Add-on for

X-PLANE 10 GLOBAL

also compatible with X-Plane 9

aerosoft™

CRJ 200

MANUAL

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CRJ-200

Manual

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X-Plane 10 & 9

Content

Introduction

It was very hard to reach this point. Not only was it quite challenging to make this plane but also to create these documents. Apart from that a lot of time went into flying the plane many times to ensure everything was ok. I don't want to speak of the task of taking screenshots and then putting them together here.
When I bought a simulator I hardly ever read the documentation but always went to follow the tutorials. Then when I encountered a problem I had the manual to take a look. Well, I would like you to read the manual before starting to fly the plane, for the main reason that if you don't follow the procedures correctly you will be faced with "bugs" that are not really bugs ... but incorrect procedures.
In this tutorial we are going to be on a flight over Spain. Here in Spain (i.e. in Europe – yes, there are still people who believe Spain is in South America. That wouldn't bad at all!!! Haha, but no... we are in good old Europe) we are facing a strong crisis and since we have been always a country renowned for its fantastic tourism I would like you to go on this touristic ride with me to my country. Of course the colours in the simulation are not quite the same compared with my country but you will see more or less the shape of it and if one day you want to visit me here in Madrid, as Austin and Anton did, you will be welcome.

The first thing you need to do if you want to go through this tutorial is to install the landscape of Europe of X-Plane 9 if you have not already done so. If you don't do it, you will see only water. You could take the tutorial flight over water but that would be very boring, wouldn't it? Once you are at it, 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 everything to the latest version:

http://www.openscenery x.com/

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

Salamanca is the city where I was born. It has a little airport that is not too busy but every time I go to my home city I enjoy watching those seaplanes. Salamanca and its airport are located 200 km west of Madrid and it is a very nice city full of students because Salamanca is home to the second oldest university

You can make a virtual visit to Salamanca here:

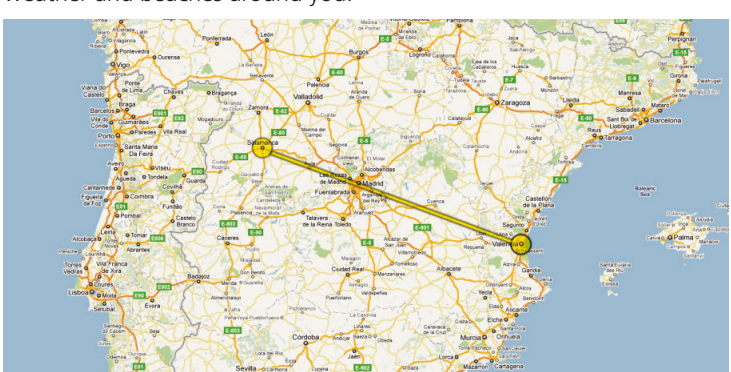
http://www.salamancatourvirtual.es/

So it is a city full of young life, with people coming to study at its university from all over the world. Matacan is the airport of Salamanca and you can download the one I used from my website for free:

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

Valencia is the city of the sun. It is located 330km to the east of Madrid and it is on the sea, i.e. the great Mediterranean. It is a big city with a mixture of modern and antique elements, with very nice and polite people who live slowly (and fast when they have parties!). This is the Spanish city of Inma, my girlfriend, and here you find the typical 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 rather say the opposite! California is like Valencia! Oranges, good weather and beaches around you.



The scenery of this city consists of two parts: the airport and the city. For both you need the OpenSceneryX addon that you hopefully have installed before. For downloading the scenery for Valencia you have to go here:

http://www.x-plane.es/xp_resources/indexlist/index.php?dir=&file=LEVC_AKESOFT_febrero-2011.7z&AutoIndex2=1184025fda16ca35606830d938b7802e

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), but you don't need them anymore. Once downloaded you have to copy both of them into the folder "Custom Scenery" inside your X-Plane folder.

Ok. So, now you have the plane and the sceneries ready for proceeding with this tutorial. Now you have to open X-Plane and load the plane with engines not running (more info on how to do this can be found in the manual). Load the Salamanca Matacan airport (ICAO-code: LESA) and choose parking "Ramp 5 Medium".

- Go to "Environment – Date and Time" and set the date to April 15 and the local time to 7:46h (Zulu time 6:46h). Don't worry that it is dark outside. By the time you take off the sun will be there.
- Now in "Environment – Weather" set a temperature of 20ºC (68ºF) and set the baro to 30.22 inches or 1023 millibar.

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

The first thing we need to know is the route we are going to take. For that purpose we can open a specific webpage that I like and which I have used for a long time (of course there are also other sites for that):

Route Finder: (http://rfinder.asalink.net/free/)

Please write LESA (Salamanca) in the departure field and LEVC (Valencia) for the destination. We are going to change the FL330 field 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 in the flight plan list are summed up in this little line, and this line is what we are going to punch into the FMS.
As you can read the first point is the departure airport LESA, then after take off we will go directly (DCT) to UNSOL and there join the A33 airway and follow that until we reach CENTA. Here we will continue with the STAR (standard arrival procedure) to one of the 2 runways of LEVC. We can also see 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 because I have made this trip so many times, but you should remember that in this plane 250 nm equals 1 hour of flight).
Now we need to fuel the plane. We are not going to fill it to full capacity. Maybe that is ok for cars, but for planes it is not. The more fuel you load the more expensive the flight will be because more fuel also means more weight, so the plane has to burn more to become airborne and keep flying. How do we calculate the correct amount of fuel?

Here is the formula to calculate the fuel:

THERE IS NO FORMULA!!

Of course there is one, but all the pilots I asked didn't know. There are too many variables to count with to calculate the fuel... but one pilot told me the following:

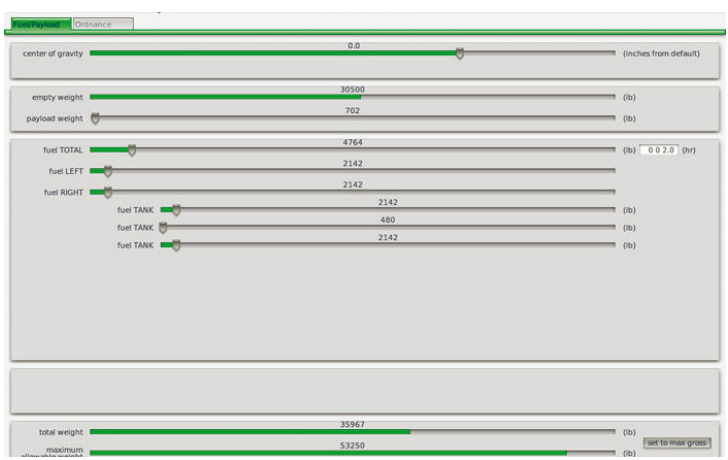
Total fuel to load = TAXI + BURN OFF + FINAL RES + ROUTE RES + ALTN

WELCOME TO THE WORLD OF SIMULATION!!! HAHAHA!

- TAXI: Fuel needed to taxi and for APU. Of course at a bigger airport it is not the same as at a small one.
- BURN OFF: Fuel needed to travel to destination airport.
- FINAL RES: Fuel to perform a 30 min holding at 1500 feet.
- ROUTE RES: 5% of Burn Off for Reserve.
- ALTN: Fuel needed to fly to alternative airport, i.e. ALTN + another Final Res.

