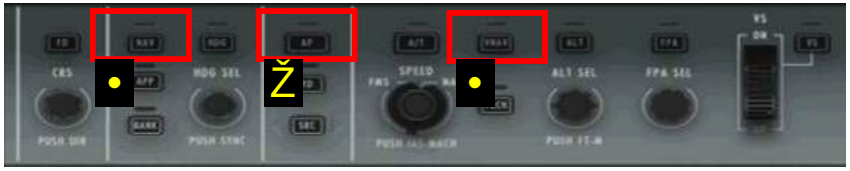


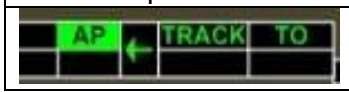
Ready to go!

We are now ready for take off, aligned in the middle of the runway (well, not quite in my case as I am not completely aligned with the axis as illustrated just below!)

Fully advance the throttle and maintain the airplane in the axis of the runway.

Monitor thrust on the EICAS and keep an eye on your speeds using V1 and VR references as speed increases.



AP pressed:	**NAV** pressed:	**VNAV** pressed:
		

You should hear **V1 – ROTATE – POSITIVE RATE OF CLIMB**

When hearing **ROTATE**, pull on your yoke to lift the airplane

When hearing **POSITIVE RATE OF CLIMB**, retract the landing gears

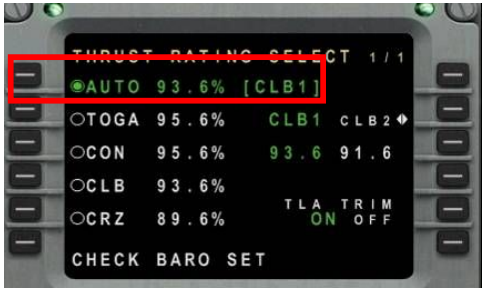
While flying the aircraft manually, **maintain a correct climb angle** by keeping the pink bars aligned in the centre of the PFD. Here for example, you can see that my rate of climb is too high as the aircraft symbols are way too high the horizontal pink bar. This could lead to a dramatic reduction in speed and possibly stall. In this case, push on the yoke to reduce the rate if climb.

Passing 400 feet or so, engage AUTOPILOT by pressing • **AP** key

Immediately engage lateral navigation mode by pressing Ž **NAV** key

Engage vertical navigation by pressing • **VNAV** key.

Monitor that the modes are engaging correctly on the PFD.The aircraft is now flying automatically, except for the speeds that we still control manually increasing or decreasing the throttles.



Retract the flaps using the visual aid of the PFD: **green dots** Œ appearing next to speed indicates when to retract flaps by one increment. Here for example, we should retract flaps passing 190 knots. **–F indicator** • in pink is pointing at the speed when flaps should be fully retracted.

Monitor your speed. In situation Ž the aircraft is approaching its high speed limitation. We know it is accelerating as the white trend bar is going up, soon reaching the –F indicator. The dashed red and white bar from 230 knots and beyond indicates not permissible speed as long as the flaps are not retracted.

Passing Transition Altitude (5000 feet), **adjust altimeters** to **2992**. Should you forget, you will see **MSG** in yellow appearing on the PFD with **CHECK BARO SET** being displayed on the scratchpad of the FMS.

Once altimeters calibrated, erase the MSG of the FMS by pressing

Check the thrust mode in the FMS. Press **TRS** key then check that AUTO mode is engaged. Thrust should be the same as climb, as we are climbing at the moment.

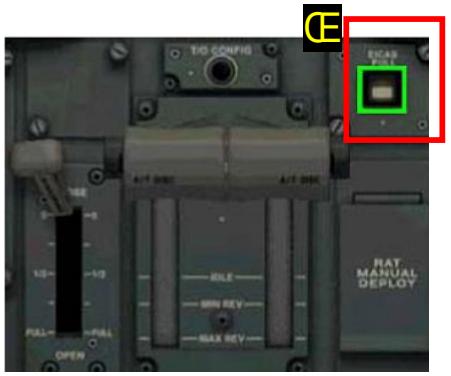
Also check of the EICAS that CLB mode is currently engaged.

