CRJ 200

X-PLANE

TUTORIAL

SALAMANCA - VALENCIA

It has been very hard to reach this point. Not only make the plane but also make these documents. Fly the plane many times to ensure everything was ok. Take screenshots and then put together here. When I bought a simulator rarely I read the documentation but always go to follow the tutorials. Then if if find a problem I have the manual behind to take a look when it is needed. Well I would like you also read the manual before starting fly the plane, for the main reason that if you don't make the procedures well you can find "bugs" that are not bugs.. but not good procedures made.

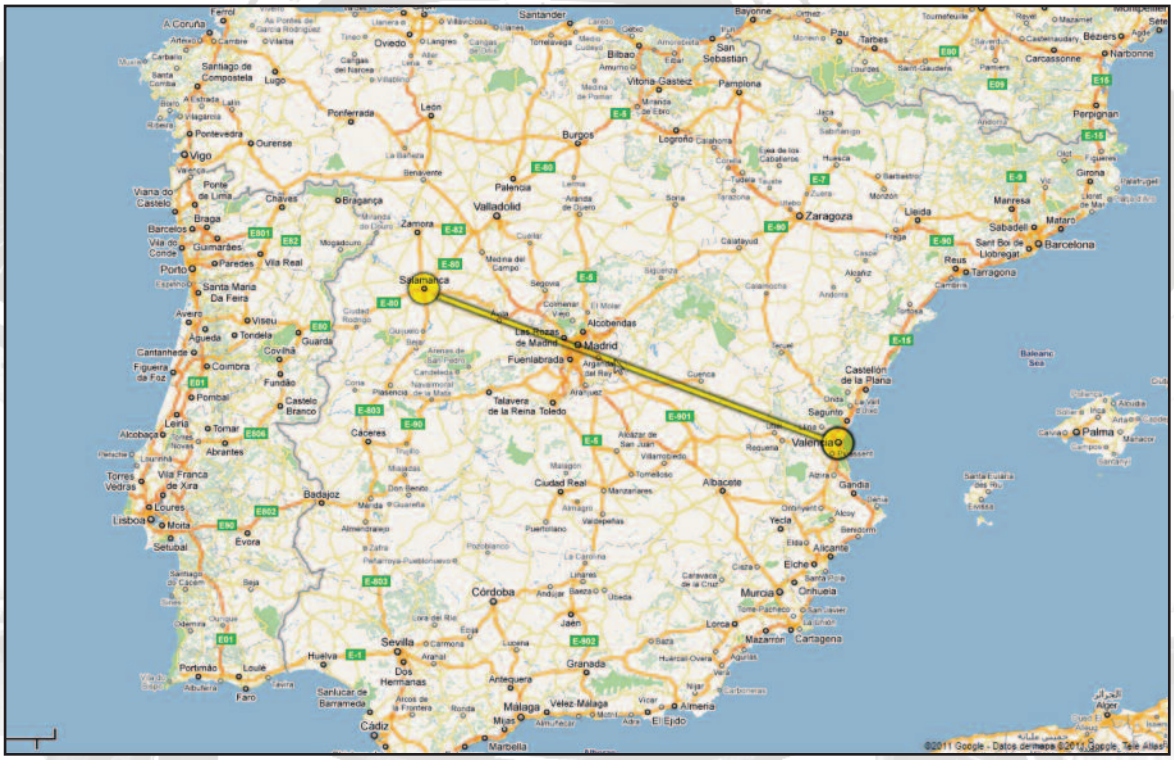
In this tutorial, we are going to make a flight over Spain. Here in Spain (Europe, still there are people that thinks Spain is in South America. That wouldn't bad at all!! haha but no.. we are in the old Europe) we have an strong crisis, and we have been always a good country for making tourism. So I want you to take this tourism ride with me to my country. Of course the colours are not the same on the simulator compared with my country but you will see more or less the shape of it, and if you want one day to visit me here in Madrid, as Austin and Anton did, then you will be welcome.

The first thing you need to make this tutorial is install the landscape of Europe of X-Plane 9 if you don't have already. If you don't do it, you only will see water. You could do the tutorial flying over water but that would be very boring, isn't it?.
Once you do, there are two airports, you can install. You can fly from the default ones but you won't have a real experience.

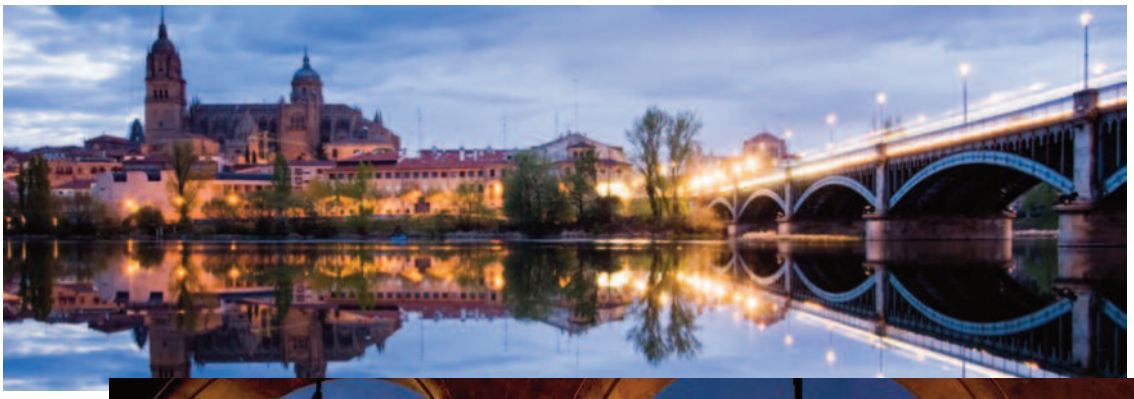
The first thing you need to install is Openscenery x, and update all to latest version:

http://www.openscenery x.com/

It installs objects necesary for the Valencia airport, and you can use them for other airports.
We are going to fly from Salamanca to Valencia.



Salamanca is the city where I was born. It has a little airport that usually is not used too much but that every time I went to my born city I saw those seaplanes with so much expectation.
Salamanca and its airport is located 200 km west of Madrid and it is a very nice city, full of students because here is located the second university founded in time in the history.



You can make a virtual visit to Salamanca here:

http://www.salamancatourvirtual.es/

so it is a city full of young life, with people comming to study on its university from all countries around the world.

Matacan is the airport of Salamanca and it is the one I used is the one that you can download for free on my webpage:

http://www.jrollon.com/Matacan.html

Valencia is the city of the Sun. It is located 330km to the east of Madrid and it has sea. The great Mediterranean Sea. It is a big city with a mixture between modern and antique, with very nice and polite people that lives slowly (and fast when they have parties!). This is the Spanish city of Inma, my girlfriend, and where is typical the Paella food, but also the Horchata drink, and one of the most famous parties in the World: The Fallas.
We could say that Valencia is like the “California of USA” but I would say the opposite!! California is like Valencia!!. Oranges, good weather and beaches are around you.

The scenery of this city is composed of two parts. The airport and the city. For both are necessary the OpenSceneryX addom that you installed before.
For downloading the scenary you have to go here:

http://www.x-plane.es/modules/smf/index.php?topic=3173.0

and search for “Valencia - Escenario AKESOFT febrero 2011” that is the airport, and if you also want the city look for “Valencia ciudad”.
Passport and login are on the same page (on top).
Once downloaded both you have to copy inside the folder Custom Scenery inside X-Plane folder.

Ok.. so you have the plane and the sceneries ready for making this tutorial. Now you have to open x-plane 9.68 and load the plane with engines not running (more info on manual how to do this).
Load the Salamanca Matacan airport ICAO LESA on the parking “Medium Ramp 5”.

• Go to **Environment - Date and time** and set 15 April Local time 7:21h zulu time 6:46h) don’t worry it is dark but when you take off the Sun will be there.
• Now in **Environment - Weather** set 20ºC (68ºF) and baro to 30.22 inches or 1023 milibars.

Ok, so you have opened the main door (consult manual to know how) and you have entered the plane.

The first thing we need to know is the route we are going to make. For that purpose we use a webpage that I like, and had used for long time:

Route Finder

On Departure field we are going to introduce LESA, and on destination LEVC (Valencia). We are going to change the FL330 fields to FL240, and will press Find route:

ID	FREQ	TRK	DIST	Coords	Name/Remarks
LESA		0	0	N40°57'07.29" W005°30'07.28"	SALAMANCA/MATACAN
UNSOL		78	42	N41°09'32.30" W004°36'40.00"	UNSOL
DISKO		121	20	N41°00'54.88" W004°13'23.65"	DISKO
INDEG		121	22	N40°51'12.50" W003°47'32.20"	INDEG
MAGIN		121	12	N40°46'01.29" W003°33'52.63"	MAGIN
HORTA		121	14	N40°39'37.70" W003°17'10.80"	HORTA
CJN	115.6	121	38	N40°22'19.06" W002°32'40.58"	CASTEJON
BENED		123	20	N40°12'37.50" W002°09'30.00"	BENED
PRADO		123	8	N40°08'50.96" W002°00'37.23"	PRADO
CENTA		123	30	N39°54'02.22" W001°25'55.21"	CENTA
LEVC		123	50	N39°29'21.52" W000°28'53.84"	VALENCIA/MANISES

But for us the most important line is the last one:

LESA DCT **UNSOL** A33 **CENTA** STAR **LEVC**

All the points on the page5 are resumed in this little line, and this line is what we are going to introduce in the FMS.
As you can read the first point is the airport **LESA** then, we must take of going **direct** (DCT) to **UNSOL** and there connect with A33 airway to go until reach **CENTA** and there start the STAR (standard arrival procedure) to one of the 2 runways **LEVC** has.

We can see also on the page that the distance to fly is 256.1 nautical miles. The whole trip should take 1 hour more or less (I know this becasue I have made so many times the trip, but you should consider that **in this plane 250 nm is 1 hour of flight**).

So we need put the fuel inside the plane.
We are not going to fill it full capacity. Maybe on cars that is ok, but on planes is not. The most fuel loaded the most spensive is because it is more weight, so the plane has to burn more to make it fly.
How we calculate it?

This is the formula to calculate the fuel:

THERE ISN'T!!

Of course there is a formula, but all the pilots I asked they didn't know. There are too many variables to count with to calculate the fuel... but one of them told me this:

Total Fuel to Load = TAXI + BURN OFF + FINAL RES + ROUTE RES + ALTN

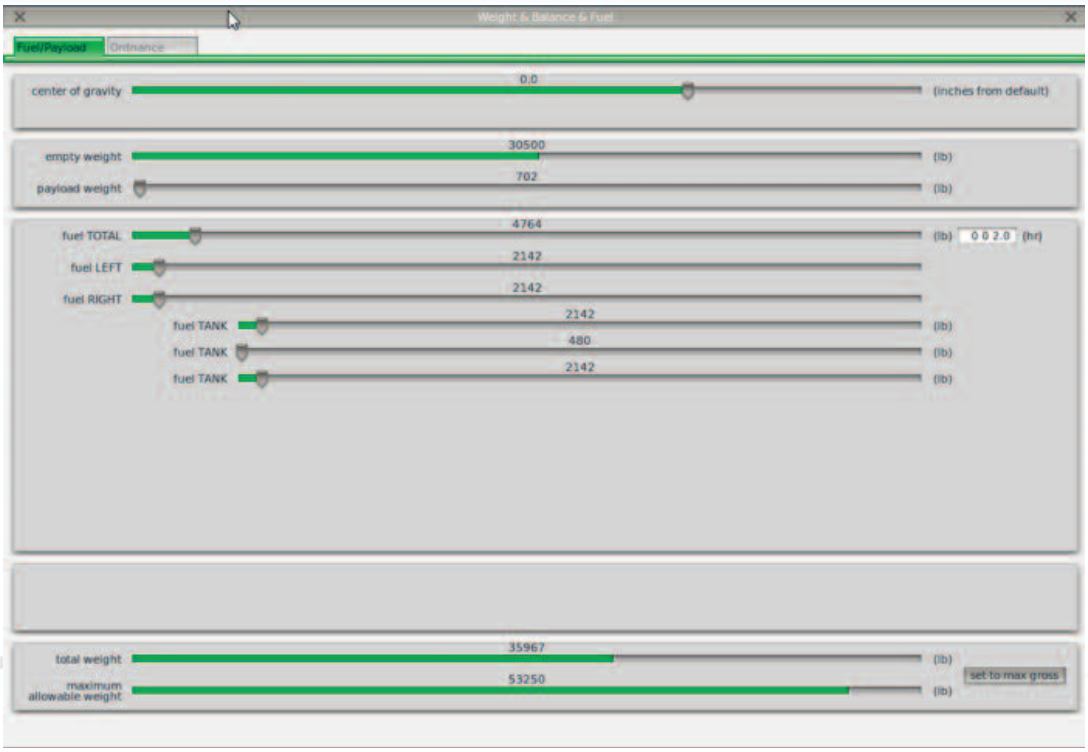
WELCOME TO SIMULATION!!! HAHAHA

- **TAXI:** Fuel needed to Taxi and APU. Of course it is not the same a bigger airport than a small one.
- **BURN OFF:** Fuel needed to travel to destination airport.
- **FINAL RES:** Fuel to make 30 min holding at 1500 feet.
- **ROUTE RES:** 5% Of Burn off for Reserve.
- **ALTN:** Fuel needed to fly to Alternative. that will be ALTN + another Final Res.

In this case I didn't follow the real procedures because I knew that I wasn't going to go to Alternative (man!! it is enough tutorial preparation for me spend 7 hours flying to take screenshots, etc. to go to an alternative. The way to proceed to an Alternative is explained on the Manual).

I know my flight will take me 1 hour (7 preparing all for this tutorial) and I need more fuel for Taxi + 30 minutes of possibly wait + reserve = 1h + 30min + 30 min = 2 hours of fuel

On X-Plane there is an easy way to put fuel needed for the time you are flying. So we can go to **Aircraft** menu - **Fuel and Weight** and leave it as the graphic below...



Once you set those values because the plane will also load the fuel in the center tank the plane will automatically start transferring fuel from that tank to the wing ones to ensure, the plane has fuel on wings the most time possible.

Another thing to take into consideration is the payload weight. That means all that the plane is going to carry. People and bags, not counting the pilots.
This is a rare flight where we are going to deliver this plane to Valencia empty. Only 3 friends will be with us on board. Anton, Austin and Cameron. Philipp will be flying the plane with me (sorry you don't look too handsome today Philipp!! That moustache!! argg!! and you are a little more fatty than usual. To much beers in Germany my friend!) Later I will explain why the Payload weight is 702 lb. For now, just introduce them (Fuel loader and payload loader on x-plane don't allow to set exact numbers so the closer to this the better).

Sooo.... we have loaded the plane with the necesary Fuel and bags are inside (people are still taking outside. Always work has to be done by only one!!)

- Hello Philipp how are you? (my voice)

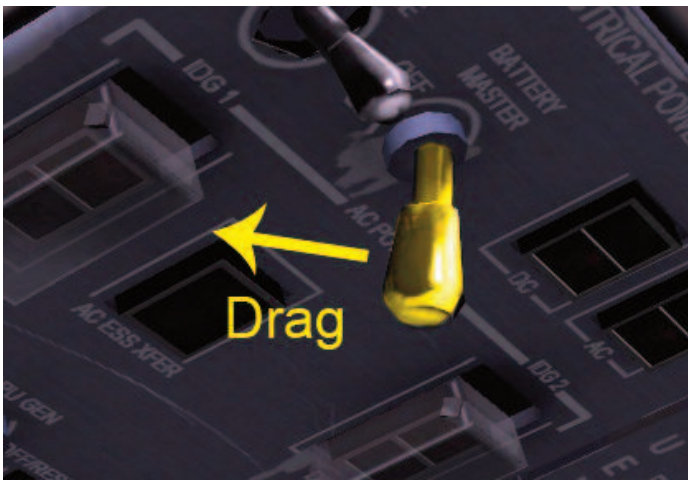
Well he seems to be a little bit tired, he has worked very hard to ensure this flight today, and I trust on his work.

Ok.. we start!!