If you want an easy approximation without too much calculating I suggest you use the online fuel calculator at http://fuel.aerotexas.com/. In our case I didn't follow the real procedures because I knew that I wasn't going to go to an Alternative (man!! it was enough tutorial preparation for me to spend 7 hours of flying to take screenshots etc. The way to proceed to an alternative is explained in the manual).

I know my flight will take me ca. 1 hour (7 getting everything ready for this tutorial) and I need more fuel for Taxi + 30 minutes of possibly delay + reserve = 1h + 30min + 30 min = 2 hours of fuel. In X-Plane there is an easy way to set the fuel needed for your flight. So we can go to "Aircraft menu - Fuel and Weight" and set it like below...



If there is fuel in the center tank the plane will automatically start transferring fuel from that tank to the wing tanks if they are not full to make sure that the plane has fuel in the wings rather than in the main tank.

Another thing to take into consideration is the payload weight. That means everything that the plane is going to carry. People and bags, but not counting the pilots.

This is a rare flight because we are going to fly this plane to Valencia empty. Only 3 friends will be on board with us: Anton, Austin and Cameron. Philipp will be flying the plane with me (sorry, you don't look too handsome today Philipp!!! That moustache!!! Arggh!!! And you are a little heavier than usual. Too many beers in Germany, my friend!). Later I will explain why the payload weight is 702 lb. For now, just set this value. The fuel loader and payload loader on X-Plane don't allow setting exact numbers, so the closer to this the better.

Well, we have loaded the plane with the necessary fuel and the bags are inside (people are still talking outside. As usual the work is to be done by only one person!!!)

- Hello Philipp how are you? (my voice)

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

Ok, ... we can start!!!

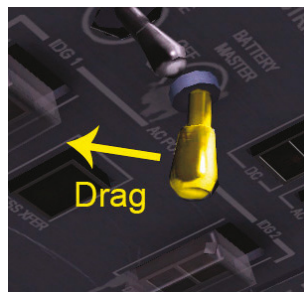
Important note:

This CRJ product is a plane continuously changing. One of the changes I made before the plane was released but after making this tutorial was to redefine fuel consumption, so now it is more like the real one. But of course it affects this part of the tutorial.

In this case you could still choose 2 hours (I believe 1.5 hours should be enough), but the weight is going to be different: 8,278 lbs.

Safety Checklist

- Circuits Breakers, closed (red text means that this feature is not simulated, so it cannot be executed).
- N/W Strings, off.
- Hydraulic Pump. All off.
- Landing gear lever. Is down.
- Spoilers lever. Retracted.
- Flaps lever. Zerodegrees.
- Radar. Set to off.
- ADG Manual Release. In and stowed.
- Battery Master. Set to On.



Once you switch the battery on, the 2 central displays will appear and a warning and caution light will start flashing:

You can switch off the flashing warning and caution lights by pressing both buttons.

APU / AC electronics. In this case I am going to ask for an external GPU to have energy, and that way we won't burn fuel with the APU. To do that we have to:

- Popup the FMS (can be done with the3D FMS also. On the 2D FMS you won't see animated keys, on the 3D FMS you will).
- Press the MCDU MENU button.
- Press the EXT AC POWER Left Function Key that is next to the label in line 1 (1LK). It will change to green (because programming it may take too long to change its condition from white to green. I made it that way to save on the performance) (fig 1).

fig 1

Ok, now that we have GPU connected outside (fig 2) make sure you have set the parking brakes, because if they are not on, you won't be able to use the GPU.
Ok... we have now GPU connected outside (fig 2)!


fig 2

(Ensure you have set parking brakes, because if they are not on, you won't be able to have the GPU.)

Ok if we look up at the overhead panel we will see a green light inside the AC button in the ELECTRICAL POWER SERVICES Panel (fig 3).

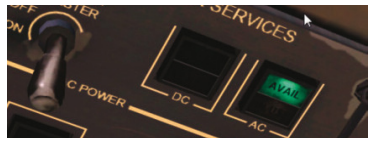


fig 3

The only thing you do to give AC power to the plane is to simply click that button (fig 4), and all the screens on the CRJ will come on (fig 5).

fig 4

fig 5

- IRS (both) to Nav. Changed to Nav (fig 6).
- Airplane documents. On board.
- Hydraulic 3A. Set to ON. (fig 7)

fig 6

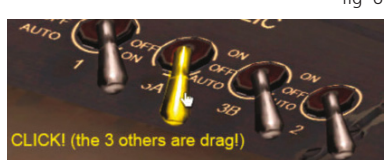


fig 7

That way we have control over the yoke and the pedals in case we forget to activate them later. To verify we have hydraulics pressure we can check that on the Hyd EICAS display (fig 8).

- FMS initialization. It is already on.

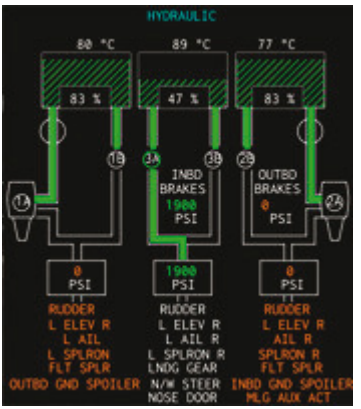


fig 8

Safety Check Checklist Completed.

Originating Checks

- Interna & External Pre-Flight Checks. Completed.
- Audio Warning Panel. Normal.
- Fire Detection Firemonitor test. Completed.
- Test lights. Checked (fig1).

fig 1

You will see the christmas tree. All the lights of the buttons are illuminated. You have to click the switch again to return it back to 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 of the auto transfer program to ensure the wings are filled. (Usually for fuel filling you should first set the wings and if you need more capacity then you go to the central tank). However, the total quantity you will see is always the same: 4,802 lbs. (fig 2).

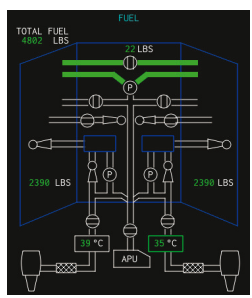


fig 2

- 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 anti-ice 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 to ON.
- Standby Compass. Checked.
- Stall Test. Complete.
- GPWS Test. Complete.
- N/W Strings. Off.
- Clocks. Set. (we could start them clicking, but we leave them at zero).
- EFIS Control Panels. Checked.
- Instrument Panels. Checked.
- MLG BAY Overheat Test. Complete.
- Upper Pedestal. Checked all normal.
- Thrust Lever Quadrant. All normal. Thrust levers in cutoff position.
- Avionics. All screens on.
- APR. Arm.
- ENG Speed. On.
- Trims. Checked working.

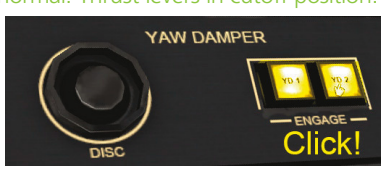


fig 3

- Yaw Damper. Engaged. Both lights turn dark (YD engaged Lights extinguish. YD disconnect = the lights come on) (fig 3)
- Lower Pedestal. Checked. Parking brakes are on.