In case of emergency, when extra thrust is required, open the FMS and press 2L **TOGA** mode for maximum thrust.

Passing DLS waypoint, increase altitude to level **290**

Check of the MFD that aircraft is progressing correctly. **The upper part** of the MFD is showing **lateral navigation** (aircraft symbol should be aligned with the route) while the **lower part** is showing **vertical navigation** (the current vertical speed is represented by the green rising line which should be more or less aligned with the pink line. The horizontal dotted cyan line is representing the altitude set of the FGCPS.

Passing 10000 feet, switch **STERILE**, **FSTN BELTS** and **LANDING** lights **OFF**



EICAS automatic de-clutters mode after takeoff

De-cluttering occurs 30 seconds after landing gear retraction and flap/slat retraction, if all parameters are displaying normal indications. The following items are de-cluttered from EICAS:

- § . Oil pressure.
- § . Oil temperature.
- § . Engine vibration.
- § . Slat position.
- § . Flap position.
- § . Speed brake position.
- § . Landing gear position.
- § . Pitch trim green band.

The EICAS FULL pushbutton Œ on the control pedestal inhibits the automatic de-clutter of EICAS. The EICAS is fully displayed when a cautionary condition is detected on one of de-cluttered indications. In normal conditions, de-clutter is disabled when the landing gear is extended.

While climbing, check and monitor the pressure indication on the EICAS

1 – CABIN ALTITUDE INDICATION
2 – CABIN RATE OF CHANGE INDICATION
3 – DIFFERENTIAL PRESSURE INDICATION
4 – LANDING FIELD ELEVATION INDICATION

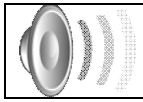
Climb	**290 / M73**
Cruise	**M78**
Descent	**M78 / 290**

As we decided to manually monitor and adjust the speed, we will refer to the normal ERJ170 performance profile as indicated here.

Passing **GERCA**, we should be nearing our **TOC** – Top of Climb

This can be both seen on the **lateral mode** and **vertical mode**

Passing 28000 feet, you should hear buzzing and FL290 on the PFD will turn yellow.



BUZZ - BUZZ

VASEL should appear passing 28500 feet.

VALT should appear at 29000 feet while the aircraft is levelling off.

VNAV Autopilot limitation

Autopilot will never overfly the altitude set on the MCP. Therefore, you must make sure you change the Altitude on the MCP if you want the FMS to fly it. A typical procedure upon taking off will be to set the constraint altitude by rotating the ALT knob, according to ATC clearance. Vnav will automatically disconnect upon reaching the altitude indicated on the MCP. When ATC clears for higher altitude, set the new ALT on the MCP and hit VNAV again.

We have now reached our cruise altitude. Time to relax?

Well, you may want to stretch your legs but before doing so, there's a few things we need to sort.

Change **TCAS** mode to **NRM** on the MFD

Tilt the weather radar in case nothing is displayed on the PFD. Tilting consists of orienting the weather captors up or down by positioning you mouse over the highlighted area and then scrolling the mouse wheel up or down.

Change Thrust mode to cruise on the FMS. Press 5L to activate it.

OK, we are now going to “play” with the auto throttle so as to **make the flight fully automated.**

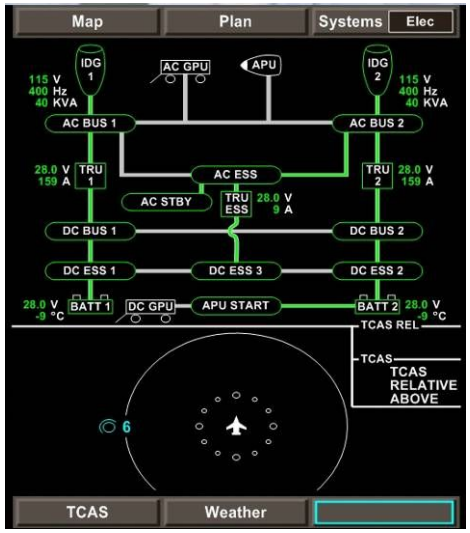
Make sure the Œ Speed control knob is positioned to **MAN**ual then rotate the knob until the PFD reads 300 knots •.