SAFETY CHECKLIST

• Circuits Breakers, closed (red text means that is not simulated so cannot be executed)
• N/W Strings, off
• Hydraulic Pump, they are all off (philipp voice)
• Landing gear lever, is down.
• Spoilers lever. Retracted.
• Flaps lever. On cero degrees.
• Radar. Set to off.
• ADG Manual Release. In and stowed.
• Battery Master. I set it on.

Once you put Battery on, the 2 central displays will appear and a warning and caution light will flash. (fig 2)



Switch painted in yellow to clarify which one is the needed to manipulate.

Fig 2

• I switch off the warning and caution flashing lights pressing both buttons.
• APU / AC electronics. In this case I am going to ask for a external GPU to have energy, and that way we won't burn fuel from the APU. To do that we have to:

  • we popup the FMS (can be done with the 3D FMS also. On 2D FMS you won't see keys animated, on 3D yes).
  • Press the MCDU MENU button.
  • press the EXT AC POWER Left Function Key that is next to the label (1LK) it will change to green (because programming it may take a little to change condition from white to green. That was made that way for saving performance) (fig 3).

Ok.. we have now GPU connected outside! (fig 4)
(ensure you have set parking brakes, because if they are not on, you won't be able to have the GPU.

Fig 4

Fig 3

Fig 5

Fig 6

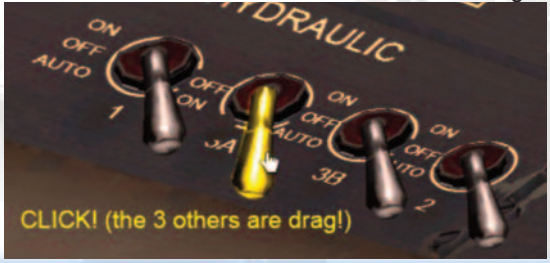
Ok if we look up on the overpanel we will see a green light in the AC button, inside the ELECTRICAL POWER SERVICES Panel (fig 5)
The only thing you do to give AC power to the plane is just click that button (fig 6), and all the screens on the CRJ will be on (fig 7)

Fig 7

- IRS (both) to Nav. Changed to Nav (fig 8).
- Airplane documents. On board.
- Hydraulic 3A. set to On (fig 9)

Fig 8

Fig 9



That way we have control over yoke and pedals in case we forget to activate later. To verify we have hydraulics pressure we can check it on Hyd Eicas display (fig 10).

• FMS initialization. It is already on.

Safety Check Checklist completed.

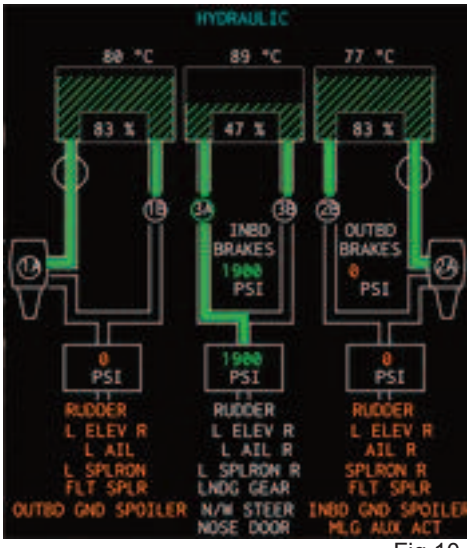


Fig 10

ORIGINATING CHECKS

• Interna & External Pre-Flight Checks. Completed.
• Audio Warning Panel. Normal.
• Fire Detection Firex monitor test. Completed
• test lights. Checked (fig 11)

Fig 11

You will see the christmas tree.All the lights of the buttons illuminated. You have to click again the switch to leave back where it was.

• Fuel Panel. Checked

You have to open the Fuel Eicas page to see how the fuel is distributed in each tank. Fuel quantity between central tank and external will be changing because the auto transfer program to ensure wings are most time filled (Usually on fuel filling you should set first the wings and if you need more capacity then go to the central).

On the total quantity you will see the number is always the same. 4802 lbs. (fig 12).

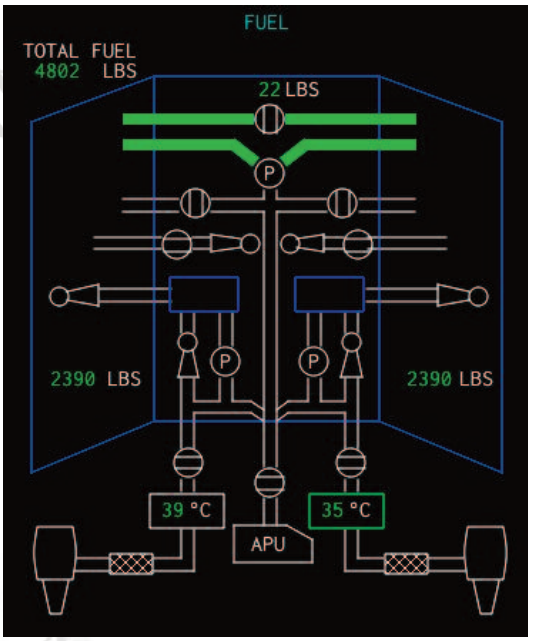


Fig 12

• Bleed air panel. Checked off.
• APU. Checked off.
• Start panel. Checked off and normal
• Hydraulics. Checked only 3A on.
• Pressurization. Checked normal.
• Air-Conditioning. Checked. Packs off.
• Ice, Detection test. Checked
• Windshield. Low. This is the antiice windshield but this CRJ only has on and off positions.
• Emergency Lights. Armed. On the CRJ the Armed position is an OFF position, so if you want to activate them, you have to set them on.
• Standby Compass. Checked
• Stall Test. Complete
• GPWS Test. Complete

• N/W Strings. Off
• Clocks. set (we could start counting them, but we leave at zero)
• EFIS Control Panels. Checked
• Instrument Panels. Cheked
• MLG BAY Overheat Test. Complete
• Upper Pedestal. Checked all to normal.
• Thrust Lever Quadrant. All to normal. Thrust levers to cutoff position.
• Avionics. All screens on.
• APR. Arm
• ENG Speed. On
• Trims. Checked working.
• Yaw Damper. Engaged Both lights come to white (fig 13)

Fig 13

• Lower Pedestal. Checked. Parking brakes are on.

Originating checks checklist complete!

BEFORE START CHECK

Ok, now is time to call the folks and get seated on the cabin.

- HEY YOU!! STOP bla bla bla AND GET INSIDE!

• Close Main Door. Closed (main attendance voice)
• PASS signs. Both on Bleid and Smoking (fig 14)
• Pressurization. Set to Altitude of destination airport, that is (240 feet)

Fig 14

Ok. For setting this one, we have to first show the ECS Eicas page if it was not already shown (also you can find that information on the Stats screen. There you will find the line we need. **LDG ELEV.** (fig 15) At the beggining it will be set to cero. You can change it with the landing elevation knob on the CABIN PRESS panel (fig 16)

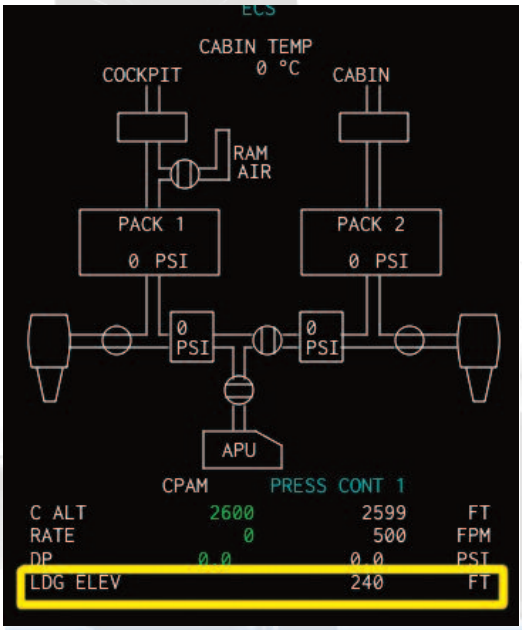
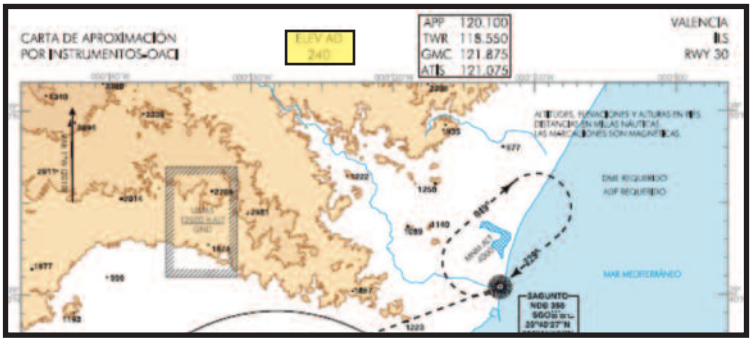


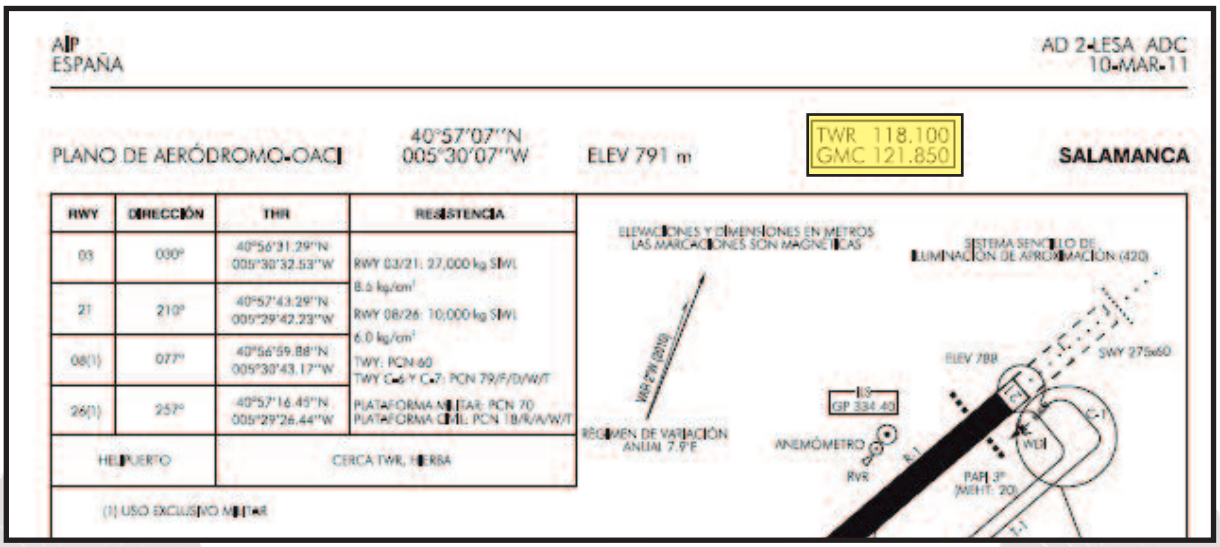
Fig 15

Fig 16

The only you have to do is rotate the **LDG ELEV** until in the ECS Eicas display is read 240 feet as landing elevation. (don't worry if it is not the exact number, because it makes a rounding. Only it has to be close to the number).
Why I know that the elevation of LEVC runway is 240 feet? Because reading the card of the airport.



Now is time to hear on the ATIS the altimeter setting. Because we are in a small airport, we won't be able to hear the ATIS, because it hasn't. So we are going to contact Ground



As we can see the frequency of ground is 121.850, so we are going to tune on the radio. So we go to the Radio panel (sorry no popup version), and press the first right function button (1RK) to choose the COM1 preselected frequency (fig 17) (if it was marked and you press again then you are going to make active the frequency it was set).

Fig 17

Then you have to tune the frequency 121.85 on the

Fig 18

preselect area, with the rotaries. Once you have it pretuned, then you can make it active just pressing a second time the 1RK (fig 19)

Fig 19

- Salamanca Tierra, IB032 (spanish. ATC is spanish! :P)
(- Salamanca Ground, IB032.)

- Salamanca Tierra, IB032, adelante.
(- Salamanca ground IB032 go ahead)

- Solicitamos aprobación plan de vuelo instrumental con destino a Valencia, IB032
(- request approval instrumental flight plan to Valencia, IB032)

- Autorizado a Valencia instrumental. Llame listo para copiar IB032
(- Valencia authorized. Call ready to copy, IB032)

- Listo para copiar, IB032
(- Ready to copy, IB032)

- IB032 Autorizado a Valencia con salida directa hacia UNSOL, CENTA via A33, Temperatura 22º QNH 30.22. Llame cuando esté listo para rodar.
(- IB032 Valencia Authorized direct to UNSOL and CENTA through via A33, Temperature 22º QNH 30.22. Call when you are ready for taxi).

- Autorizado a Valencia directo UNSOL y CENTA por via A33, QNH 30.22, llamaremos listos para rodar.
(-Valencia Authorized, direct UNSOL and CENTA via A33, QNH 30.22. Will call when ready for Taxi.

(well I can mistake what it has to be said, for sure are people around with much more experience than me. That happens because instead of flying I am the most time in the hangar to let others fly. :))
Ok... so we have the QNH.. so we can set the altimeter....
We go to the lateral left panel, and there we will find the Baro Rotary. We set 30.22 (if we want to set the pressure in HPA you have to press the button over the rotary) (fig 20).To know how much we have rotated and in which

Fig 20

Fig 21

number we are, you have to look it on the PFD (fig 21)

• Anti Skid test. Complete
•FMS and IRS initialization. Set.

Ok, here comes a big one!

• You have seen in fig 21 the PFD is not correctly configured. That is because the navigation aids hasn't align. The IRS needs to be aligned. So we are going to say to the FMS where we are right now to match the coordinates it has with the coordinates where we say we are (take from its database)

We go to the FMS, and we press the INDEX button to go to the Index page. Through there we can reach the **POS INIT** page (pg 22)

Fig 22

• We write on the Scratchpad the ICAO code where the plane is right now. LESA (because read function of typing inside the FMS is retarded to safe performance maybe you have to type a key button twice to show the letter on scratchpad) (if there is something inside the scratchpad or just you miss on typing you can delete letter by letter with the CLR button or all the scratchpad with the DEL key.)

• Once you wrote it you have to insert on the area were it is read AIRPORT. so you press the **2LK**.

• **LESA N40 57.12 W005 30.12** will appear below AIRPORT label. Now you have to copy these coordinated to the Scratchpad. To to that so, you have to press the **2RK.**

You will be able to see same coordinates on the scratchpad. And once you got there you have to insert on **SET POS** label. We will do this pressing **5RK.** Ok, we have started the IRS initialization. In 7 minutes or so we will have the PFD completelly functional. (fig 23)

If you take a look to the PFD you will see how a label **IRS ALIGN DO NOT TAXI** had appeared (fig 24)

If you wait for changes on the PFD you will see how first it shows the altitude and speed tapes making them active, and later it will show the artificial horizon.

Fig 24

But we are not going to wait. We are going to program the route we want the plane follow on autopilot.

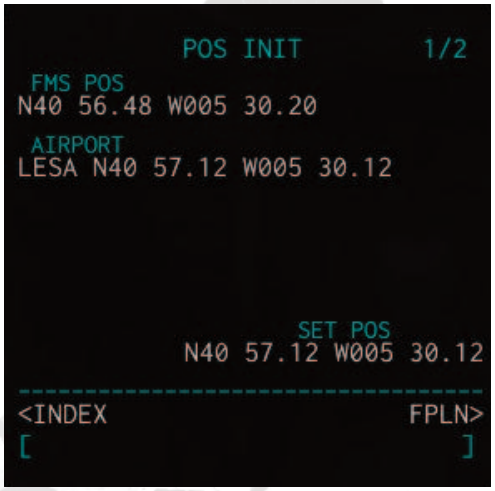


Fig 23

• To program the route we have to go to the **FPLN** page. We press the FPLN button anywhere we are on the FMS and we will reach that page.

Now we remember our route:

LESA dct UNSOL A33 CENTA star LEVC

Because we have init the irs LESA should be on the ORIGIN area already. If not, we should write on a clean scratchpad LESA and with **1LK,** introduce it on the ORIGIN airport.

Now the destination. LEVC. We type this on the clean Scratchpad and press 1RK to introduce it on the DEST area. The screen should be something like the figure 24.