Originating checks checklist complete!

Before Start Check

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

- HEY YOU!! STOP chatting AND GET INSIDE!

- Close Main Door. Closed (main attendance voice).
- PASS signs. Both ON (Belts and Smoking) (fig 4).
- Pressurization. Set to altitude of destination airport, that is 240 ft.

fig 4

Ok. For setting this one we first have to look at the ECS EICAS page, if it is not already showing (you can also find that information on the Stats screen). There you will find the line we need. LDG ELEV (fig 5). In the beginning it will be set to zero. You can change it with the landing elevation knob on the CABIN PRESS panel (fig 6).

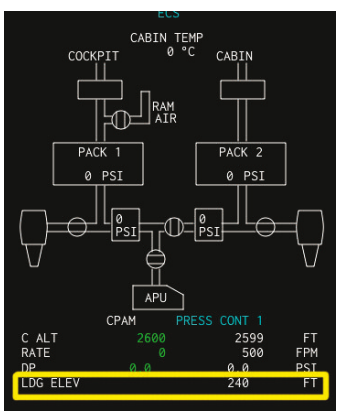
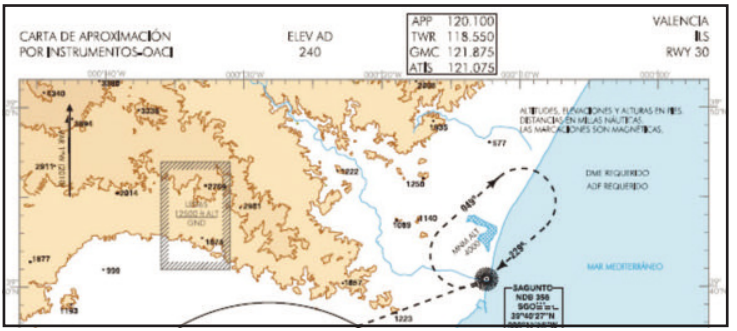


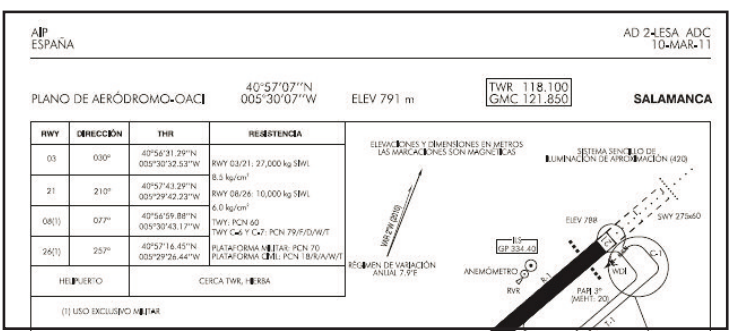
fig 5

fig 6

The only thing you have to do is rotate the LDG ELEV until the numbers in the ECS EICAS display show 240 feet as the landing elevation (don't worry if it is not the exact number, because it rounds off the numbers. All it needs is that it has to be close to landing altitude). How do I know that the elevation of LEVC runway is 240 feet? Because I had a look at the airport charts.



Now it is time to listen to ATIS for the correct altimeter setting. Since we are in a small airport, we won't be able to hear ATIS, because it doesn't exist here. So we are going to contact Ground.



As we can see the frequency for Ground is 121.850, so let's tune the radio. Go to the Radio panel (sorry, no popup version), and press the first right function button (1RK) to choose the COM1 preselected frequency (fig 7) (if it is marked and you press the button again you are going to set the original frequency to active).

fig 7

Then you have to tune the preselected frequency to 121.85 with the rotary knobs. Once you have it pretuned you can activate it by just pressing 1RK a second time (fig 9).

fig 8

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

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

fig 9

- Solicitamos aprobación plan de vuelo instrumental con destino a Valencia, IB032 (request IFR clearance to Valencia, IB032.)

- Autorizado a Valencia instrumental. Llame listo para copiar IB032. (Cleared to Valencia. Call when 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 22°. QNH 30.22. Llame cuando esté listo para rodar. (IB032 Valencia Cleared direct to UNSOL and CENTA via A33, Temperature 22°. 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 Cleared, direct UNSOL and CENTA via A33, QNH 30.22. Will call when ready for Taxi.)

(Well, I may be wrong as for what has to be said. For sure there are people around with much more experience than me. That happens because instead of flying I am in the hangar most of the time to let others fly. :)) Ok, 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 knob. We set it to 30.22 (if you want to set the pressure in HPA you have to press the button over the rotary knob (fig 10).

fig 10

If you want to know how much we have rotated and which QNH you have set, you have to look it up on the PFD (fig 11).

fig 11

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

Ok, here comes a big one!

- In fig 21 you have seen that the PFD is not configured correctly. That is because the navigation aids have not yet been aligned. The IRS needs to be aligned. So we are going to tell the FMS where we are right now to match the coordinates it has taken from its database after we punched in the Departure airport. We go to the FMS and we press the INDEX button to go to the Index page. From there we can reach the POS INIT page (fig 12).

fig 12

- On the scratchpad you write the ICAO code where the plane is right now: LESA. Because the read function of typing directly on the FMS is retarded to save performance you may perhaps have to type a key button twice to see the letter in the scratchpad. If there is something inside the scratchpad or you typed a wrong letter you can delete the scratchpad letter by letter with the CLR button or delete the whole line with the DEL key.)

- Once you're done writing you have to insert the line into the area where it says AIRPORT. In order to do this you press 2LK (second button on the left).

- LESA N40 57.12 W005 30.12 will appear below the AIRPORT label. Now you have to copy these coordinates into the Scratch-pad. To do that, you have to press the 2RK (second key on the right). You will be able to see the same coordinates in the scratchpad. And once you have them there you have to insert them into the SET POS label. We will do this by pressing 5RK. Ok, we have started the IRS initialization. In 7 minutes or so we will have the PFD completely functional (fig 13).

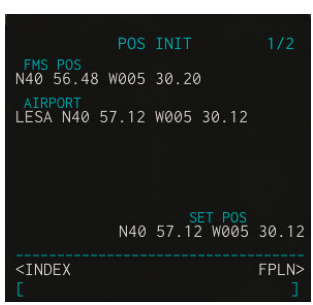


fig 13

- If you take a look at the PFD you will see that a label ALIGN DO NOT TAXI has appeared (fig 14). If you wait for the IRS hanges on the PFD you will see how first it hows the altitude and speed tapes making them active, and later it will show the artificial horizon. But we are not going to wait. We are going to program the route we want the plane to follow into the autopilot.

fig 14

- To program the route we have to go to the FPLN page. We press the FPLN button on the FMS and we will always reach that page.

Now we remember our route: LESA dct UNSOL A33 CENTA star LEVC

Because we have initiated the IRS LESA should already be in the ORIGIN area. If not, we should write LESA in the (empty) scratchpad and insert it into the ORIGIN airport field with 1LK.

fig 15

Now you type the destination LEVC in the scratchpad and press 1RK to insert it into the DEST area. The screen should then look like figure 15.

As a visual reference we write the number of our flight into the correct field. So we type IB032 and press the 5RK button.