Press the Ž. A/T Auto throttle button

Check on the PFD • that auto throttles are engaged.

Aircraft will start accelerating until reaching the speed set on the PFD •

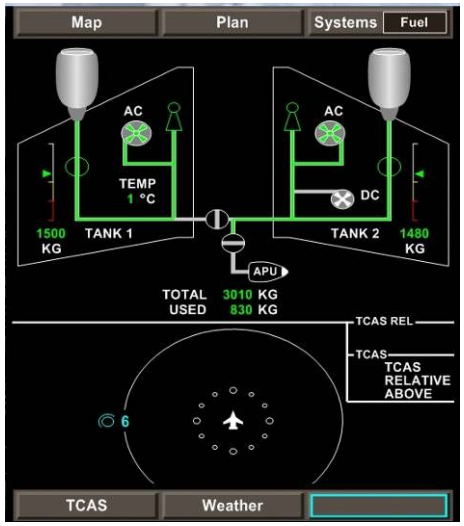
Let's now review our different systems using the MFD.



Electrical system

Check voltage for AC BUS 1 and 2.

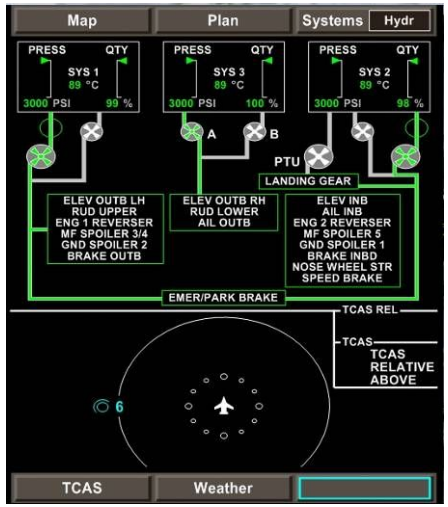
APU should be shown as off.



Fuel system

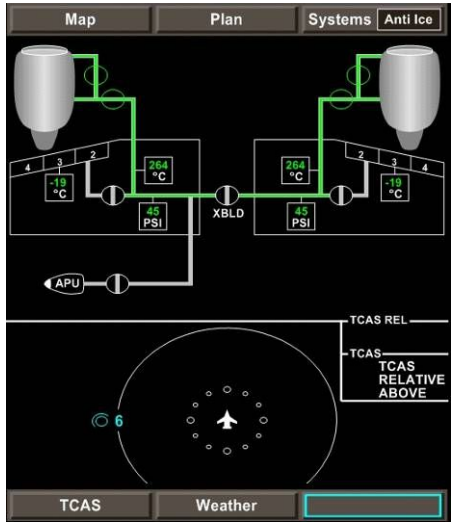
Check fuel quantity for both sides, here 1500 kg in tank 1 and 1480kg in tank 2. Values should always be even for both sides. Note that Cross feed in the centre is closed.

APU should be shown as off.



Hydraulic system

Check both pressure and quantity indicators for SYS1, 2 and 3.

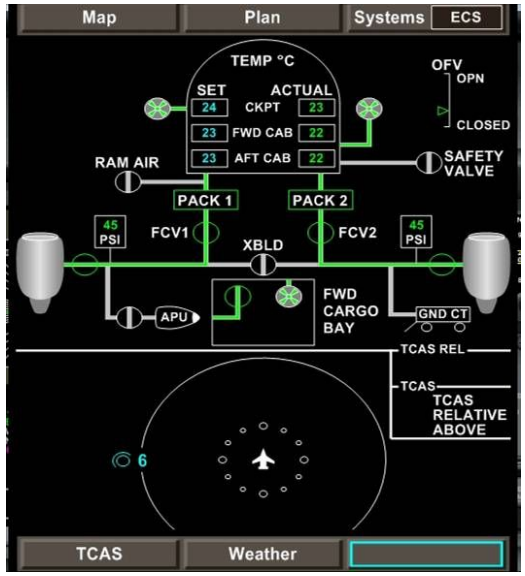


Anti Ice system

Check correct pressure indications for engine anti ice.