Fig 24

• We input the number of our flight as a visual reference on 5RK. So we type IB032 and press that right button.

• We are going to start the input of the waypoints. The first one is **UNSOL**, direct way.. So because we don't have any more space on the first page of FPLN, we are going to go the next one (pages are created when you reach the end line of each previous page). So you press **NEXT PAGE** button on the FMS, and we are on 2/2 page (it is shown on the top right corner)

We type UNSOL on Scratchpad and copy to the TO area with **1RK.** If everything is ok then the UNSOL waypoint will be shown on the TO Column in white and a DIR label on VIA column (fig 25).

Fig 25

• Now next waypoint **CENTA** but through **A33.** What would happen if we input CENTA just we did with UNSOL. Ok, we would have a DIR also, so on the LEGs Page we would only see CENTA after UNSOL. Because between UNSOL and CENTA the A33 is the only straight line, there would have not so much a problem, but there are airways that make corners, so if we don't input the via first in those cases we would go straight line.. and maybe we could find a mountain in out trajectory!!.. so be beware!

Ok.. first we have to introduce the airway: A33 so we type **A33** on the Scratchpad (clean) and we input it on **2LK.** A33 will be shown in the via column below the last DIR one. But a --- DISCONTINUITY--- will appear below it. (fig 26). What does it mean? Simply. The FMS doesn't know in which direction of the A33 you want to go, and second it doesn't know until which point do you want to go.
To solve that discontinuity you only have to type the point CENTA on the right of the A33.

So we type CENTA and input it with 2RK, inside the boxes symbols. The discontinuity is cleared and we can continue (fig 27)

Important note: If you are making your route and when input an airway or point the FMS don't find it it will say "INVALID ENTRY" or something similar. That doesn't mean is a bug. The Database you have with the 1.0 version package is the default one and old. You have to update it from Navigraph. Paying of course to them (not so much I believe)

Fig 26

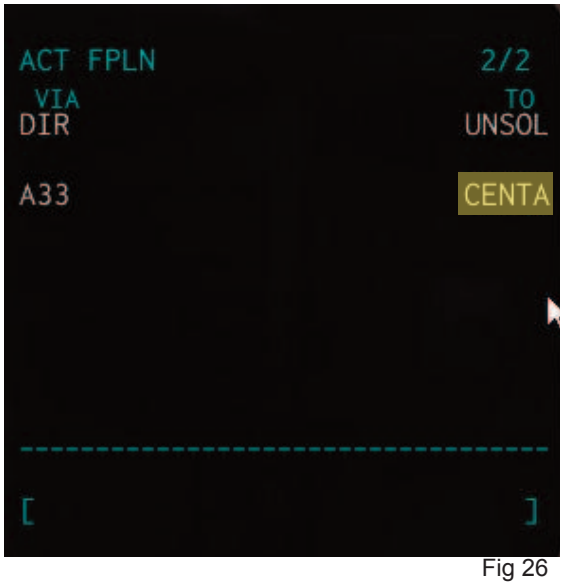


Fig 26

• It is time to verify that all the route programmed is ok. We don't want to fly to other direction! For seeing it we have to press the LEGS button on the FMS to show the Legs page and see all the points that the plane should go through (fig 27).

Fig 27

Do you remember the routefinder that gave us lots of points that the plane should fly over that A33 airway?
We have to verify that those points are on the LEGS page.

So as we can see on the first page of LEGs (1/3) we have LESA-UNSOL-DISKO (we have lots of points between UNSOL and CENTA because we programmed the route with an airway if we hadn't then we only should have UNSOL and then after that, CENTA).
-INDEG.
As we can see the same as the route.
The distance between points seens to be the same, but not the course between them. 73º(78º on routefinder) and 116º (121º on route-finder). That mismatch is becasue the database.

ID	TRK	DIST
LESA		
UNSOL	78º	42
DISKO	121º	20
INDEG	121º	22
MAGIN	121º	12
HORTA	121º	14
CJN	121º	38
BENED	123º	20
PRADO	123º	8
CENTA	123º	30
LEVC	123º	50

We are using the default free old one from Navigraph, so that is why, but there is no need to worry about it. The most important is to be close enough in all numbers.

We continue seeing other pages, so we press NEXT PAGE (2/3) and NEXT (3/3) again when we verify the rest of the points.

When we see all is correct on the LEGs page then we are ready, but it is worth making one last check. A visual one. We are going to see the route, with lines connected between points, and we are going to follow with the plane on the ground.

For doing that, we are going to use one of the modes of the Multifunction Display (MFD).

• To choose the mode, we must go to the left panel and rotate the big (fat) FORMAT knob (fig 28) (this one is a little tricky as well as the NAV SOURCE) just move dragging until you see the change on the modes).

Fig 28

When you see an image like the one on figure 29, then you have the desired MFD format. It will be centered on the first airport of the route. In our case LESA.

You cannot see the whole route, so we have to zoom out. How we do that? Easy. Remember the fat knob on figure 28. Go for the thin one! (fig 30)

Fig 30

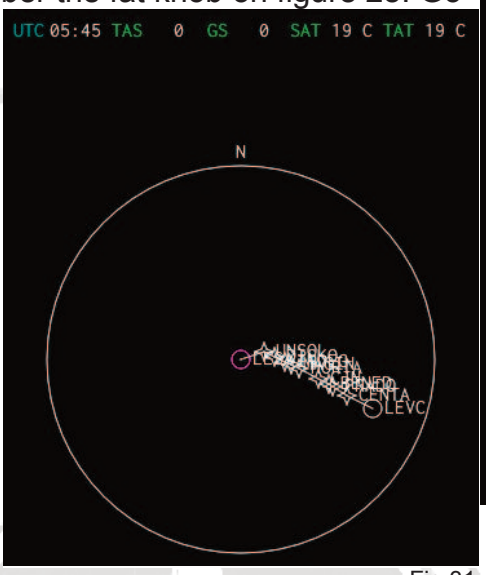


Fig 31

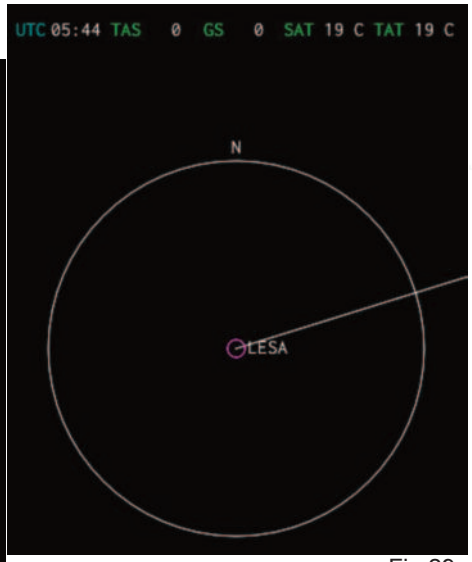


Fig 29

When we have a clear view of the route (not all) seeing clearly some points of it, then we can proceed to navigate through it.

We are going to make the center of the circle each of the points so, we can navigate watching all the routes.

To pan the view you only have to press the UP button on the FMS to go forward on the route and the DOWN button if you want go backwards (fig 32) (maybe a direct white line will appear between the first airport and the centered point. Don't worry about it) (fig 33)

Fig 32

We have to verify every point until the last one LEVC.

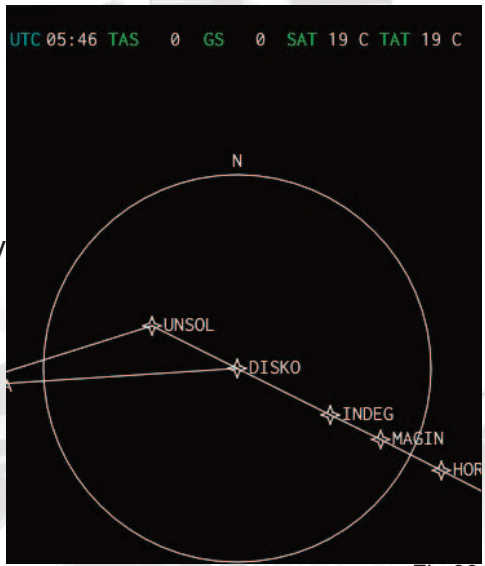


Fig 33

• Once we have checked all the points are correct and the route is correct, we are going to leave the MFD mode as the one showed on figure 34. This is the following route mode. Still the route is not shown. Will be visible when the plane has 40-60 knots.

Fig 34

• We are glad about our route, so we want to save it, in case we want to fly that route again (or we have a crash to desktop, and we don't want to program it once more).
The function that saves the route only saves the points on the programmed Flight Plan, but not the SIDs or STARs as in the real one. So you can choose another SID or STAR later.
If you had to choose a between two (or more) matching waypoints, then you will have to choose again once you load it.

So for **saving the Route** we must go to the first (1/x) flight plan page pressing FPLN on the FMS and once there you only have to press **5LK** near COPY ACTIVE label to save it. A message of ROUTE SAVED will appear on the Scratchpad, as well as the name you need to remember below the ROUTE label, if you want to load it later. In our case LESALEVC. (Files are saved inside /JRollonPlanes/SavedRoutes). (fig 35)

Ok... 18 pages of Tutorial and still we haven't started the engines!! I am dying here!!! haha. Hope you like it!

Fig 35

• Radios and Nav Aids. We set for departure.

The CRJ has an autotune feature on the FMS and we must verity if it is on. We can access that page with the Radio Button. (fig 36)
We have to check that the radios are in AUTO (cyan colour is selected option).
In our case we can see that both NAVs have been tuned to frequency 112.20 that is the one near LESA - BBI VOR.
If we would like to tune other frequency we should put in MAN mode the radio we want and then tune on the radio or here on the RADIO page of the FMS.

Fig 36

Now we should see on the PFD if the Navaid is tuned correctly. The first thing we need is change the Nav Source if it is not already on NAV1.
To do that, we go to the right panel **NAV SOURCE** knob and rotate it until we see NAV1 on the PFD (fig 37) This knob is a tricky one so you have to drag far to make the first change. Once made they change easier.

Fig 38

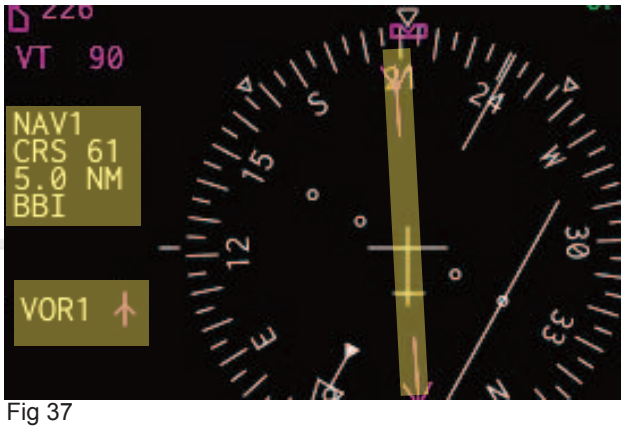


Fig 37

To show the bearing arrows to the syntonized radioAid you can press the buttons BRG button. One press shows VOR bearings and a second press Shows the ADF bearings.
A third press hides the arrows (fig 38).

Ok, we can continue with the Checklist!

- Parking Brakes. On
- Take-off briefing. We will align with runway 03, take off to 4500 feet and turn direct to UNSOL

I am going to explain why 4500 feet. When we take off we must think that maybe we can have a problem. In X-Plane there are so many birds around! so you can have a problem if you hit one of them, or maybe you receive a random failure from x-plane.

IMPORTANT NOTE: As said, there are deers, birds and random failures on X-Plane. I think that is important to say, that before anyone thinks there is a problem on the plane (bug) because a failure has been produced, maybe it was because you have activated the random failure function on x-plane. It is nice to have it connected, so it makes the flight more challenging, but I think at the begining you should deactivate it. The CRJ has very complex systems simulated, and what you think maybe is a failure, because it is not working, is that you didn't follow the procedures correctly.
To deactivate the random failures systems you have to go to AIRCRAFT / EQUIPMENT FAILURES menu and uncheck the box below that says **"use meantime between failures random failures"**

So we must see the airport card to look at the go around procedures, and we must look the IAF altitude and Holding altitude. In or case it is 4500 as shown in figure 38.

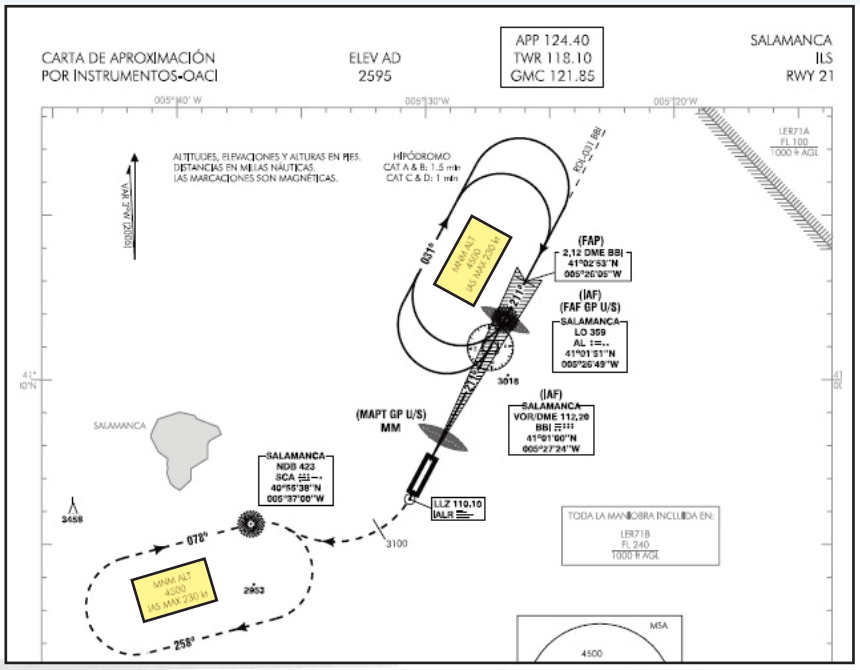


Fig 38

Before start Check completed!

CLEARED TO START CHECK

• APU. On

Fig 39

For starting the APU we have to proceed this way:

• First we have to have the **STATUS** page on the EICAS screen. It only will show the Trims and some information about the pressurization of the plane.

• On the APU panel we must press the **PWR FUEL** button to open the fuel Valve to the APU (fig 39)
• two gauges without any needle will appear on the STATUS page and the label **DOOR OPEN** will be shown (fig 40)
• Now we press the START/STOP button next to the PWR FUEL pressed before, to start the APU. Two green needles will appear on the APU gauges and will start increasing RPM and EGT (fig 41). Once the RPM has reached 100%, an Avail green light will be visible on the START/STOP button (fig 42)

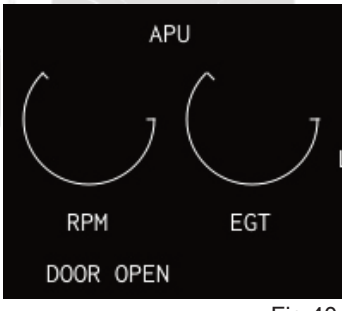


Fig 40

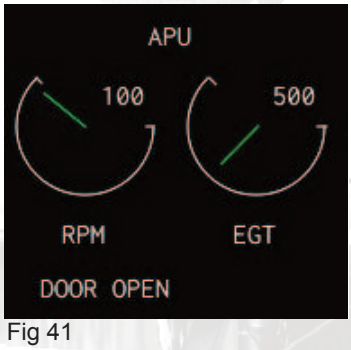


Fig 41

Fig 42

Now we are starting to burn fuel so it is better we hurry up.
With the Green Avail light on, we have the possibility of feeding the electricity plane with the APU generator. We connect it!

• We go to the Overhead panel and turn on the APU GEN switch (Fig 43)

Fig 43

Now we can switch off the GPU external.

• Go to the ELECTRICAL POWER SERVICES panel and click the AC button that is lit with the white IN USE label. It will change to the green AVAIL.

• We press the MCDU MENU on the FMS and select Plane Menu, and we press the 1LK next to EXT AC POWER to turn it white.

Now we are only having electricity on the plane from the batteries and the APU unit.