- We are going to start the input of the waypoints. The first one is UNSOL, direct way. So we insert it in the line of the FPLN page where you can see the VIA and To labels (fig 15). Note: you can see in fig16 and the following ones how this UNSOL is inserted in the 2/2 page. This is because that was the way it was done in the previous versions of the plane. Now you have to insert the first point in the first page of FPLN. Once you did that you will have that second page to continue with the programming of the route, and you can access it with the NEXT PAGE Button.

So you press the NEXT PAGE button on the FMS, and we are on page 2/2 (it is shown in the top right corner). We type UNSOL in the scratchpad and copy it into the TO area with 1RK. If everything is ok then the waypoint UNSOL will be shown in the TO Column in white and there will be a DIR label in the VIA area (fig 16).

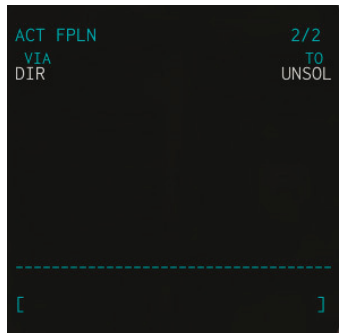


fig 16

Now to the next waypoint CENTA but via A33. What would happen fig 16 if we just inserted CENTA the way we inserted 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, we wouldn't have a problem, but there are airways that make corners, so if in those cases we don't insert the "via" first, we would go in a straight line ... and maybe we could find a mountain in our trajectory!!!

So beware of directs!

Ok, first we have to insert the airway (A33). We type A33 in the Scratchpad (empty) and we insert it with 2LK. A33 can be seen in the via column below the last DIR. But a --- DISCONTINUITY--- will appear below it. (fig 17).

What does that mean? To put it simply: the FMS doesn't know in which direction of the A33 you want to go, and secondly it doesn't know how far you want to go.

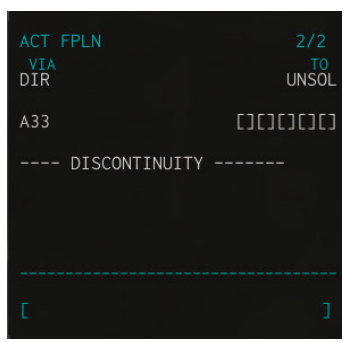


fig 17

To solve that discontinuity you only have to insert waypoint CENTA to the right of A33. So we type CENTA and insert it with 2RK.
The discontinuity is cleared and we can continue (fig 18).

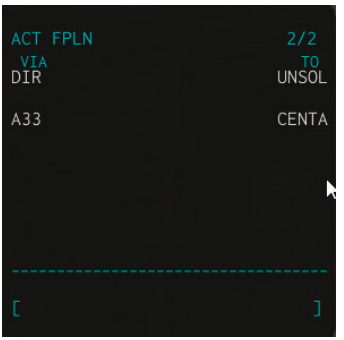


fig 18

Important note:

If you are making your route and insert an airway or waypoint which the FMS doesn't find, it will say "INVALID ENTRY" or something similar. That is not a bug but depends on the database you are using. The database you get with the 1.0 version package is the default one and old. You can buy an update from Navigraph (not really expensive, I believe).

It is time to verify that the programmed route is ok. We don't want to fly into another direction! For checking that we have to press the LEGS button on the FMS to show the Legs page and see all the waypoints that the plane should pass (fig 19). Do you remember the route finder that gave us lots of waypoints that he plane should fly along on that A33 airway? We have to verify that those points are on the LEGS page.

fig 19

So as we can see on the first page of LEGs (1/3) we have LESA-UNSOL-DISKO (we have lots of waypoints between UNSOL and CENTA because we programmed the route with an airway. If we hadn't done that then we would only have UNSOL and then after that, CENTA).

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

- INDEG.

Here we can see a deviation from the route finder. The distance between points seems to be the same, but not the course between them: 73º (78º on the route finder) and 116º vs. 121º on the route finder). That mismatch appears because of the database. We are using the default free but also old one from Navigraph, and that is why. But there is no need to worry. It is only important to be close enough in all numbers.

We continue by looking at the 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 we are basically ready, but it is worth making one last check. A visual one. We are going to see the route, with lines connecting the waypoints, and we are going to follow it with the plane on the ground.

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

- To choose the mode we must go to the left panel and rotate the big (fat) FORMAT knob (fig 20). This one is a little tricky just like the AV SOURCE. Keep dragging until you see the change of the modes).

fig 20

When you see an image like the one in figure 21, then you have the desired MFD format. It will be centered at the first airport of the route. In our case LESA.

fig 21

You cannot see the whole route, so we have to zoom out. How we do that? Easy. Remember the fat knob in figure 0? Go for the thin one (fig 22) this time!

When you have a clear view of the route (not all of it, of course) with clearly dentifiable waypoints you can proceed to navigate through it. We are going to make each of the waypoints the center of the circle so we can navigate watching the whole route. 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 23) (maybe a direct white line will appear between the first airport and the centered point. Don't worry about it) (fig 24).

fig 22

We have to verify every point until the last one LEVC. We have to verify every point until we get to the last one: LEVC. In version 1.4 of the plane we introduced the pre-visualization of the route. The route will not be active until you press EXEC so it will only show dotted lines. Please press EXEC button in the FMS to make it active.

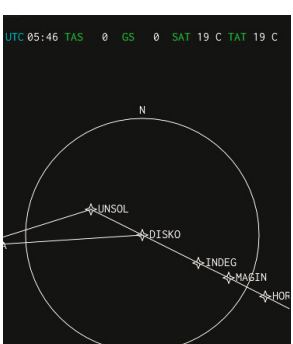


fig 24

fig 23

Once we have checked that all the points and the route are correct, we are going to leave the MFD mode in a state like the one shown in figure 25. This is the following route mode. Still the route is not shown. It will become visible when the plane has reached 40-60 knots.

fig 25

We are happy with 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 again).

For saving the route we must go to the first (1/x) flight plan page by pressing FPLN on the FMS and then press 5LK next to the COPY ACTIVE label to save it. A message of ROUTE SAVED will appear in the scratchpad, as well as the name of the route (below the ROUTE label) that you need to remember if you want to reload it later. In our case it is LESALEVC. (Files are saved inside CRJ200/plugins/CRJAvionics/routes) (fig 26).

fig 26

- Radios and Nav Aids. Set for departure.

The CRJ's FMC has an autotune feature and we must verify if it is on. We can access that page with the help of the Radio Button (fig 27).

We have to check if the radios are in AUTO mode (cyan colour is the selected option).

In our case we can see that both NAVs have been tuned to the frequency of BBI VOR near LESA: 112.20. If we would like to tune to another

frequency we should set the radio we want into MAN mode and then tune the radio or insert the frequency here on the RADIO page of the FMS.

Now we should verify on the PFD if the Navaid has been tuned correctly. The first thing we need is to change the Nav Source (if it is not already on NAV1).

fig 27

fig 28

To do that, we go to the right panel, pick the NAV SOURCE knob and rotate it until we see NAV1 on the PFD (fig 28) This knob is a tricky one as you have to drag really far to make the first change. After that the changes are easier.