Note that anti ice on the Embraer 170 is a fully automated process.

APU should be shown as off.



ECS system

Make sure Pack 1 and 2 are running and the temperatures displayed are within correct range, i.e. around 20/25°C

APU should be shown as off.

Cruise Control

One important thing you want to continually monitor during cruise is **progress** or where we are.

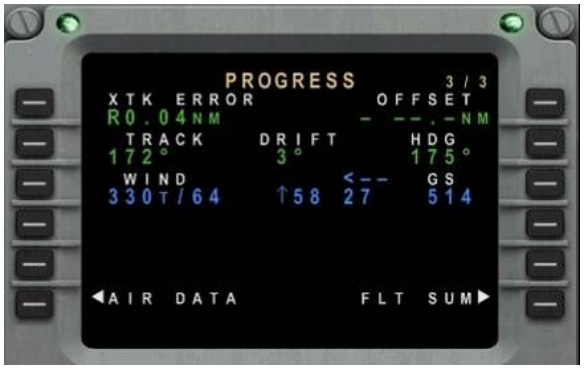
Open up the FMS and click on **PROG**

Page 1 of 3 is showing in pink the waypoint we are heading to (EBASA), the next one after that (KOBUS) and our destination (LOWW). It also indicates the distances and **ETE** – Estimated Time En route for each point and the Fuel remaining.

So here for example, we can deduct that we will reach destination in 43 minutes with 2.2 tons of fuel remaining in our tanks.

Press 

to move to page 2



Page 2 is an important one for **TOD** – Top of Descent. This indicates when to expect to begin descent. **Here we see that TOD will begin in 18 minutes.**

This page is also indicating us our **Gross Weight** and **Fuel Quantity** remaining.

Press 

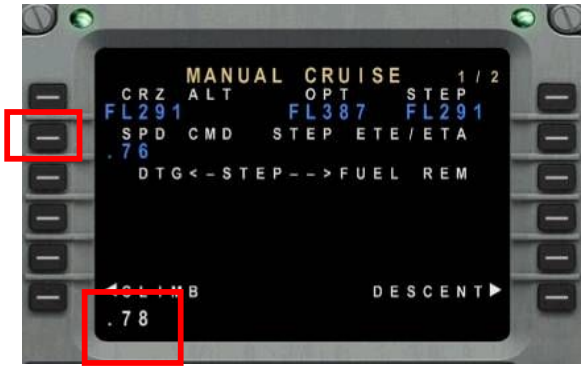
to move to page 3

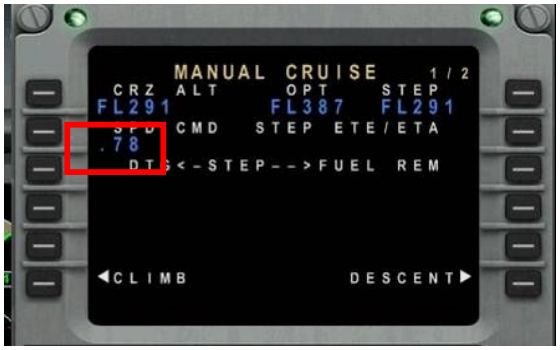
Page 3 is giving us wind speed and direction (**WIND**) and our Ground Speed (**GS**)

Good job so far. Did I tell you a bit earlier that the flight was now managed in an entirely automatic way?

Well I lied a little bit as if you remember well, we activated the auto throttle but we set up speed manually, to an arbitrary value of 300.