• Papers. On Board
• Take off Data. Set.

Ok, we are going to change the Autopilot command panel to match what is needed for a good take off.

• The first we do is put the Fligth Director that will guide us manually or automatically if autopilot servos are on. We press the **FD** button on Autopilot command panel. Immediatelly a magenta cross will appear on the artificial horizon (fig 44 and 45) and the label FD1 will appear also.

Fig 44

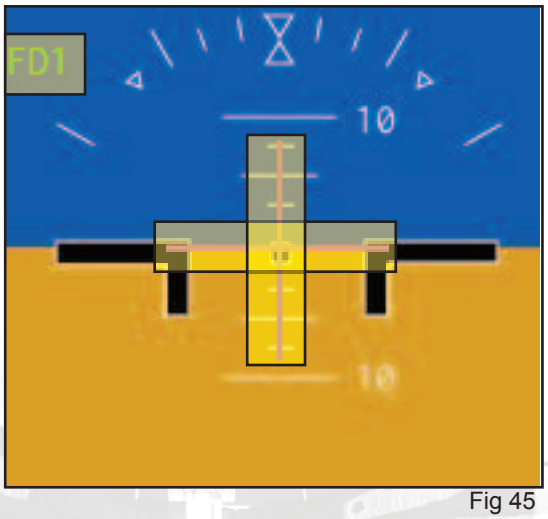


Fig 45

• Next is activate the HDG mode (but still we are not putting the Autopilot. Even for engaging the autopilot the plane must be 100 feet above the ground). We press the HDG button.
A magenta bug will be shown on the rose compass pointing in the direction we are (fig 46 and 47)

Fig 46


Fig 47

• Now we rotate the HDG knob until we can see the HDG bug is on the 30º and also we see the number on the PFD (fig 48 and 49)

Fig 48

Fig 49

• And now we can input the Altitude, and press the mode to later reach that altitude. We have to press the ALT button on the Autopilot Command panel and then rotate the Altitude knob until it is read 4500 on the magenta number over the altitude tape on the PFD (fig 50 and 51)

Fig 50

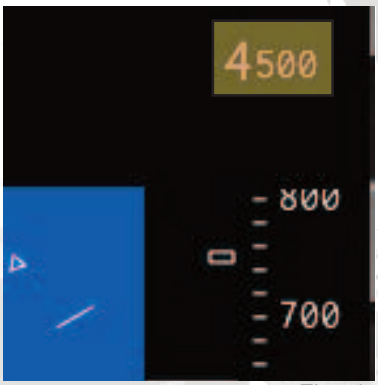


Fig 51

• Doors. We already closed before pressurization.
• Beacon. On (fig 52)
• Fuel Pumps, Gravity XFlow & Quantity.
On, and check quantity. (Fig 53)
We can check the opened valve of Gravity XFlow on the Fuel Eicas page, and also the fuel pumps (fig 53 and 54)

Fig 52

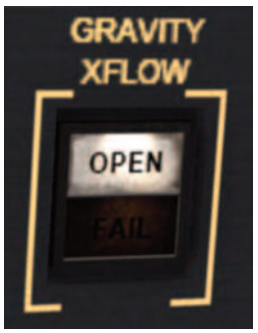


Fig 53

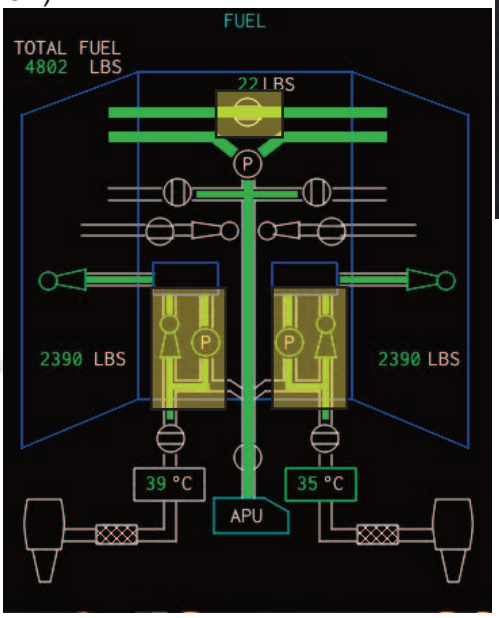


Fig 54

Fig 52

Fig 55

• Hydraulic Pumps. Auto (fig 55)
• Parking brake. On
• Packs for start. Off (by default they are off but is better to check).
• Ignition A (can be B also if you want). Arm.

Ok! here is where the starting the engines process starts. Because we have a clear exit from the parking we do not need pushback service so we can start the engines right now (well we could start the engines also while on pushback but I prefer not. Only because security.

• Ok, we will take a look at the Primary Eicas display. All the gauges will be reading zero values (if you see the ITT are with a value different than zero as on the 56 image is because the plane was loaded after it started the engines before so it has to cold down the temperatures to ambient)

• We press the ARM IGNITION A (or B if we like to) (fig 57).

Fig 57

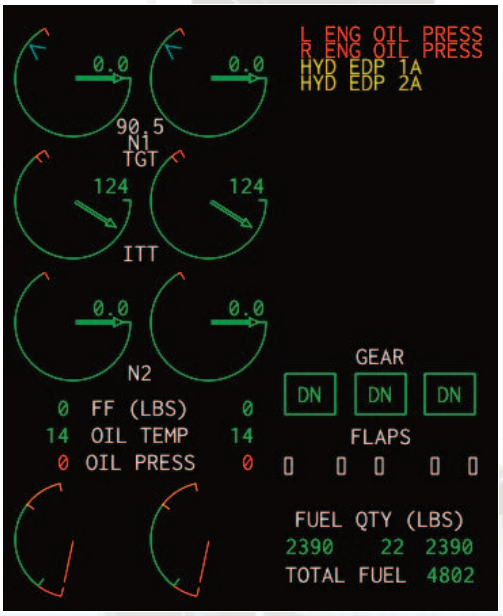


Fig 56

• Now we need to open APU bleed air valves to let the air coming from the APU push the N2 stage of each engine to allow us to start them.
We go to the **10Th Stage** panel and click over the APU LCV and the ISOL buttons to open both valves (fig 58). You can see on the ECS Page of the EICAS how air is bleeding to the engines. If we have both PACKS open then the pressure over the engines would be lower so maybe we could not start the engines. That is because they are off (fig 59)

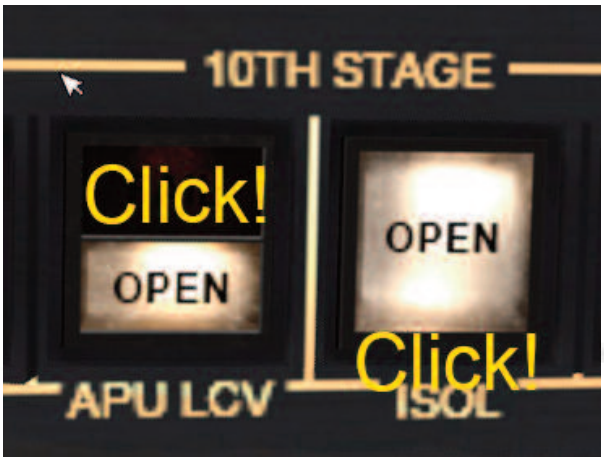


Fig 58

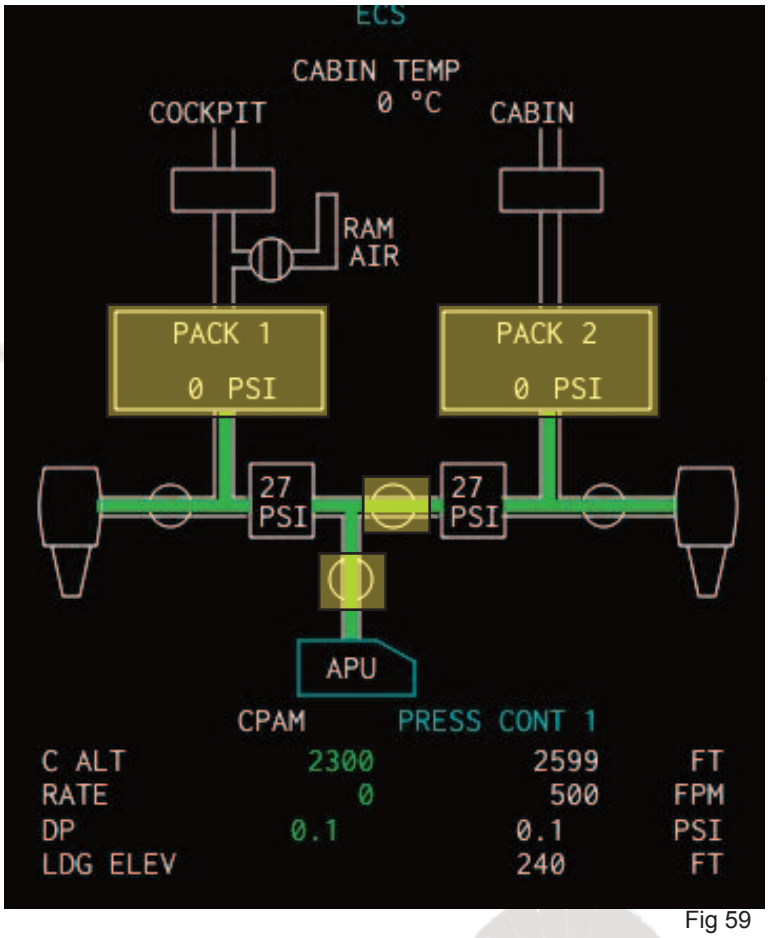


Fig 59

Now we can start the engines.

• First we start with the right engine. We press the START button. (fig 60)
Automatically the N2 gauge in the right engine will start increasing in rpm %. (fig 61)

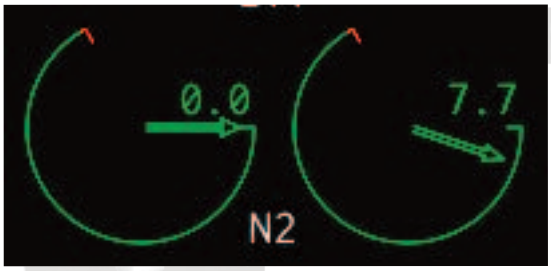


Fig 61

Fig 60

• When the N2 % is over 15, then we can proceed to open the fuel valves for the right engine . You do this pulling the right red lever on the throttle command panel (fig 62).

Fig 62

You will see then, how the N1, ITT and N2 gauges are increasing until they stabilize. Also the Oil Pressure will start to increase. (fig 63)

Fig 63

• Once we have started the right engine, we can proceed with the left one the same way we did with the right, but choosing the left buttons and levers.
At the end the Primary Eicas display would show the gauge numbers like the figure 64.

Maybe you noticed that the oil pressure gauges disappeared and two FAN Vibration gauges appeared. That will happen when both engines are on.

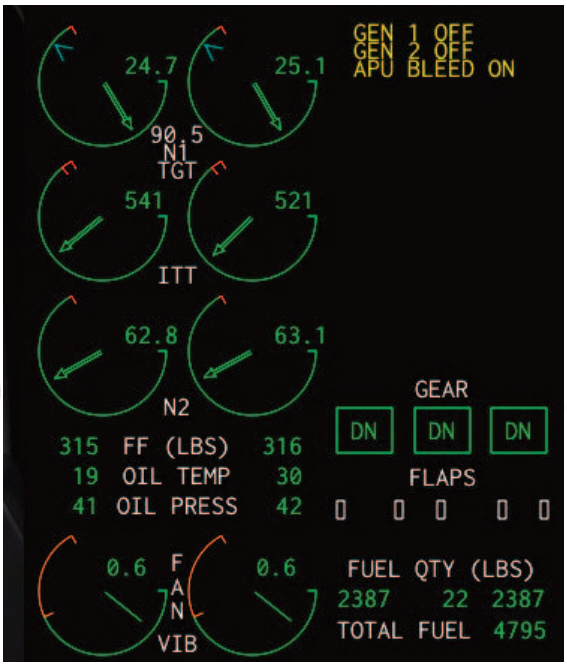


Fig 64

It is very important you don't pull the red levers before N2 15% or so because if you do you will make a hot start.

If you make a hot start then you have to turn that engine off inmediatelly. Because if not it can be fire.
To switch off the engines you can or press down the red lever again or press the STOP button below the START ones.
Stop it and let the ITT cool down.

At last we started the engines!

Cleared to Start Check Complete!

AFTER START CHECK

• Engine generators. On

It is time to connect the engine generators to generate electricity and switch off the APU. We could leave the APU in case of an engine suddenly stop on take off. I think is a good security measure, because we can start quickly an engine if APU is below 13.000 feet. (we also can start it with the air bleed generated by the other engine)

- So we switch on Engine Generators and switch off APU Generator (fig 65).

Fig 65

• Now we turn of the APU just pressing again the START/STOP button, and we close the fuel valve pressing the PWR FUEL button. The APU gauges will disappear from the STATUS page and the label APU DOOR CLOSED will be visible.

• We switch off the APU Bleed Air Valves. We press APU LCV and ISOL to close the valves.

we have done the stop of the APU.

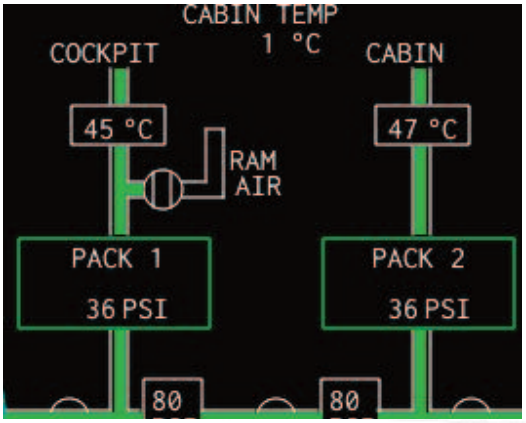


Fig 66

• Ignition A (or B). Off (if we are in continous contiditions we have to press the ign continous.

Fig 67

• Left and Right Packs. On. Yes our friends are having hot in there. Lets refresh them. (fig 66.)
• Anti Ice. As required, Off.
• Probes. Probes anti ice on (fig 67)
• APR. Tested. Armed
• Electronics. Checked. We take a look to the electronics AC and DC on the Eicas page to see if everything is normal (green conditions around)
• Rudder. Chequed pedals motion.
• N/W STRG. Armed

After Start Check Complete!

TAXI CHECK

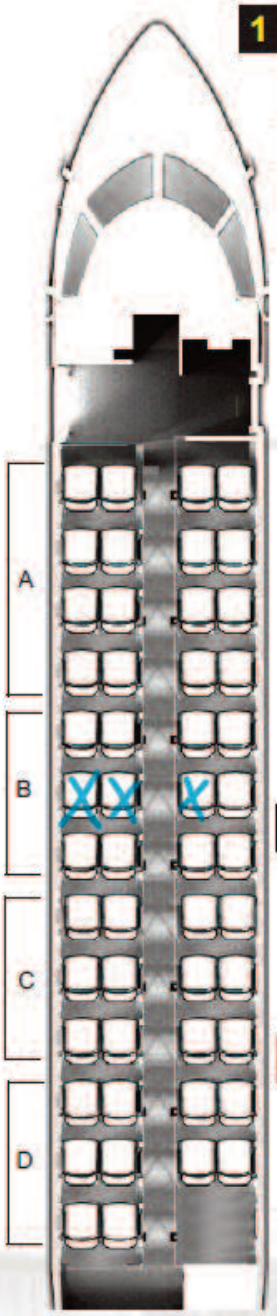
Fig 68

• Flaps. Set 8º.(fig 68)
• Fligth Controls. Cheked. Yoke and pedals move correctly.
• Trim and Stab. Green and setting.

Ok, here comes a difficult one so please pay attention.

TRIMs

For calculing the Pitch trim necessary for take of (and landing) we must go to the page 4 of the pilot handbook. I Recommend you print that page for every flight you make and write down your numbers to make calculations.