If you want to see the bearing arrows relating to the synchronized radio you can press the corresponding BRG buttons. One press shows VOR bearings and a second press shows the ADF bearings. A third press hides the arrows.

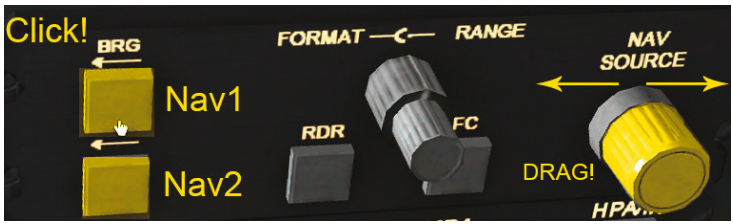


fig 29

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.

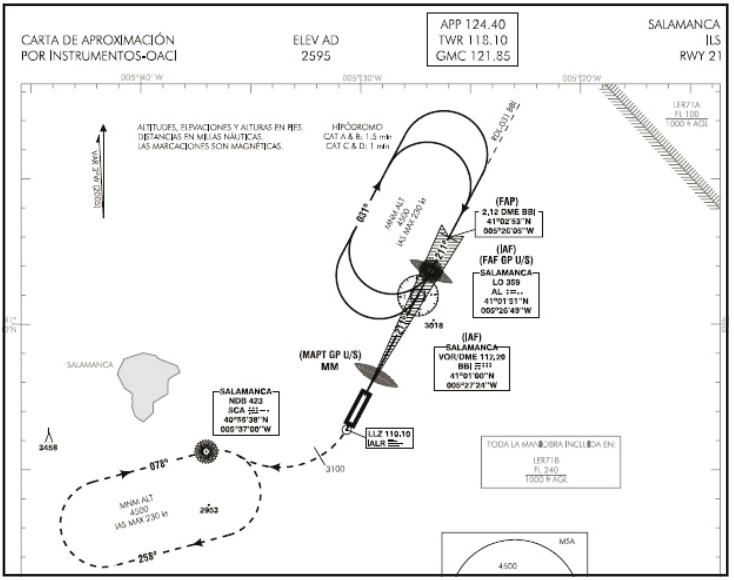
I am going to explain why 4500 feet. When we take off we must be aware that maybe we will encounter a problem. In X-Plane there are so many birds around and you can have a problem if you hit one of them, or maybe you will have to cope with a random failure originated by X-Plane.

Important note:

As mentioned above, there are deer, birds and random failures on X-Plane. I think that it is important to mention this before anyone thinks there is a programming problem with the plane (bug). Maybe the problem occurred because you activated X-Plane's random failure function. It is nice to have it connected, because it makes the flights more challenging, but I think in the beginning you should deactivate it. The CRJ simulates very complex systems and what might deem a failure to a pilot, could be a result of him/her not following the procedures correctly.

To deactivate the random failures systems you have to go to the AIRCRAFT/EQUIPMENT FAILURES menu and uncheck the box that says "**use meantime between failures random failures**".

We must have a look at the airport charts to become familiar with the go around procedures, and we must look at the IAF altitude and Holding altitude. In our case it is 4500ft as shown in figure 38.



.

Before start Check completed!

It is very important you choose the SID of the departure airport before takeoff. Even if the airport doesn't have SIDs, like Salamanca, you have to choose the Runway you are going to use. If you don't do it, you won't be able to see the route in the following MFD route page. To do that just press the DEP/ARR button of the FMS and choose LESA - SIDs. Now select the runway you want to choose for departure –
In this case rwy03.

Once you've done that, your whole flight plan is going to be temporary because you made a modification. Just press EXEC to activate it.

Cleared to Start Check

- APU. On.

In order to start the APU follow this procedure:

- First we need the STATUS page on the EICAS screen. Initially it will only show the Trim setting 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 for the APU (fig 1).
- Two gauges without any needle will appear on the STATUS page and the label DOOR OPEN will be shown (fig 2).
- To start the APU press the START/STOP button next to the PWR FUEL button we pressed before. Two green needles will appear on the APU gauges and will display the increasing RPM and EGT (fig 3). Once RPM reached 100%, a green AVAIL light will be visible on the START/STOP button (fig 4).

fig 1

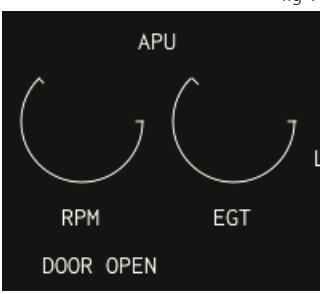


fig 2

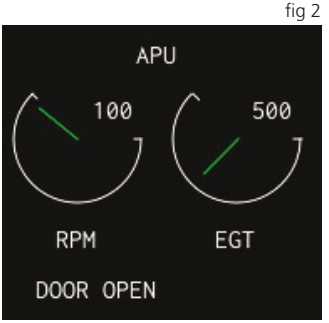


fig 3

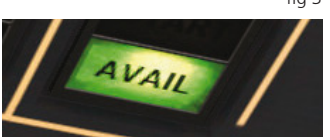


fig 4

- Since now we are starting to burn fuel we'd better hurry up. With the green AVAIL light on, we have the possibility to feed the plane with electricity from the APU generator. Let's connect it!
- We go to the Overhead panel and turn on the APU GEN switch (Fig 5). Now we can switch off the external GPU.

fig 5

- 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, select PLANE MENU, and press 1LK next to EXT AC POWER to turn it white. Now we are only using electricity 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 set what is needed for a good take off.

The first thing we do is switch the Flight Director on that will guide us manually or automatically if the autopilot servos are on. We press the FD button on the Autopilot command panel. Immediately a magenta cross will appear on the artificial horizon (fig 6 and 7) and the label FD1 will appear.

fig 6

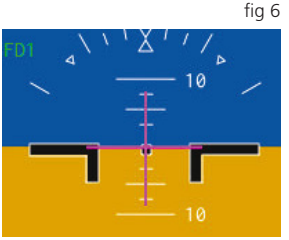


fig 7

- Next we activate the HDG mode (but we are not setting the Autopilot yet as for engaging the autopilot the plane must be 100 feet above ground. We simply press the HDG button. A magenta bug will show on the rose compass pointing towards the direction set by the HDG knob (figures 8 and 9).

fig 8

fig 9

- Now we rotate the HDG knob until we see the HDG bug on 30° and the selected heading appears on the PFD (fig 10 and11).

fig 10

fig 11

- Now we can set the Altitude and select 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 the magenta numbers above the altitude tape on the PFD show 4500 (fig 12 and 13).

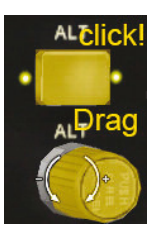


fig 12

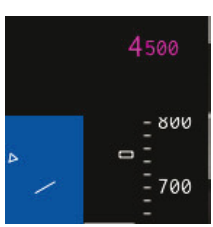


fig 13

- Doors. We already closed them before pressurization.
- Beacon. On. (fig 14)
- Fuel Pumps, Gravity XFlow & Quantity. On, and check quantity. (Fig 15)

We can check the opened valve of Gravity XFlow on the Fuel EICAS page, and also the fuel pumps (fig 16 and 17).