In the next pages, we are going to learn how to manage and control speed using the FMS.





Press **PERF** button of the FMS then select 3R **CRUISE**

Here we can see that the current cuising speed is set to 0.62 mach. This is actually the **L**ong **R**ange **C**ruise setting (LRC) which is fine for long haul flights but for today, we really want to make this faster.

Type **.78** on the scratchpad then press 2L to replace the old value.

Check that the new value is now appearing as the active speed (**0.78**) **in blue**

Now turn the **SPEED selector** to the FMS position (was pointed to **MAN**ual before). To rotate the knob, place your mouse just above it and rotate the mouse wheel.

Take a look at the speed indicator on the PFD: It should read **0.78M in pink** meaning the FMS is now controlling our speed.

OK, let's move to the Flight Plan Pages now.

Press **FPL** key

Here, we have 3 pages of flight plan. You can check our next waypoint in pink which is KOMUR, and the following ones. We can also check the speed (SPD) and altitude for each waypoint.

Note that the speed is now matching the FMS speed (**0.78M**) and our cruise altitude (**FL290**). We can also deduct that the **TOD** (Top Of Descent) will occur between VLM and ASTUT as the planned altitude in ASTUT will be FL131.

Feel free to browse the flight plan using PREV and NEXT

It is also possible to monitor our **progress** directly on the MFD in Map mode.

Press **MAP** then tick **Progress** box.

You should now see a new section appearing between WEATHER and TCAS, displaying progress information such as the **E**stimated **T**ime **E**n route for our destination (29 minutes here).

We can also figure out that our TOD (Top of Descent) is getting closer as it now appears on our route

It's time to prepare our descent and approach to LOWW!

⚠ **Refer to pages 20,21 and 22 for LOWW charts**

Press **FPL button** on the FMS to display Flight Plan.

Press 6L to display the **ARRIVAL** pages.

Press 3L **STAR**

Choose **ASTUT7W** by pressing 1L

We can see that our STAR is now selected.

Press 2L to choose the **approach**

We are expecting a runway 16 landing, using the ILS

Press 5L to choose this landing option

This is the TRANSITION Page. Refer to chart on page 21 for LOWW transitions. We need to activate Transition **MABOD 2L**

Press 2L to choose this landing option

Now press **FPL** button to switch to Flight Plan mode

You may get a message from the computer **CHECK RESERVE FUEL** as illustrated here.

Press **CLR** key of the FMS to delete the message. We will check the fuel reserves a bit later

Switch to Plan mode on the MFD, zoom accordingly (here 12.5nm) and visually check the STAR and Transition route. Note that the route has not been activated yet as it appears as a white dotted line.

Once happy with the STAR, press 6R **ACTIVATE** on the FMS to activate it. The **dotted line should become solid** as illustrated below:

Switch back to **Plan** view on the MFD. We should now be very near the Top Of Descent.

Check the flight plan information on the FMS, • ASTUT is to be reached at **FL210**.

Using the altitude selector knob, reduce altitude to **FL210.** Check on the PFD that FL210 is properly displayed

Just before reaching TOD, a new vertical mode control scale • will appear on the PFD. At TOD, **VPATH** is arming • (shown highlighted) then activated and the aircraft starts descending.

We are now going to enter our **approach speeds** in preparation for landing.

Press **PROG** key of the FMS then NEXT to move to page 2

Check our **current Gross Weight** which is **28830 kilos**

Next, Press **PERF** key of the FMS then 3R LANDING then press twice to move to page 3/3 (see next page)

NEXT NEXT

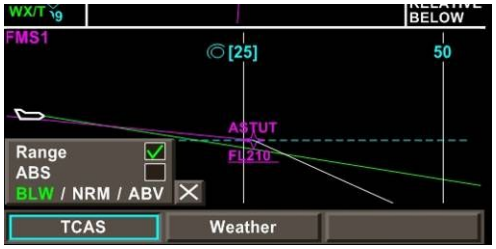
LANDING V SPEED CHARTS:

NO ICING CONDITIONS

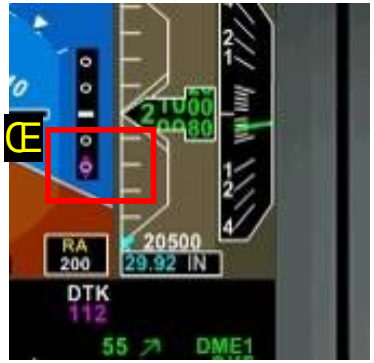
WEIGHT (kg)	V_{AC} - FLAP 2 (KIAS)	V_{AC} -FLAP 4 (KIAS)	V_{FS} (KIAS)	V_{REF} - FLAP 5 (KIAS)	V_{REF} - FLAP FULL (KIAS)
22000	128	113	155	108	102
23000	131	116	158	110	104
24000	134	118	162	112	106
25000	137	120	165	115	108
26000	139	123	168	117	110
27000	142	125	172	119	112
28000	145	127	175	122	114
29000	147	130	178	124	116
30000	150	132	181	126	118
31000	152	134	184	128	120
32000	155	136	187	130	122
33000	157	138	190	132	124
34000	160	141	193	134	126
35000	162	143	196	136	127
36000	164	145	198	138	128
37000	166	147	201	140	129

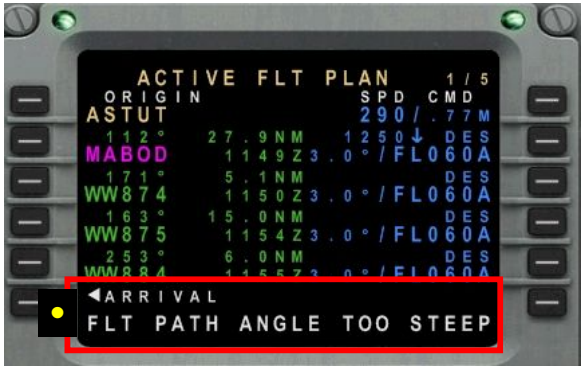
Now identify the line matching our gross weight, here we will go for he closest, that is **29000 kilos.** It is always better to considerate a slightly heavier weight just to make sure we will not stall.

- Type **178** then 1R
- Type **116** then 1L
- Type **130** then 2L
- Type **147** then 3L



☑ On the MFD, change **TCAS** mode to BELOW (**BLW**)





Monitor your angle of descent. You may find out that **we are not descending fast enough:** the little triangle is way too low on the PFD and you get a message on the FMS

We need to increase our descent speed:

☑ Activate **VS** mode and increase vertical speed to 2000 feet / minute by rotating the vertical speed knob .

Vertical mode on the PFD should read VS in green

Monitor the select VS on the PFD (displayed in cyan)

☑ Just before reaching 10000 feet, switch **FSTN BELTS** sign and **LANDING** lights **ON**.

☑ **Reduce speed to 250 knots** MAX

☑ Reduce ALT to **6000 feet. VPATH** should still be selected as the current vertical mode.

☑ Passing **MABOD**, reduce altitude to **5000 feet**

☑ Set **Radar altimeter** to **500 feet** by pointing your mouse to the RA section on the PFD and rotating your mouse wheel.

☑ **Set altimeters to LOWW ATIS** as instructed, **30.01 IN** in this example both on PFD and standby altimeters.

Passing **WW880**, we are executing our last turn before aligning to the runway.

Press RADIO button of the FMS and tune Runway 16 ILS both on NAV1 and NAV2 : press 4L to highlight stand by value then rotate the FMS knob to tune **108.50.**

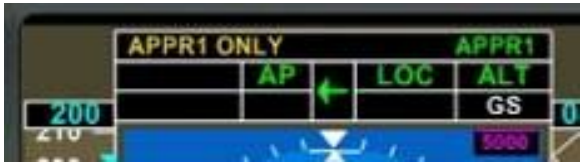
Press 3L to activate **108.50** (should become green.