1 Weight Calculation

		Nº	Weight (Kg/Lb)
Adult	80 kg / 176 lb X	3	= 528lb
Child	40 kg / 88 lb X		=
Bags	13 kg / 29 lb X	4	= 116lb
Cargo		+	=
TRAFFIC LOAD		=	644lb

Dry Op. Weight +	13,835 kg / 30,900 lb
ZFW (MAX 19,958 kg) (MAX 40,000 lb)	= 31,544lb
Take Off Fuel +	4,800lb
TOW (MAX 23,134 kg) (MAX 51,000 lb)	= 36,344lb
Trip Fuel -	
LW (MAX 21,319 kg) (MAX 47,000 lb)	=

2 Adult Passenger Index Variation

PAX Nº	ZONE A	ZONE B	ZONE C	ZONE D
1	1,6	0,8	0,1	0,6
2	3,3	1,7	0,2	1,2
3	4,9	2,5	0,3	1,8
4	6,5	3,4	0,4	2,5
5	8,1	4,2	0,5	3,1
6	9,8	5,1	0,6	3,7
7	11,4	5,9	0,6	4,3
8	13,0	6,8	0,7	4,9
9	14,7	7,6	0,8	5,5
10	16,3	8,5	0,9	6,1
11	17,9	9,3	1,0	
12	19,6	10,2	1,1	
13	21,2			
14	22,8			
15	23,4			
16	25,0			

Consider each child as 0.5 Adult

3 Cargo (&Bangs) Index Var.

CARGO kg / lb	Index
50 / 110,2	0,8
100 / 220,5	1,6
200 / 441	3,3
300 / 661,2	4,9
400 / 881,9	6,5
500 / 1102,3	8,2
600 / 1322,8	9,8
700 / 1543,2	11,4
800 / 1763,7	13,0
900 / 1984,2	14,7
1000 / 2204,6	16,3
1100 / 2425,1	17,9
1200 / 2645,6	19,6
1225 / 2700,1	20,0

4 Fuel Index Variation

FUEL kg / lb	250 551,2	1000 2204,6	1250 2755,8	1500 3306,9	1750 3858,1	2000 4409,3	2500 5511,6	2750 6062,7	3000 6613,9
Index	0,8	3,4	4,0	4,6	5,1	5,4	6,0	6,2	6,3

FUEL kg / lb	3250 7165	3500 7716,2	3750 8267,3	4000 8818,5	4500 9920,8	5000 11023,1	5500 12125,4	6000 13227,7	6489 14305,7
Index	6,3	6,3	6,2	6,0	6,8	9,4	13,4	14,8	17,9

5 Index Calculation

Pax A	Pax B	Pax C	Total A
	+ 2,5 +		- 2,5

DOI	Pax D	BAGS	CARGO	Total B
36,84	+	+ 0,8 +		- 37,64

Total A	Total B	LIZFW
5	- 37,64	- 32,64

6

LIZFW	FOB T/O Fuel Index	LITOW
32,64 -	5,6 -	27,04

LIZFW	LDB Landing Fuel Index	LILW
32,64 -		

Ok.. Now the explaining:

1 On this area we will put (in pounds in this example) the number of passengers we have. Because we have 3 passengers then I multiply the 3x176lb=512lb.

• We also have 4 bags on the cabin. 4 x 29lb = 116lb

• We make the sum of both numbers = 644lb. If you remember on payload when we were setting the amount of fuel and payload weight we put 700 (because cannot input exact numbers)

• we continue with the arrow indication and we sum 644 + dry Op Weight (30,900lb) = 31,544lb

• Next we sum that to the Take of fuel, that if we look on the fuel eicas panel it will be 4800lb (I made a little mistake here because we have to subtract the fuel burned on Taxi and APU.. but in our case because the airport is small and we should not be too much time with APU then we can leave that number. But better next time do it correctly).
So it is 36,344 lb.

2 • Now we ask our flight attendance to tell us where our friends are seated. She mark their seats on the paper so we can continue calculating. They are on zone B, so because they are 3, the index to the passengers will be 2,5.

3 • The weight of the bags is 116lb so, the index is 0,8.

4 • The take off fuel index is between 5,4 and 6 (should be 5,4 because fuel burned on taxi and APU but we leave the way it is on the picture) so.. it should be 5,6.

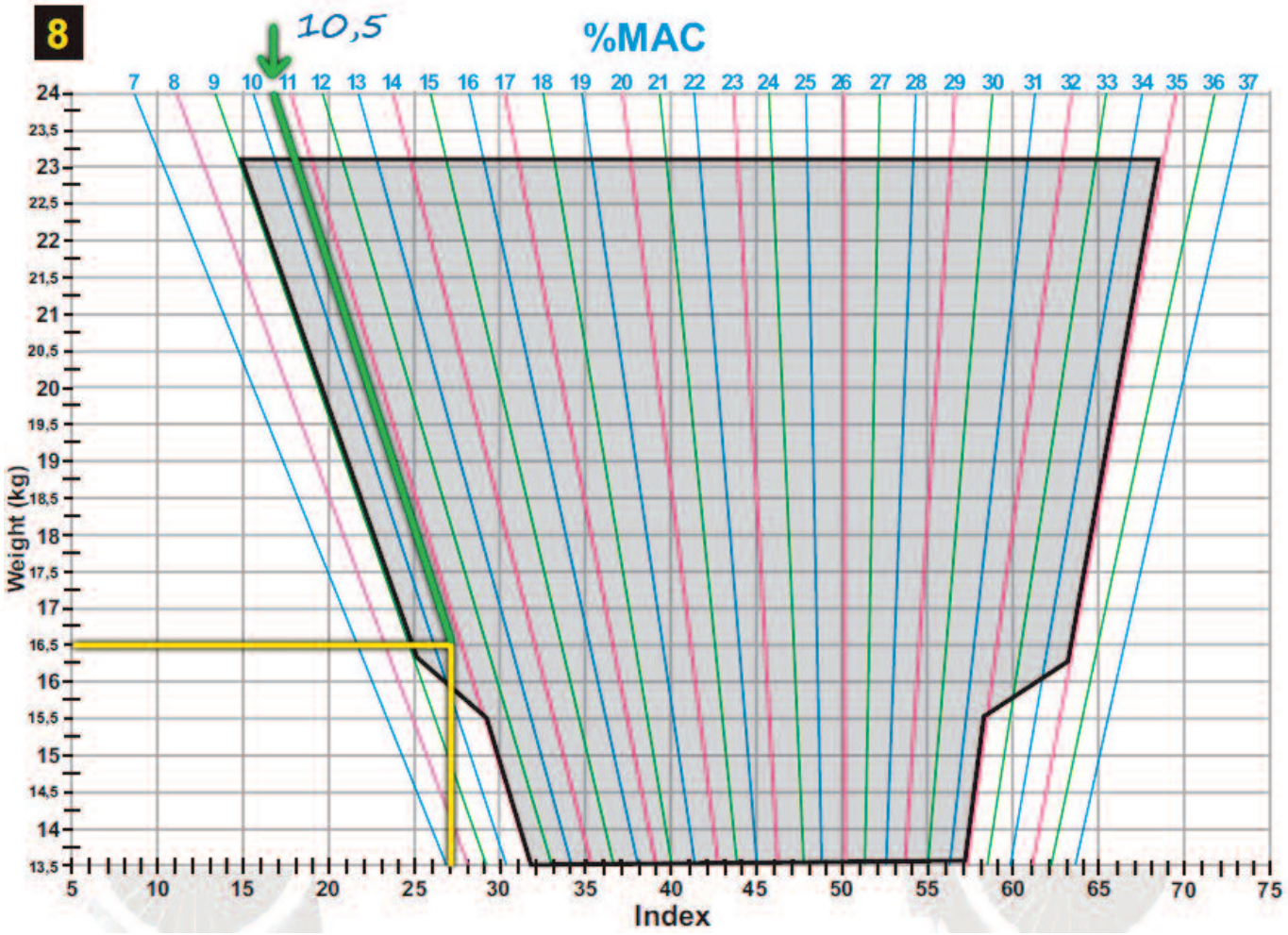
5 • Make the index calculation just putting numbers on boxes.. On the Total you can see that it should be -32.64, but we take the positive number. So LIZFW is 32,64

6 • With the numbers we had before we have the LITOW 27,04

Later when we know how much fuel have we burned in flight, then we can calculate the LILW.

With the LITOW (27,04) we can calculate the Pitch Trim setting.
We go to the %MAC graphic on page 5 of the Pilot Handbook and calculate the %MAC.
First we need to calculate in Kg the amount of TOW (36,344lb), that going to internet it is

16,520 Kg



So, we cross the value on the vertical of 16,520 kg, with the value of the index of 27,04. And from that point we draw a parallel line with those around at the top of the graphic. And there we got the %Mac. In our case 10,5.

Stabilizer Trim setting for flaps 8 or 20 Takeoff

%MAC	9	10	12	14	16	18	20	22	24	26	28	30	32	34	35
TRIM	8,2	8,0	7,7	7,4	7,1	6,7	6,4	6,1	5,8	5,4	5,1	4,8	4,5	4,2	4,0

Ok.. we are almost there. We carry the value of 10,5 to the table Stabilizer trim setting for flaps 8 or 20 takeoff.. and we got it.... In our case:

7,9

So we just move with your hardware joystick (you have to map a button of your joystick to the trim pitch up and other for trim the pitch down) button trim to show on STATUS page that number on the STAB Trim tape. (fig 69)
Too much calculation for such a little number? well that is what pilots do on real life. Well maybe if you are piloting an Airbus all calculation is given by the FMS with just pressing some buttons, but I like more this way. It is fascinating to learn these things.

(I have to thank you a great real pilot of the CRJ that showed me all about this! Thanks Ed!)

we can continue....

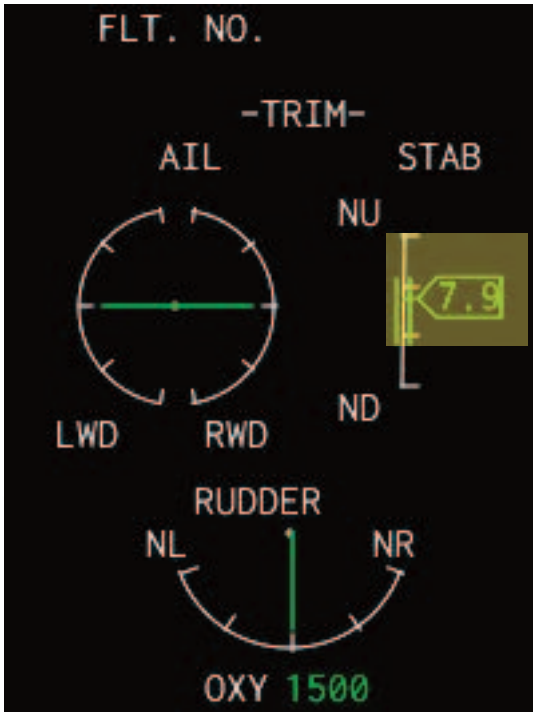


Fig 69

- Thrust Reversers. Armed. (fig 70)

Fig 70

- Fligth Insturments. Cheked

Here we will look the Autopilot command panel again to see if everything is like it was programmed before.
But also we are going to set the VSpeeds on the PFD.

Here we have to remember our TOW. It is **36,344lb** as calculed on the %Mac calculation made before.
Now we have to go to the **Take of Performance data tables** on the pilot handbook to calculate the VSpeeds.

16,500 kg - 36,376 lb

FLAPS	8º	Vspeed Corrections Altitude (1,000')	20º	Vspeed Corrections Altitude (1,000')
		ºC/ºF SL 2 4 6		ºC/ºF SL 2 4 6
V_1	115	-40/-40 00 01 02 03 0/32 00 01 02 03 10/50 00 02 02 04 30/86 02 03 04 05 50/122 05 06 07 08	104	-40/-40 00 01 03 04 0/32 00 01 03 04 10/50 00 02 04 04 30/86 02 03 05 05 50/122 05 06 07 08
V_R	119	-40/-40 -01 00 01 02 0/32 00 01 01 02 10/50 00 01 02 03 30/86 02 03 04 05 50/122 04 05 06 07	111	-40/-40 -01 01 02 03 0/32 -01 01 02 03 10/50 00 02 03 04 30/86 02 03 04 05 50/122 05 05 06 07
V_2	131	No Correction	121	All Temp 00 00 00 00
V_{FTO}	156	FL200 161 ← FL250 170 ← FL300 178 ← FL350 188 ← FL410		

We are going to take off with 8º flaps, because we are not so heavy on this flight.
Ok, so we will have:

V1 : 115 knots
Vr : 119 Knots
V2 : 131 Knots
and Vfto: 156 Knots

With no correction because we are at 20ºC at an altitude of 791 feet (that is the altitude of Salamanca Airport.

So we have just to copy those values to the Vspeed bugs on the plane. They are going to be only references to us. But is good to have them.
Ok.. lets learn who you can change the speed bugs:

• We have to go to the left side panel and play with the **SPEED REFS** knob. First we are going to check that the bigger knob is situated on the **TGT** position to set the VFTo (or whatever speed you want to set as target can be whatever speed you want). If we would like to modify Vspeeds then you should drag the rotary to the **VSPDS** position. (fig 71)

• Now we must rotate the thin rotary to set the speed we want (fig 72). There will be a mark over the vertical speed tape labeled T (others will be 1, 2 and R) (fig 73), and you can see the number you are modifying on the PFD (fig 74)

Fig 71

Fig 72

Fig 73

Fig 74

• To set the Vspeeds you have to turn the fat knob to the VSPDS as said, and then start tuning them with the thin rotary like the Vt speed, but when you have finished with one you have to select next vspeed with the **SEL** button over the rotary (fig 72). The sequence will be V1, Vr and V2

Now we can continue...

• FMS. Autotune (radio)
• BTMS. Checked

TAXI CHECK COMPLETE!!

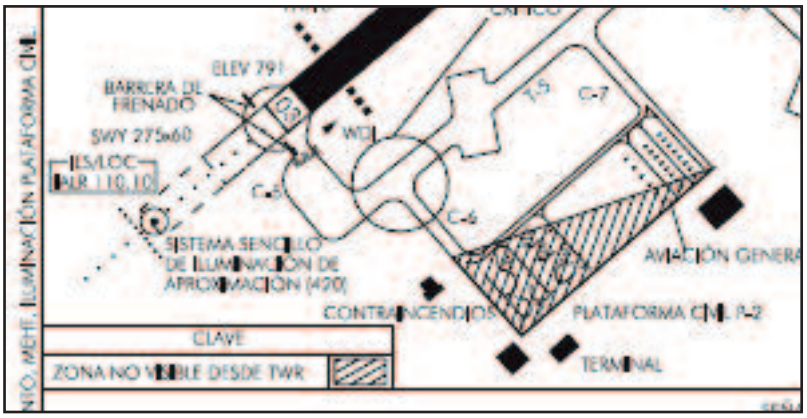
We are ready now to call back to Ground to ask for permission Taxi to holding point of rwy 03.

- IB032
- Adelante IB032
(- Go ahead IB032)

- Estamos listo para rodar, IB032
(- We are ready for Taxi, IB032)

- Muy bien. Proceda a punto de espera de la 03 desde su posición por C6 - Tango - C5, cuando llegue contacte con torre en 118.100. Responda en 5372
(-ok, proceed to rwy 03 holding point from your position via C6, Tango, C5. when you arrive contact tower on 118.100). Transponder in 5372

- C6,T,C5 hasta punto de espera de la 03. Llamaremos torre en 18.100 cuando lleguemos IB032
(-C6, T, C5, to 03 holding point. We will call tower on 18.100 when arrive, IB032)



Ok, from our position we can see on the map the path the plane has to taxi to reach HP of rwy 03.
We have Taxi clearance so we continue with procedures.

• Taxi light. On
• Navigation light. On.
• Transponder set. Set on 5372.

So we go to the Radio panel, press 4LK function to give us the possibility of changing the ATC number, and with the Rotaries, we set
the Transponder to 5372.
We must to be sure that the transponder is on Standby (fig 75)

Fig 75

• Parking Brakes. Off

So we apply a little bit of thrust on both engines until the plane starts moving, and control turns with both pedals. LETS ROCK AND ROLL!

When we reach HP of 03 we tune the tower on the radio and call.