- Hydraulic Pumps. Auto (fig 18).
- 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 process of starting the engines begins. 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 during pushback but I prefer not to - for safety reasons).

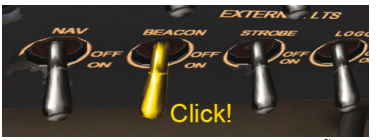


fig 14

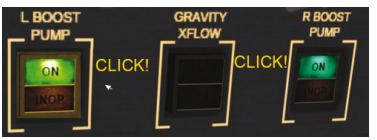


fig 15

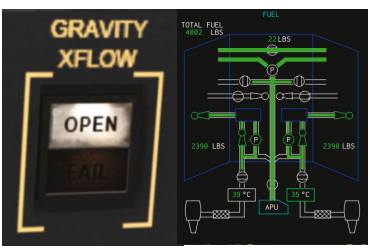


fig 16 fig 17

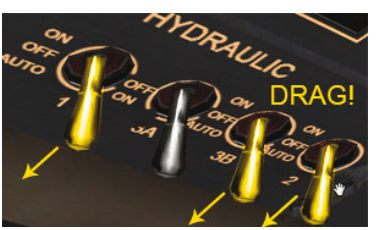


fig 18

- Ok, we will take a look at the Primary EICAS display. All the gauges read zero values (if you see that the ITT have a value different from zero like in fig 19 it is because the plane was loaded after engine start so it has to cool down first.

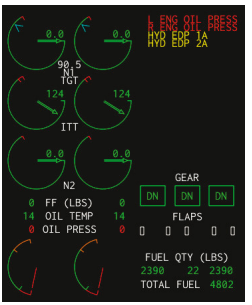


fig 19

- We press the ARM IGNITION A (or B if we like to) (fig 20). Now we need to open the APU bleed air valves to make the air coming from the APU rotate the N2 stages of the engines which will allow us to start them.

fig 20

- We go to the 10th Stage panel and click the APU LCV and ISOL buttons to open both valves (fig 21).On the ECS Page of the EICAS you can see how air is bleeding to the engines. If we had both PACKS open then the pressure would be lower and maybe we would not be able to start the engines. That is the reason why they are off (fig 22).

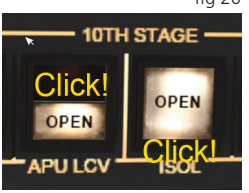


fig 21

Now we can start the engines.

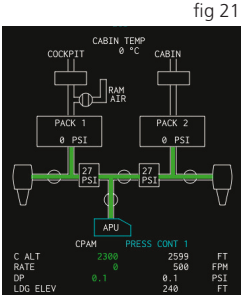


fig 22

We start with the right engine by ressing the START button (fig 23). The N2 gauge in the right engine will show increasing values for rpm % (fig 24). When N2 % shows more than 15 it is time to open the fuel valves for the right engine. You do this by pulling the red lever on the right throttle control (fig 25). You will then see the N1, ITT, N2 and the oil pressure values increase and stabilize.

fig 23

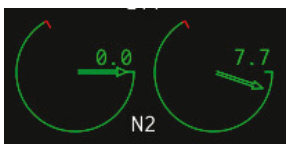


fig 24

Once we started the right engine, we can proceed with the left one in the same way as before, but of course choose the left buttons and levers. In the end the Primary EICAS display will show gauge values like in figure 26.

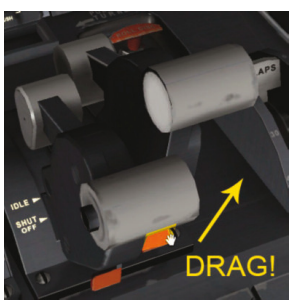


fig 25

Maybe you noticed that the oil pressure gauges disappeared and two FAN Vibration gauges appeared. That is the case when both engines are on. It is very important you don't pull the red levers before N2 reaches 15% because if you do you will perform a hot start. If you make a hot start you will have to turn that engine off immediately. If you don't you'd better call the airport fire fighters. To switch the engines off you can either push the red lever down again or press the STOP button below the corresponding START button. In case of a hot start stop the engine and let the ITT cool down.

Finally we got the engines started!
Cleared to Start Checks completed!

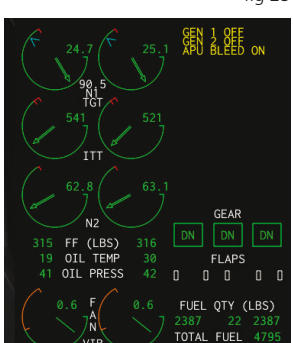


fig 26

After Start Check

- Engine generators. On.

It is time to connect the engines' electricity generators and switch off the APU. We could leave the APU on in case we might have to restart an engine during take off. I think is a good security measure, because with the help of the APU we can start an engine quickly as long as we are below 13,000 ft (You could also start it with the bleed air generated by the other engine).

- So we switch the Engine Generators to ON and the APU Generator to OFF (fig 1).

fig 1

- Now we turn the APU off by pressing the TART/STOP button again and we close the fuel valve by pressing the PWR FUEL button. The APU gauges will disappear from the STATUS page and the label APU DOOR CLOSED will become visible.
- We switch the APU Bleed Air Valves off and press APU LCV and ISOL to close the valves

We have completed switching off the APU.

- Ignition A (or B). Off (if we are in continous contiditions we have to press the ign continous.
- Left and Right Packs. On. Yes it's hot in there for our friends. Let's show them the benefits of air-conditioning (fig 2).
- Anti Ice. As required, Off.
- Probes. Probes anti ice on (fig 3).
- APR. Tested. Armed.
- Electronics. Checked. We have a look at the electronics AC and DC displays on the EICAS page to see if everything is normal (green conditions all over).
- Rudder. Chequed pedals' motion.
- N/W STRG. Armed.

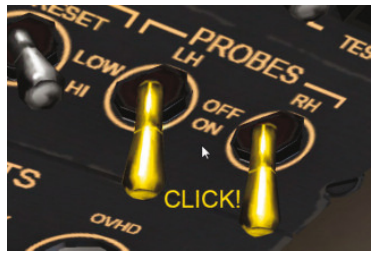


fig 2

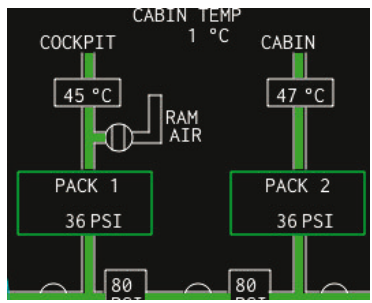


fig 3

After Start Check completed!