Repeat the same operation for NAV2 (4L + 3L)

Heading to WW819, **align HDG to the current heading** (around 233°) using the HDG knob then press **HDG** button to activate it.

Select the VOR/LOC navigation source by pressing the **V/L button**.

The information has now changed colour and we are back with a green compass.



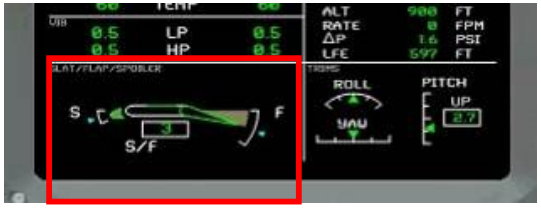
Quickly align the **CRS** to runway heading, that is **162°**

Press **APP** button to activate Approach Mode.

Note that **LOC** and **GS** should appear on the PFD. **LOC being active** in green and **GS in stand by mode** in white.

Soon before reaching the Glide Slope threshold, you will notice a little green triangle on the PFD.

At D13.8 OEZ, **GS** mode becomes active and aircraft starts to descend. Note that **AUTOLAND** is also available.



Gear in transit :

Arm the **AUTOBRAKE** selector to **MED** position. Runway 16 is long enough to allow slow breaking, we could even choose LO.

Monitor your speed on the PFD.

At FS **start lowering flaps** following indications from the speed tape (green dots). Check flap deployment on the EICAS.

I tend to disable the auto throttle at this stage and control the throttles manually.

Lower the gear and monitor on the EICAS for 3 green.

Monitor your speed!

Especially if you decided to control your speed manually, do not let it drop in the **RED zone**, that is below 110 knots in this case. **This is the STALL speed**, something we surely do not want to try at 2000 feet above the ground.

Try to maintain AP speed.

At 1500 feet, **disconnect autopilot** by pressing the AP key and fly the aircraft manually.

Upon touching ground, immediately engage the RESERVE thrust (F2 key or yoke assignment) and slow down the aircraft to take **the nearest exist to the right.**

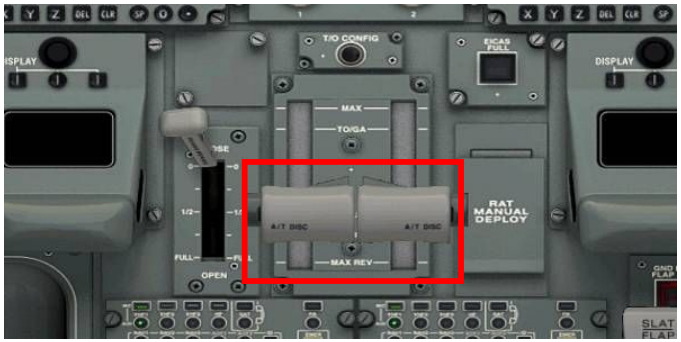
- [x] Upon leaving the runway, switch off **STROBE and LANDING LIGHTS**, switch on **TAXI NOSE** and **SIDE** on

- [x] Turn the **APU** on

- [x] Fully Retract FLAPS

- [x] Call for AES window and press **F3 – Request follow me car**

Taxi to the parking stand and use AES help to stop at the right position.



Set the parking brake

.

Switch OFF all lights except NAV from the overhead panel, release the passengers by switching **FSTN BELT** sign off

Fully decrease throttles to cut fuel flow and stop the engines

Open main door (Shift + E) and cargo doors (Shift + E + 2)

☑ Request Deboarding from AES

Airport busses approaching for our passengers…

☑ Turn **ELECPUMP** A to **OFF**

☑ Turn **BATT 1** and **BATT 2** to **OFF**

Quickly head to Wien city centre to taste wonderful food and drinks, well BEER of course, I bet you really deserve it!

Well done !

Thank you very much for using this tutorial. This is version 1 which still needs to be improved. Any suggestions or mistakes noticed can be reported at contact@flytutorial.com

Your contribution is greatly appreciated!

David