- Torre de Salamanca, IB032
(- Salamanca Tower, IB032)

- Le veo, Puede entrar y mantender, IB032. Transponder on Charlie.
(- I see you. You can entry and hold, IB032. Charlie mode)

- Entramos y mantenemos, IB032
(Entry and hold, IB032)

• Now we press 4RK on the radio to change from Standby to Charlie mode (R on Cyan)
• We put Emergency lights on.
• Landing lights on and Taxi lights off.
• Strobe lights to on position.

• we set configuration of two popup screens (PFD and MFD)

Trick: if you want hide the frame of the displays you have to go to JRollonPlanes folder and inside, go to CRJ200 folder, and rename the file DisplayFrame.tiff to DisplayFrame.tiff.off)

- IB032 permiso para despegar. Viento en calma QNH 30.22. Llame en el aire.
(- IB032 you have takeoff clearance. Wing calm. QNH 30.22. Call on air)

- Llamaremos en el aire, IB032
(- We will call on the air, IB032)

When I was following tutorials like this one in most cases they said, “once you reached this point press pause mode if you need it”. And really I think is necessary in most of cases.
But the main idea is once you are in the air, you fly the plane manually, and trim it, and when you see that the plane is just climbing without touching the yokes, then you can process with autopilot modes.

We just take a quick look that everything on autopilot is ok.
But there is one little thing we need to make before pushing the throttles to full forward, and it is just that. You don’t need the throttles to be pushed to full throttle to take off. If you do every flight you make, soon you won’t have engines working.

So, we go to Pilot Handbook and look for Reduced Thrust Take-off setting %N1 in page 17. We are at 790 feet more or less and the temperature is 20º, so we will need a thrust limit of 90.8 (I set on the screen 90.5 but it was enough ;))

Now we need to set that value over in the CRJ.
So we go to the FMS and press the PERF button to go to the Performance Init page. There you will only find a Thrust limit option (on future updates we will try to put more options).
Get inside that Thrust Limit page, and then we just put 90.5 on scratchpad, and press 1RK to input on TGT area. Inmediatelly a <ACT> label will appear (fig 76)

Reduced Thrust Take-Off Seting, %N_1
(Two Engine Operation)

TEMP °C / °F	Pressure Altitude SL	1000'	2000'	3000'	4000'	5000'	6000'	7000'	8000'	10000'
-40/-40	81.2	81.6	82.0	82.4	82.8	83.3	83.8	84.3	85.8	85.7
-35/-31	82.0	82.5	82.9	83.3	83.7	84.2	84.7	85.1	85.6	86.6
-30/-22	82.9	83.3	83.7	84.1	84.6	85.0	85.5	86.0	86.5	87.6
-25/-13	83.7	84.1	84.6	85.0	85.4	85.9	86.4	86.9	87.4	88.4
-20/-4	84.5	85.0	85.3	85.8	86.2	86.7	87.2	87.8	88.3	89.3
-15 / 5	85.1	85.7	86.2	86.6	87.1	87.6	88.1	88.6	89.1	90.2
-10 / 14	81.1	86.6	87.0	87.5	87.9	88.4	88.9	89.5	90.0	91.1
-5 / 23	86.9	87.4	87.8	88.3	88.8	89.3	89.8	90.3	90.8	91.8
0 / 32	87.8	82.2	88.6	89.1	89.6	90.1	90.6	90.1	91.7	92.8
5 / 41	88.6	89.0	89.4	89.9	90.4	90.9	91.4	92.0	92.5	91.7
10 / 50	89.3	89.8	90.2	90.7	91.2	91.7	92.3	91.2	92.2	91.2
15 / 59	90.1	90.6	91.0	91.5	90.8	90.8	90.8	90.8	90.8	90.7
20 / 68	90.8	91.4	90.5	90.4	90.4	90.4	90.4	90.4	90.3	90.1
25 / 77	90.0	90.0	90.0	90.0	89.9	89.9	89.8	89.7	89.6	89.4
30 / 86	89.5	89.4	89.5	89.4	89.3	89.2	89.1	89.0	89.2	
35 / 95	88.6	88.6	88.6	88.6	88.6	88.5	89.0	89.5		
40 / 104	87.8	87.8	87.8	88.1	88.7					
45 / 113	87.0	87.6	88.0							

Fig 76

But also a cyan mark and the label TGT between the two N1 gauges will appear on the Primary Eicas display (fig 77).
The engines will try to maintain that throttle limitation.

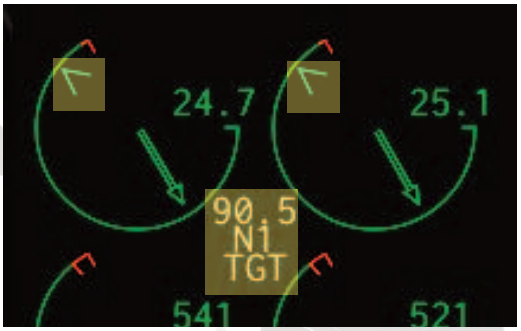


Fig 77

Ok, ready to go!!

• Engage Full throttles (they won't go so much farder than the limitation set).
The plane starts to roll over the runway and we gain speed.

• Once we are over 40 knots the speed tape will start to move.
we will see the bugs of Vspeeds coming.

• When we cross the Vr speed we pull gently the yokes and the plane will start to put the nose up.

• With an eye over the vertical speed indicator when we are above 100 feet or so and we have a positive rate of climb we put Landing gear lever in Up position.

• All the time we are pressing our pitch trim button on the yokes if we needed. If to maintain the climb we have still to pull the yoke then we pitch up the plane.
If the plane starts to climb with a very high rate of climb (+2000 fpm) We pitch down the trim.

• Once we have reached the Vt speed we put throttles back until we maintain that speed.

• With the yokes on center and the plane climbing, we go to the autopilot command panel and press the Vertical speed mode. You set a desired vertical speed of +1000 fpm.
(or you can press Speed mode and once you press it it automatically will match the speed bug on the PFD to the actual speed.)

• Because still we didn't activate the the autopilot the plane won't do anything. Only Flight Director will move.

• When you see that the horizontal flight director is over the cero altitude horizon, just press the Autopilot button. The autopilot will fly the plane.
Be careful that the plane don't pitch down. Could happen if you don't do something good.
All of these don't have to be done quickly, just constantly.

Ok, you have the plane flight with autopilot mode following heading 30º and climbing to 4500 feet. We are going away from the route but don't worry.

• Now set Nav Source to FMS source (as said, if this is the first time you change the Nav Source with the Nav Source Knob, you have to drag far away first to the right until it changes, then you can return to the left until you see FMS on the PFD (fig 78)

Fig 78

• You should have 15x knots and climbing to 4500. Now it is time to put flaps to cero.

• Now we have the FMS source is time to catch the route. We first are going to arm the Nav mode. Just press the NAV button on the autopilot panel and the FMS route will be armed showing it on the PFD.
Still is the Heading mode the one active in your plane (if you activated NAV mode away from the route). So, we must point the plane directly to intercept the route at an angle between 20º and 60º or so.

• we turn the HDG knob on the autopilot panel and point to intercept the route.

the plane will start turning (to the right in out case) (fig 79)

Fig 79a

Fig 79

• Then, near the route the plane will change from HDG mode to FMS mode (shown on the PFD) and the plane will start its turn to the left to catch the route (fig 80)

WE ARE ON ROUTE!

Fig 80a

Fig 80

Now is time to call Salamanca tower.

- IB032 en el aire
(- IB032 airborn)

- IB032 contacte con centro en 132.55
(IB032, contact Madrid Center on 132.55 (they will be changing in the route but we are going to stay here once)

- 32.55, muchas gracias, IB032
(-32.55 thank you very much, IB032)

Now on the COM radio we tune that frequency and call. There are a few traffics there, so we need wait a little.

- Madrid Centro, IB032
(Madrid Center, IB032)

- Madrid centro, IB032 contacto radar, prosiga ruta según plan y ascienda a nivel de vuelo 240.
(- Madrid Center, IB032, radar contact. Proceed with route as filed and climb to FL240)

- Ascendemos a 240, IB032
(Climb to 240, IB032)

Now is the time to climb but at this time we are going to do it with the Speed mode. You are 0 fps level, so we proceed:

• We set 24000 on the altimeter (still the altimeter is On. It changed to green ALTS label on PFD when it reached the 4500 feet).

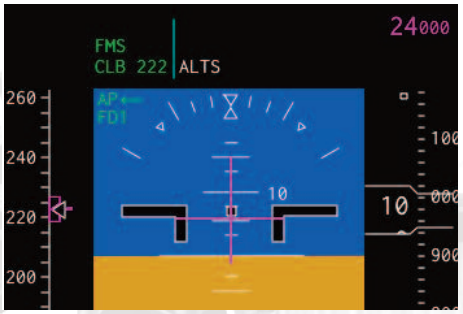
• Next, we press Speed mode. The speed bug will reset at the same speed the plane has. Now we turn the Speed knob to the desired climb speed. 222 should be good (below 250 under 10,000 feet).

Fig 81

• Nothing has changed but green CLB 222 label on PFD, and ALTS on white, armed with the right (fig 81)

• How do we start climb? Easy just push the throttles. The plane will have more push so because the speed mode is selected and the plane has to maintain that speed, the only way doing it is climbing. If we use for example, The speed mode for descending, then we should do the opposite. Just pull the throttles, so the plane to maintain the speed have to pitch down. Easy isn't it?

So you control pitch angle with the thrust of engines.
ENJOY!



The plane is climbing

We cross 10,000 feet so it is time to set the altimeter to standard 29.92. It is easy the only you have to do instead of tuning to 29.92 is just press the baro knob.

(you have noticed that I am not putting too much pictures on this last explanations. Well I think you already are becoming familiar with the controls and systems and you don't need any information about it, but if you still needed the Manual is a good solution for finding what you are searching. Also I am not following step by step right now the checklist. They are "there" and you can consult them as you please)

The plane is close to **UNSOL** and it is going to start its turning to next waypoint **DISKO**

• We turn off Landing lights, and put passenger belts to off also, so these folks can move around and visit our to the cockpit.

• We are going to release the CRJ from the Thrust limit. To do that, we have to go to the thrust limit page on the FMS again, and on a clean Scratchpad we press the DEL button. DEL@ will appear on Scratchpad. (fig 82)
When we see that DEL@ function on scratchpad we can delete somethings, like this thrust limit or waypoints on the LEGS page (only Legs page)

The only thing we need to do to delete the limitation is just press 1RK. TGT area will be again blank and we will have full thrust if we desire it.

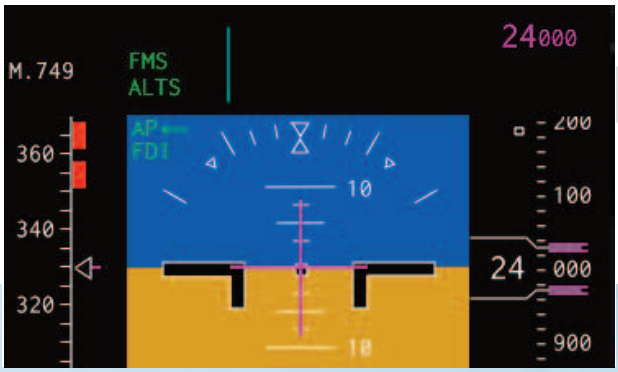
Fig 82

We are near DISKO and we should be close to our final altitude, the plane is still climbing so we must take care of it.

• 23,000 feet and the 1000 feet alarm advice sounds. We are close. Put one hand on the throttles.

• Near 24,000 and the plane starts to pitch down to level it. You will see how the Magenta speed trend starts to scale up, it is time to start relaxing the throttle of the plane, but let it continue increasing the speed.

• 24,000. The plane leveled and speed increasing. We are going to reach 0.75 Mach (the speed in Mach is over the speed tape (fig 83)



• Be careful with the red squares that appear on top of speed tape. The plane if it is too close to them will start to pitch up to be at a safe speed and not break.

Fig 83

Time to have that coffee or refreshing drink!
But don't relax too soon because still we have to make several things.

The first we need to do is know which is the active runway on Valencia. So we call Madrid center to tell us.

Fig 84

- Madrid Centro, IB032
(Madrid Center, IB032)

- IB032 adelante,
(-IB032 go ahead)

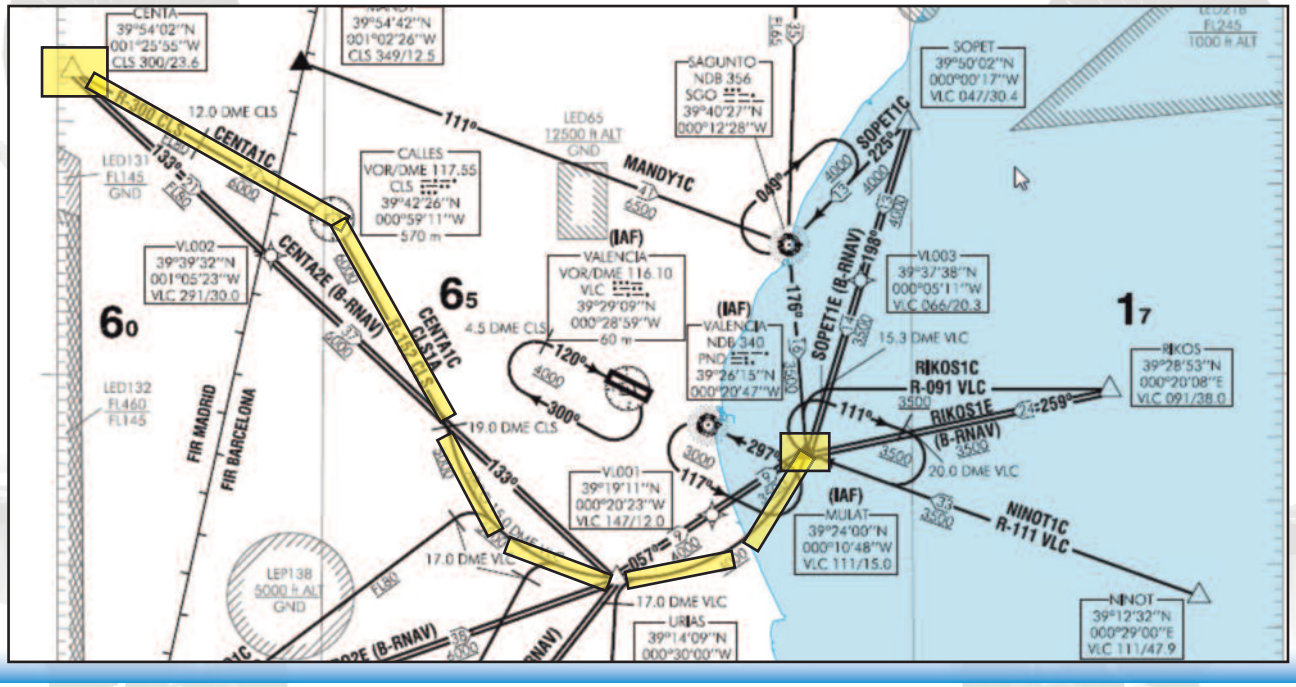
- Si. ¿Nos podría decir la pista activa de Valencia?
(-ah, May we know the active runway on Valencia?)

- si, claro. Es la 30.
(-Sure!, it is rwy 30)

Ok, so now we can choose the STAR arrival at Valencia. Ah!! you forgot we didn't input? Well this is the best moment I think, because we are approaching and we can put the STAR right in a minute.

• We go to the DEP/ARR page pressing the same button on the FMS (fig 84). Because on this route there wasn't any SID option for LESA, just pressing the DEP/ARR button will change to Arrivals with only one press.

• When you choose SIDs the first you have to do is choose the runway first and then the SID name.
In this case is the opposite. You have to select **first the STAR** then the approach.
So because our first point of the STAR (that is the last point of our route) is CENTA, we open our STARs arrivals to LEVC.



So we are going to choose **CENTA1C**.

• We go to the FMS and search for the STAR CENTA1C

• Because it is not on the first page of Arrivals, we have to press NEXT PAGE button. As we can see there are 6 pages of STARs we can choose.

Fig 85

• We find **CENT1C** So we press the Left Function Key next to that option. All will disappear, but don't worry, is because we are on a different page than the first one and the rest of STARs disappeared once you chose one. We must press PREV PAGE button, until we are again on PAG 1/2 in this case (fig 85). CENT1C<SEL> will be selected on first page.