Taxi Check

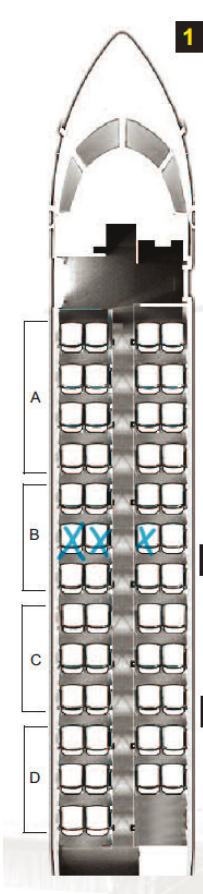
- Flaps. Set 8º (fig 4).
- Fligth Controls. Checked. Yoke and pedals move correctly.
- Trim and Stab. Green and setting.

fig 4

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

Trims

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



1 Weight Calculation

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

Dry Op. Weight +		13,835 kg / 30,900 lb
ZFW (MAX 19,958 kg) (MAX 40,000 lb)	=	31,544 lb
Take Off Fuel +		4,800 lb
TOW (MAX 23,134 kg) (MAX 51,000 lb)	=	36,344 lb
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	Consider each		
15	23,4	child as 0.5 Adult		
16	25,0			

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, here is the explanation:

1
- In this area (in this example it is in pounds) we will write the number of passengers we have. Then we multiply the number of pax with their (standardized ;-)) weight. So, because we have 3 passengers that makes 3x176lbs = 528bs).
- We also have 4 bags in the cabin: 4 x 29lbs = 116lbs.
- We sum up both numbers = 644 lbs. If you remember in the payload section when we were setting the amount of fuel and payload weight we put in 700 (because we cannot set the exact numbers).
- We continue with the arrow indication and we add 644 + Dry Op Weight (30,900lbs) = 31,544lbs.
- Next we add that to the Take Off Fuel. By looking at the fuel EICAS panel we can see it is 4,800 lbs. I made a little mistake here because actually we would have to subtract the fuel burned during Taxi and by using the APU. But in our case we can disregard that because the airport is small and we did not have the APU running too long. So we can leave that number. But you'd better do it correctly next time

2
- So all in all we calculate 36,344 lbs.
- Now we ask our flight attendant to tell us where our friends are seated. She marks their seats on the paper and we can continue calculating. The 3 of them are in zone B, so the pax index will be 2.5.

3

4
- The weight of the bags is 116lbs so, the index is 0.8.
- The take off fuel index is between 5.4 and 6 (should be 5.4 because of the fuel burned for taxiing and by the APU but we leave it the way it is in the picture) so it is 5.6 (take a look at the new index).

5
- Make the index calculation by putting the numbers into the boxes... On total you can see that it should be -35.14 but we take the positive number. So LIZFW (Loaded Index Zero Fuel Weight) is 35.14

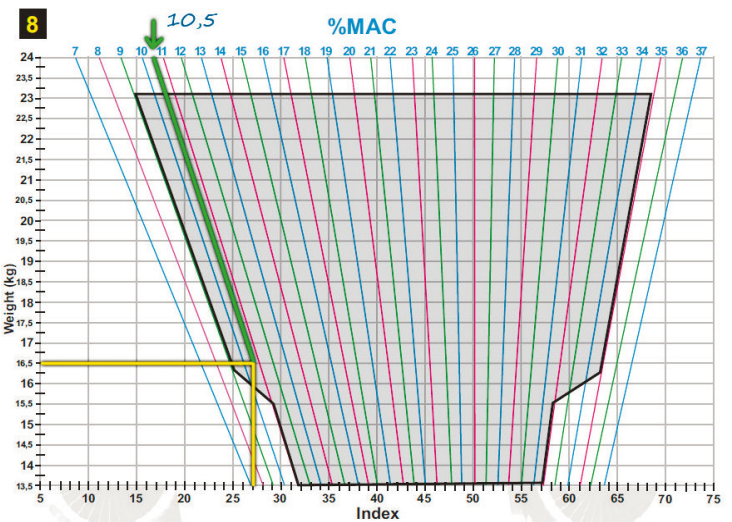
6 • With the numbers we had before we have a LITOW (Loaded Index Take Off Weight) of 29.54

Later when we know how much fuel have we burned in flight, we can calculate the LILW (Loaded Index Landing Weight).

Please note that in the graphic below the weight is in Kilos, not lbs!. Make the correct changes. Here you can find a page to convert from pounds to Kg: http://www.metric-conversions.org/weight/pounds-to-kilograms.htm

With the LITOW (29.54) we can calculate the Pitch Trim setting. We go to the %MAC (Mean Aerodynamic Chord) graphic on page 5 of the Pilot Handbook and calculate the %MAC. First we need to calculate the TOW in kgs. With a little help of the Internet 36,344lbs make 16,485 kgs.

8



So, we cross the value on the vertical of 16,485 kg, with the value of the index of 29.54. And from that point we draw a line parallel to those going to the numbers on top of the graphic. And there we get the %Mac. In our case it is ca.12.2.

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 look at the value of 12.2 in the trim table (Stabilizer Trim setting for flaps 8 or 20 Takeoff) and with a little back and forth we get a trim setting of 7.7. Don't take all this too lightly but also don't overdo it: During his training Nici, an ex CRJ captain was told that when the CRJ200 was first introduced you could only set full numbers, i.e. 6, 7 or 8. However, if you don't set the trim correctly, you won't get you plane's nose up or it will go up by itself and you won't be able to get it down again.

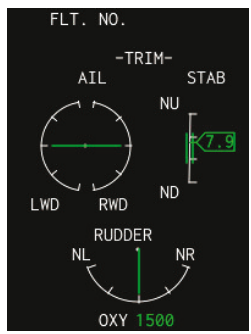


fig 4

Now you move the trim with your joystick trim buttons/switches (you have to map a button of your joystick for trimming the pitch up and another one for trimming the pitch down) until the calculated setting shows on the STAB Trim tape of the STATUS page (fig 4).

Too much calculation for such a little number? Well that is what pilots do in real life. Well maybe if you are piloting an Airbus all calculation is done by the FMS by just pressing some buttons, but I like it more this way. It is fascinating to learn these things. (I have to thank a great real pilot of the CRJ who showed me all about this! Thanks, Ed!)

fig 5

Let's continue...

- Thrust Reversers. Armed (fig 5).
- Fligth Insturments. Checked.

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

Here we need our TOW again. It is 36,344lbs as calculated in the % Mac calculation made before. Now we have to go to the Take off Performance data tables in the pilot handbook to calculate the VSpeeds.

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 the new fuel consumption plane change, you should check the table at 39,683lbs (18,000kgs) to calculate the VSpeeds. They should be:
V1: 122 + 1 (correction) = 123 knots
Vr: 125 + 1 = 126 knots
V2: 137 knots
Vfto: 163.

Sorry for the inconvenience!

We do not need any correction because of the 20ºC at an altitude of 791 ft (i.e. the altitude of Salamanca Airport).

So we will copy those values to the VSpeed bugs. 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 have to check that the bigger knob is in the TGT position to set the VFTo (or whichever speed you want to set). If you would like to modify the VSpeeds then you should drag the rotary knob to the VSPDS position (fig 6).

fig 6

- Now we must rotate the thin rotary knob to set the speed we want (fig 7). There will be a mark over the vertical speed tape labeled T (others will be 1, 2 and R) (fig 8) and on the PFD you can see the number you are modifying (fig 9).

fig 7

fig 8

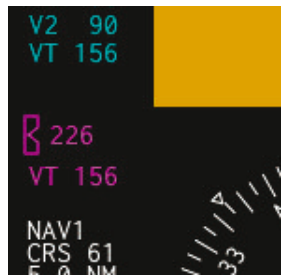


fig 9

- To set the VSpeeds you have to turn the fat knob to VSPDS and then start tuning them with the thin rotary like the Vt speed before. When you have finished with one you have to select the next VSpeed with the SEL button above the rotary knob (fig 7). The sequence will be V1, Vr and V2.