If you would like to choose other STAR, maybe because you miss, or whatever, then the only you have to do is press 1LK (the Left Function Key next to the selected STAR, and all the possibilities will appear back again. This also is possible on the approaches, transitions and SIDs.

• Now we must choose the Approach. We want the ILS of 30. So Just press 4RK will select that one.

Fig 85

• And now only appears one Transition point (could be more) We choose MULAT (fig 86).

• Now, same we did when we check the route, we are going to do it again with the STAR. It is important to introduce the STAR before the last point because once selected it will be active.

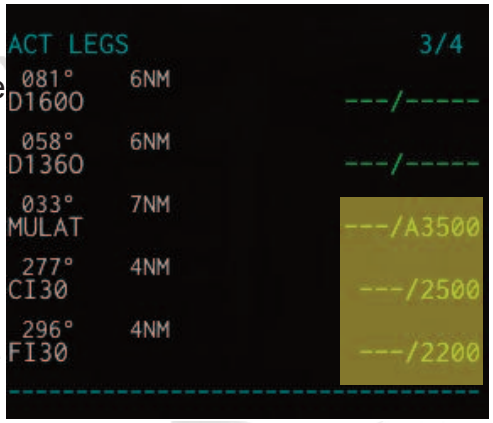


Fig 86

• We go to LEGS page and see all the points. We can see there if the points are correct making a comparison between this and the map. But there are some Dnumbers points that we don't recognize.
Also we can see altitude limits that the plane must follow (fig 86).

• Because those "estrange" points still we don't know if they are correct. Looking at the distances it seems that are ok, but we are going to go to the full circle mode on the MFD to navigate through the STAR, the same way we did with the route when we were on the ground.

• We check all the points with the arrow buttons on the FMS and make a zoom on the MFD to see all the new routes clearly. We see that is perfect, and that also loaded the Go Around procedure in case of needing it (fig 87)

• We go back to the ARC mode in the MFD and continue our travel.

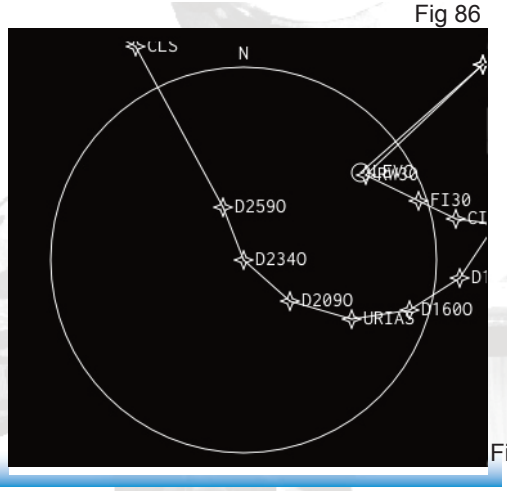


Fig 87

We are going fast and we are going high. Soon we will need a descent.
This plane don't have (still) VNav advisory so we have to calculate when make the descent.
There is an easy formula to do that.

Distance from altitude to reach = (Altitude Difference/1000) x 3

Well it is easier than imagine. We are going to put an example, with this flight.
We are at 24,000 feet and looking at the STARs map we need to be above 6000 feet between CENTA and CLS. So we choose to be at 10,000 over CENTA.

When should we start our descent to reach CENTA at 10,000 feet? Easy:

Altitude Difference = 24,000 - 10,000 = 14,000 (we need descent 14,000 feet)
14,000/1,000 = 14
14 x 3 = 32

we need start our descent 32nm from CENTA.

And the descent rate needed? Easy formula also:

Descent rate needed = (Ground Speed / 2) x 10

We will see our ground speed near those 32 nm to CENTA.

Ok, but there is no instrument that show "your plane is xx nm from CENTA".. so we have to calculate (FLY) again.

• Go to LEGs page. There you will see distances from point to point and distance from next waypoint to your plane.

As you can see on figure 88, we are 18 NM from BENED, then we are:

Fig 88

8nm (from BENED to PRADO) + 30nm (from PRADO to CENTA) + 18nm (from our plane to BENED) = 56 nm

So when our plane will be 32 nm from CENTA? that is our decending point? Easy...

When we are 2 nm from PRADO

Because 30 from PRADO to CENTA + those 2 from the plane at that moment to PRADO, makes 32.

So the only we need right now is program 10,000 over the altitude in the Autopilot command panel, and wait the plane be 2nm from PRADO.

• Before reaching those 2nm from PRADO we have read the Ground speed our plane has (fig 89)

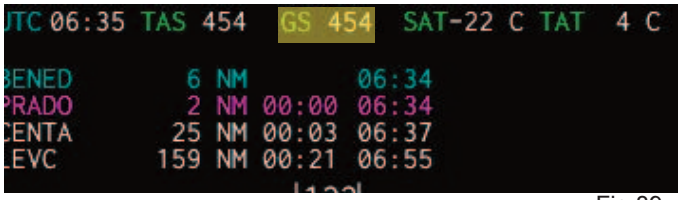


Fig 89

We can see on the top line of the MFD that our plane is flying at 454 Knots, so we remember the formula:

Descent rate = 454 / 2 = 227

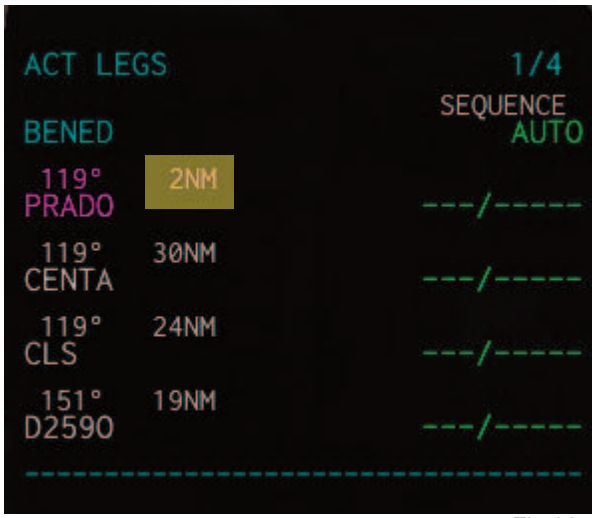


Fig 90

227 x 10 = -2270 fpm

So, when we are 2nm from PRADO (fig 90) we just press Vertical Speed mode, and input **-2.3** (fig 91)

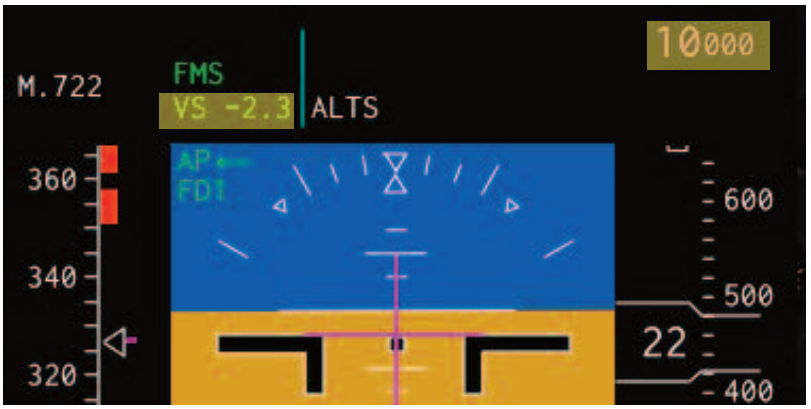


Fig 91

The plane will start its descent to 10,000 CENTA, but if we change the ground speed (and it will be changing) we must redefine our descent rate. Of course also we have to control thrust to not overspeed, but if we just make the easy formula looking the ground speed and the VS indicator, then we can reach more or less 10,000 feet over CENTA (it is not necessary to reach that altitude. The only we need to do is not be below 6000 feet. But the more we descent, the less we have to descent later).

- IB032?

- IB032, adelante
(- IB032, go ahead)

- IB032 Parece ser que tenemos mucho tráfico hoy en Valencia. Por favor le rogaría que hiciera una espera en CLS.
(- IB032, it seems that we have a lot of traffic today in Valencia. Please, make a holding at CLS)

- Sin problema. ¿De cuanto será la espera?
(-No problem. How long will be the holding?

- No creemos que mucho. Unos 10 minutos bastarán
(-Not long. We think 10 minutes will be enough)

- Recibido. Haremos una espera en CLS. IB032
(-Roger. We will make a holding at CLS. IB032)

Ouch!! A holding. Well we are going to dance a little!
So we must prepare the holding. Still we are 34NM from CLS so we have time.

Fig 91

• First of all we must open the **HOLD page**, pressing the HOLD button (fig 92). (in the image you can see we have a DEL@ label on Scratchpad. We must clear the Scratchpad so we press again DEL button).

• Now we can make the holding right where the plane is pressing 1LK (but we don't want that) or just copy CLS from the list (if it is not on the page, then you can navigate through pages with NEXT PAGE and PREV PAGE buttons.) pressing 3LK (or the left function key that is near CLS waypoint).

• Once we have pressed it CLS will appear on Scratchpad. the only thing needed is just press 6LK, so the holding will be programmed over CLS (fig 92) and the icon of Holding (fig 93) will appear over the point we chose on the MFD (direction of holding will be the same we got from the route)

Fig 92

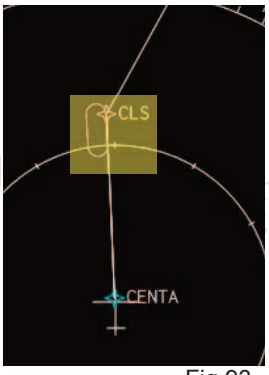


Fig 93

• We can choose between doing the holding to the left or to the right. We are going to choose the default option. To the Left, so we don't have to press anything.

We are descending and everything is going smooth. we are close to CLS and almost at 10,000. We have reduced thrust and even put a little of spoilers to have near 250 knots, we have changed our final altitude to 6000 feet (fig 94)

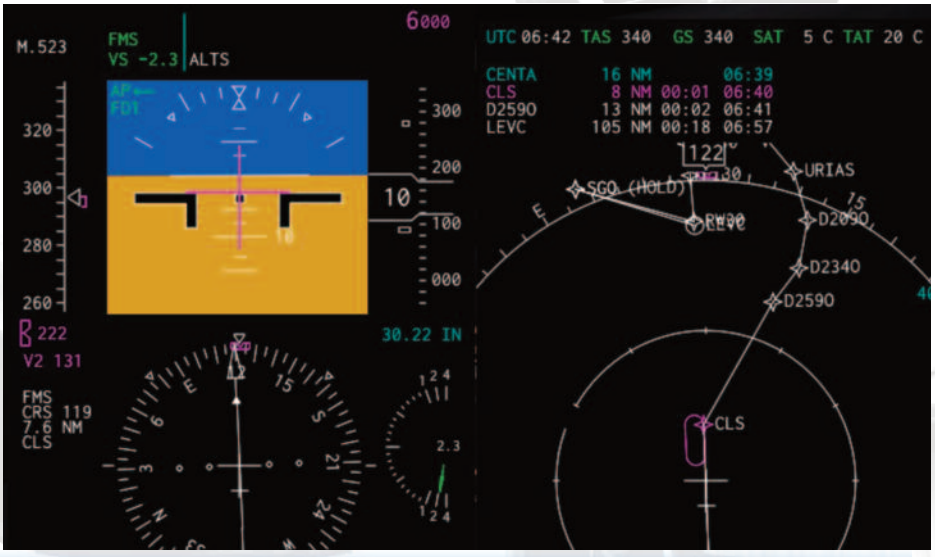
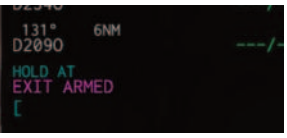


Fig 94

We are at CLS and the plane starts its holding turn to the left, and the plane is at 6,000 feet. Everything is going perfect. (fig 35)

Fig 95

We expect 10 minutes of holding so, if every Holding should be 4 minutes to complete, then we should make 2-3 turns...



We have made 2 turns and the plane is starting the third turn.

- IB032, puede continuar ruta.
(-IB032, you can continue route)

- Procedemos de nuevo a ruta. IB032
(-We will go back to route. IB032)

So we must ARM the exit. We go to the Holding page on the FMS and we press 6LK near Exit. It will appear a EXIT ARMED in magenta. (fig 96)
The plane will proceed to make the full third turn before exiting the HOLD pattern, because we armed the exit once we passed third time CLS.

Once we are close again to CLS we go back to course and the plane starts a nice turn to the right.

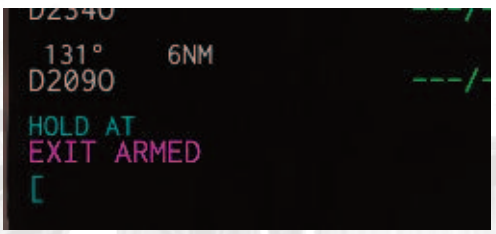
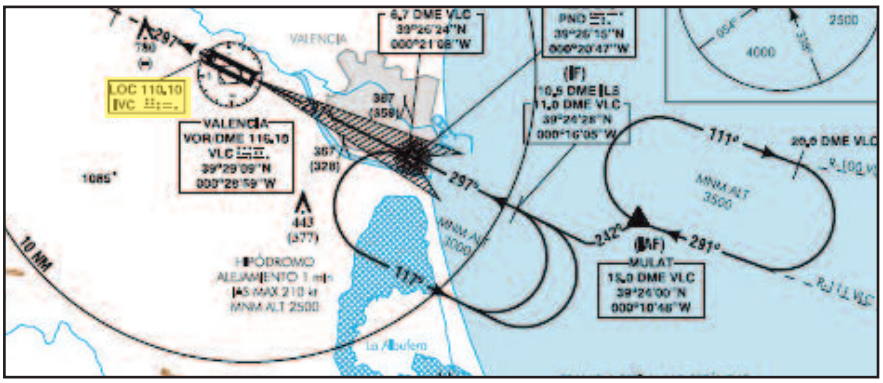


Fig 96

It is time now to configure the ILS approach.

• First we need to do is tune the NAV1 (or Nav2) radio to the ILS frequency, that is 110.10 as we can read on the Approach map of runway 30 in LEVC.



• But remember we have the autotune function on the FMS, and we are still far from Valencia. So we must set in MANUAL mode the NAV1 radio.
We press 4LK and the MAN will be illuminated in cyan colour. We can now tune the NAV1 (if it is on AUTO and we try to tune it automatically will change to the most near radio aid) (fig 97)

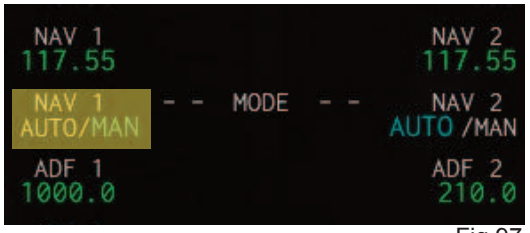
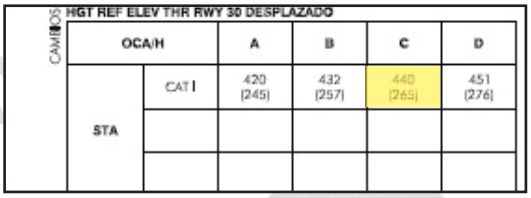


Fig 97

• We can now input the 110.10 frequency on NAV1 inside the radio page in the FMS. We have just to input to the scratchpad 110.10 and then press 3LK.

• Now we are going to set the decision height. If we read the approach map, below we can see it.
It is a C class plane so we read 265, so we must input 265 on Decision Height instrument.

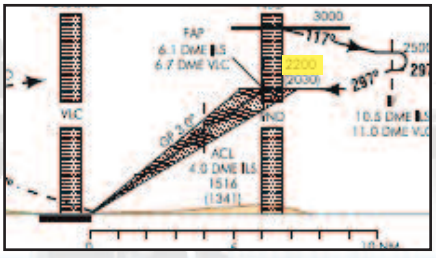


• First of all we must show the DH label on the PFD. We go to the left panel, and press the DH/MDA thinner knob (fig 98)
Immediatelly the DH with a number will be visible. We have just to rotate the thin knob and adjust the altitude to 256 (fig 99)

Fig 98

Fig 99

We are descending to 5,000 feet (our target is a progressive descent to 2,200 feet where the Glide Slope will be activated) (fig 100)



In these cases where we have made a holding, make a direct after exiting the holding pattern is unusual, but this time we are going to make a DIRECT to the IAF (MULAT) to learn how to do it.

• The way to do it is deleting points on the LEGs page. We have to delete points between MULAT and next active point the plane is going the plane (it is not good to delete that active point, because once deleted the course is going to change immediatelly to the next not deleted active (remember here there is still not EXEC function programmed)

• Because we are flying right now between D2590 and D2340 (fig 100), to program a direct to MULAT we could do it two different ways:

Fig 100

1. We write MULAT on Scratchpad and just “paste” (press the left function key) that is next D209O. That way after D234O will be MULAT. But still the “other” MULAT programmed before still will be on the legs page, so if we just do this “paste” only, the plane would go this way:

D234O - MULAT - D209O - URIAS - D160O - D136O - MULAT

So we should delete the points after the first MULAT: D209O - URIAS - D160O - D136O - MULAT.

2. Just delete the points between D234O and MULAT. D209O - URIAS - D160O - D136O. How we do this?. Easy. Just press the DEL button and when on the Scratchpad appears **DEL@** you have to press the Left Function Keys that are next to D209O, URIAS, D160O and D136O in the order you want. Every point deleted you have to press again the DEL button and repeat the process.

When you do that, the route will be like the figure 101, and the plane will start its turn to MULAT when reaching D234O.

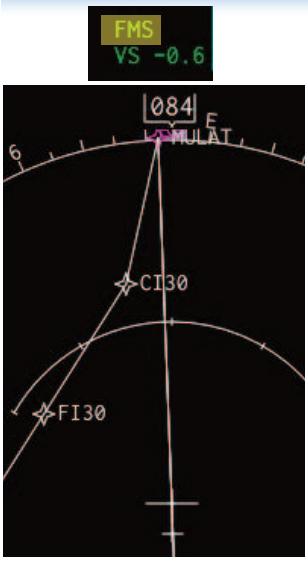
Fig 101

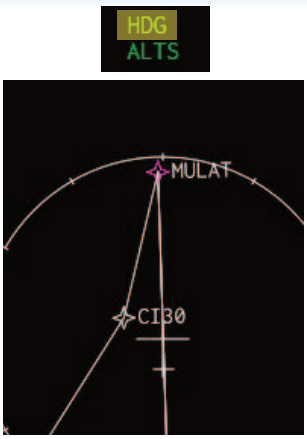
We should be in MULAT at 3,500 feet. so we program the Altimeter to that altitude and start the descent while we are flying to MULAT.

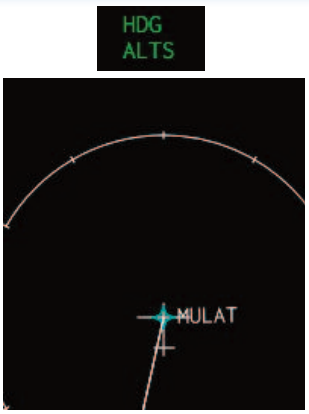
• We are flying to MULAT and we are going to deactivate the Navigation mode. While we are flying a straight line to MULAT we press the HDG mode to synchronize HDG angle to the actual course the plane is flying and we are ready to press HDG button when 8NM or so from MULAT.

Why are we doing this? Because if we leave the Navigation mode fly the plane when reaching MULAT the plane is going to turn to the LEFT to follow the route, but the angle between the course we had, and the new one is too high, so the plane would take long to intercept that new course.

The better way is overpass MULAT and fly 1 minute with the same Heading. After that program Approach mode and turn to the RIGHT to intercept it. It will be more precise than the Navigation mode.







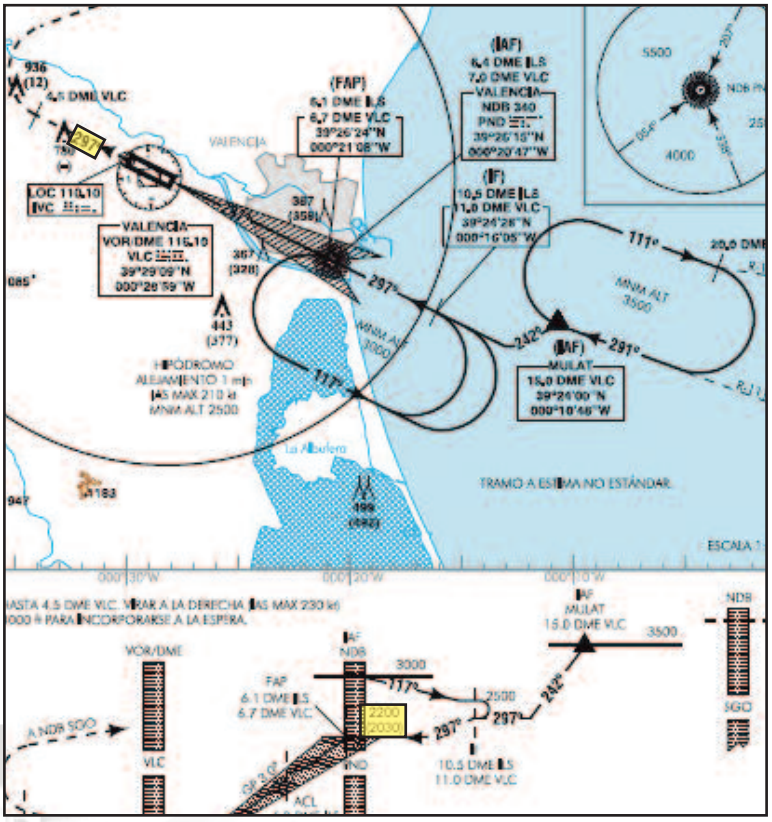
So we have flown over MULAT and put the chronometer on. We are not going to change the heading in 1 minute.

• This is the time to change the NAV source (to NAV1) and the course of the tuned (long ago) 110.10 ILS frequency, that is 297º (you can see it on map)

Of course before of this we have been authorized to this approach by ATC.

- IB032, autorizado aproximación ILS30, contacte torre en 118.55 cuando tenga la pista a la vista.
(-IB032, authorized IL30 approximation. Contact tower on 118.55 when you have runway in sight.)

- Contactamos Torre cuando tengamos la pista a la vista. IB032
(- We will contact tower when we have the runway in sight)



We are turning the plane to the right and because we must intercept glideslope at 2,200 feet, we input that altitude on the Autopilot and press the APPR button to ARM LOC1 and GS (still the GS mode armed won't appear because ALTS is armed (fig 102)

Fig 102

Fig 102

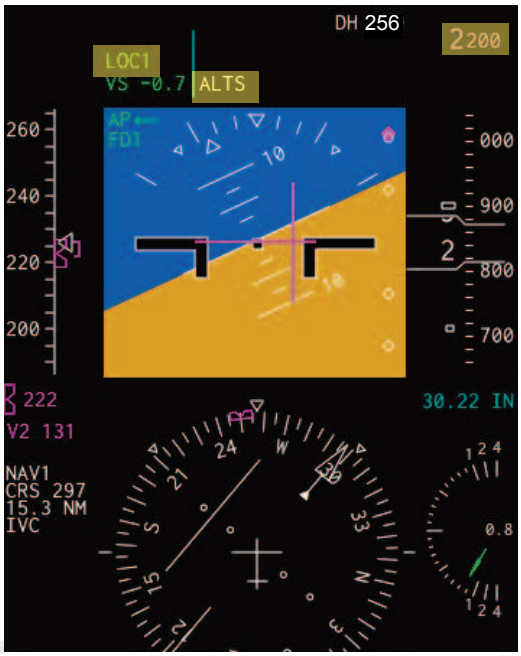
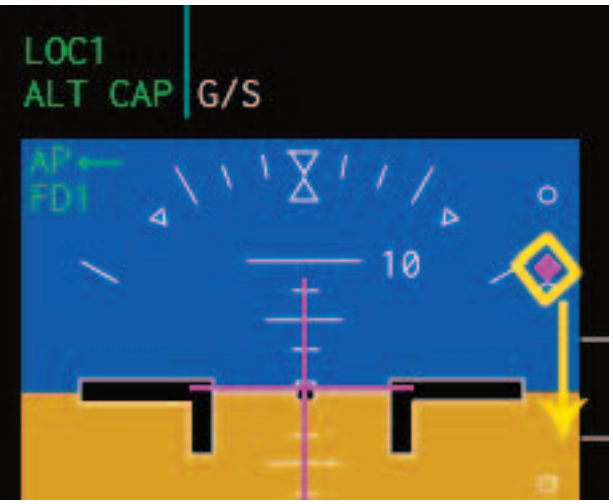
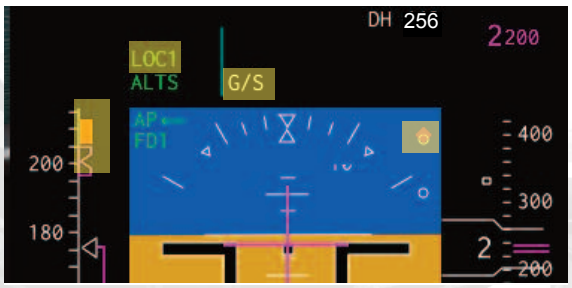


Fig 103

Fig 103

Soon the LOC1 mode will be active and near to descend to 2,200 feet. (fig 103), and when we reach that altitude GS mode will be armed and you will have to take a look on the magenta diamond on the right of the artificial horizon.
Also we set 8º flaps, when we are below 200 knots. You will see the red marks for flap speed security.





I haven't forgotten the Vspeeds this time and Trim configurations, but I am not going to explain them too much because the tutorial is long enough. The only you need to do is look how much fuel do you have right now and with that you can go to the sheet to calculate the %MAC and then the pitch trim.
VSpeeds are the same. You have to look what is your weight (the only changed unless you through away our friends, is fuel), and look the temperature on Valencia and altitude.

Once you have the Vspeeds and Trim you can set them on bugs.
Why set Vr? because we could make a go around.

• When we are close to intercept the Glideslope, the magenta diamond will start moving down. At the time the diamond is at the zero altitude, we will capture the GS mode (fig 104).

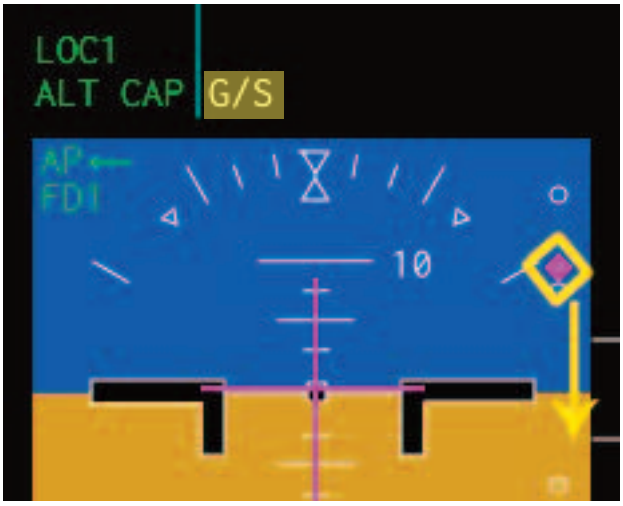


Fig 104

• Now we are descending direct to the runway, we set full flaps and extend landing gears (fig 105)

• Also we put Auto reverse thrust and auto spoiler.

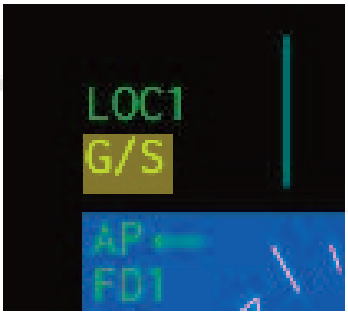
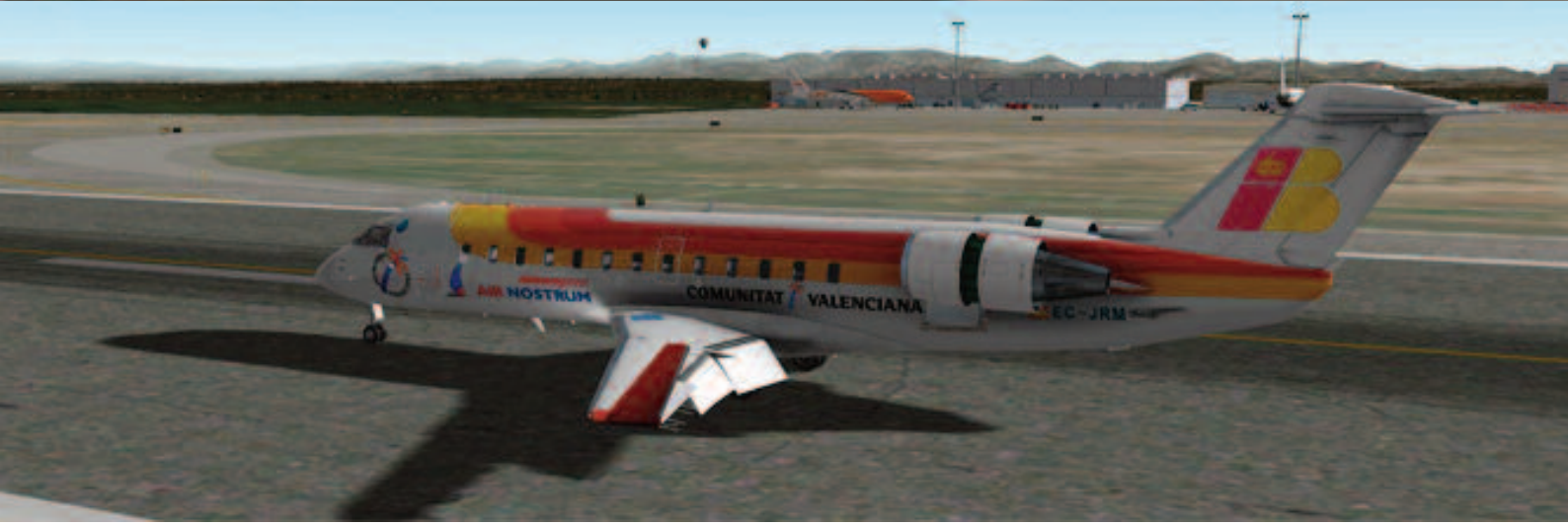


Fig 104


Fig 105

• And we set the altimeter to the Go Around altitude. That is 3,500 feet in case we need to.



At 100 feet from ground Autopilot deactivates automatically and you have to take control of the plane. It won't be difficult if there aren't turbulences. So when you are about to land, you have to pull the yokes a little and "relax" thrust on engines to let the plane fall.

Thrust reversers have activated when touch down (you have to do a nice landing to auto deploy the reversers. It can happen, that if you make a hard landing, reverser don't activate. Be careful, and when the plane is 80 knots or so, we deactivate Thrust reversers (better if you assign a button to toggle thrust reversers. If you don't have any button assigned then you have to put thrust reversers to idle **AND** push a little the 3D thrust levers **individually not your hardware joystick.**

• We exit runway and contact ground. Put Transponder on Standby position, and switch off Landing gears (turning on Taxi lights).
Ground give us clearance parking where ever we want so we just taxi and park in a good parking place.
Around us we can see the planes that made us make the holding...

Now we have to shutdown the engines. Only put on cutoff position the red levers. Turn off Engine generators, and hydraulics and you are ended.
If you pressurized the plane you will be able to open the main door. If not.. we will have to eat the lunch inside the plane until the plane is unpressurized, or you can press emergency depress button.

And here we are done! I hope you liked the tutorial. It has been very hard making this one but I think it will worth it.

Now it is your time to fly! Enjoy your own routes!

Javier Rollon Moran

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JRollon Planes website:
http://www.jrollon.com

X-Aviation webpage:
http://www.x-aviation.com

The CRJ-200 plugin relies on the vascore plugin for simulating the FMS.

Vascore is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

Sourcecode is available from
https://github.com/PhilippMuenzel/vascore-embedded