Now we can continue...

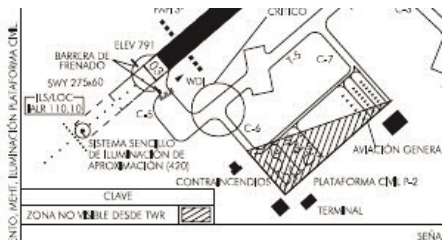
- FMS. Autotune (radio)
- BTMS. Checked

Taxi Checks Completed!

We are ready now to call Ground and ask for permission to taxi to the 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 Radiopanel, press the 4LK function to give us the possibility of changing the ATC code. With the rotary knobs we set the transponder to 5372.

We must to be sure that the transponder is on Standby (fig 10).

fig 10

- Parking Brakes. Off.

We apply a little bit of thrust on both engines until the plane starts moving, and control the turns with both pedals. LET'S 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. Squawk mode Charlie.)
- Entramos y mantenemos, IB032. (Entry and hold, IB032.)
- Now we press 4RK on the radio to change from Standby to mode Charlie (R on Cyan).
- We switch the Emergency lights ON.
- Landing lights ON and Taxi lights OFF.
- Strobe lights to ON position.
- We set the configuration of two popup screens (PFD and MFD).

Trick: if you want hide the frame of the displays you have to go toJRollonPlanes folder and there go to the 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 are cleared for takeoff. Wind calm. QNH 30.22. Call when airborne.)
- Llamaremos en el aire, IB032. (We call when airborne, IB032.)

When I followed tutorial flights like this one they mostly said, "once you reach this point press pause mode if you need it". And really I think is necessary in most cases. But the main idea is that once you are in the air, you fly the plane manually and trim it and when you see that the plane is climbing without touching the yokes, then you can proceed with autopilot modes. We just take a quick look to make sure that everything is OK with the autopilot. However, there is one little thing we need to do before pushing the throttles to full forward and it has to do with just that. You don't need to set the throttles to full throttle for take off. If you do that too often you will soon wreck your engines.

So we go to the Pilot Handbook and look for Reduced Thrust Take-off setting %N1 on 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 90.5 on the screen but it was enough ;))

Now we need to tell that value to the CRJ. We press the PERF button on the FMS to go to the Performance Init page. There you will only find a Thrust limit option (for future updates we will try to put in more options). Get inside that Thrust Limit page, and then write 90.5 on the scratchpad, and press 1RK to insert that in the TGT area. An <ACT> label will appear immediately (fig 11).

fig 11

A cyan mark will appear and "TGT" will show up between the two N1 gauges on the Primary EICAS display (fig 12). The engines will keep to the set throttle limitation.

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							

Ok, ready to go!!

- Engage Full throttles (they won't set any farther than he limitation). The plane starts to roll along the runway and we gain speed.
- Once we are faster than 40 knots the speed tape will start to move. We will see the VSpeed bugs coming up.
- When you reach Vr speed pull gently on the yokes and the plane's nose will start to rise.

fig 12

- Keep an eye on the vertical speed indicator and when we are above 100 feet or so and have a positive rate of climb put the Landing gear lever to the Up position.
- All the time keep pressing the necessary pitch trim button on the yoke if needed. In order to maintain the climb rate we still have to pull on the yoke to keep the plane going up. When the plane is climbing at a very high rate of climb (+2000 fpm) pitch the trim down.
- Once you reach the Vt speed pull the throttles back until you maintain that speed.

- With the yokes centered 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 change to Speed mode which will automatically match the speed bug on the PFD with the actual speed).
- Because still we haven't activated the autopilot the plane won't do anything automatically. Only the Flight Director will move.
- When you see that the horizontal flight director is above the zero altitude horizon, press the Autopilot button. The autopilot will then fly the plane. Be careful that the plane doesn't pitch down. This can happen if you do something not quite perfectly. Nothing has to be done quickly, just constantly. Now you have the plane flying in autopilot mode following heading 30º and climbing to 4500 feet. We are deviating from the planned route but don't worry.
- Set the Nav Source to FMS source (as mentioned before this is the first time you change the Nav Source with the Nav Source Knob by dragging it far to the right until it changes. Then you can return to the left until you see "FMS" on the PFD (fig 13).

fig 13

- You should be flying at 150 knots or faster and be climbing to 4500ft. Now it is time to return the flaps to zero.
- Now that we have selected the FMS source it is time to catch the route. First we are going to arm the Nav mode by pressing the NAV button on the autopilot panel. This will arm the FMS route which will can be seen on the PFD.
- Since we activated the NAV mode far away from the planned route the Heading mode is still active. Thus we must point the plane directly towards the route.

- We turn the HDG knob on the autopilot panel and point it to intercept the route at an angle between 20° and 60°.
- The plane will start turning (in our case to the right) (fig 14).

fig 14

- Once close to the route the plane will change from HDG mode to FMS mode (shown on the PFD) and it will start its turn to the left to catch the route (fig 15).

WE ARE ENROUTE!

fig 15

Now is the 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.
- 32.55, muchas gracias, IB032. (32.55 thank you very much, IB032.)

Now we tune that frequency on the COM radio and call Madrid Center. There is a bit of traffic there, so we need to 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.

- Right now we are level, so we set 24,000 as our assigned altitude (the label ALTS on the PFD changed to green when we reached 4500 ft).
- Next, we press Speed mode. The speed bug will set at our current speed. Now we urn the Speed knob to the desired climb speed. 222 should be good (less than 250kts below 10,000 feet).
- Nothing has changed but we see CLB 222 in green on the PFD, while ALTS is in white. (fig 16)

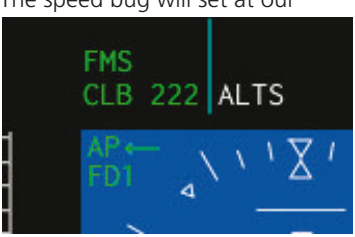


fig 16

- How do we start climbing? Easy, just push the throttles forward. The plane will have more push because the speed mode is selected. However, the plane has to maintain the selected speed, and the only way it can do this is by climbing. If we for example use the speed mode for descending, then we should do the opposite. Pull the throttles, so the plane has to pitch down in order to maintain the selected speed. Easy isn't it? So you control the pitch angle with the help of engine thrust.

ENJOY!

The plane is climbing. We cross 10,000 feet so it is time to set the altimeter to standard 29.92. This is easy as the only thing you have to do is just press the baro knob (you may have noticed that I am not putting too many pictures in for these last explanations.
Well I think you have already become familiar with the controls andsystems. If you still want more information the manual is a good solution for finding what you are looking for. I also do not follow the checklists step by step right now. But they are "there" and you can consult them as you please.

The plane is close to **UNSOL** and it is starting to turn to next waypoint **DISKO.**

- We turn off the Landing lights, and also set the passenger belt signs to off so the folks can move around and visit us in 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 with a clean scratchpad we press the DEL button. DEL@ will appear in the scratchpad (fig 17).

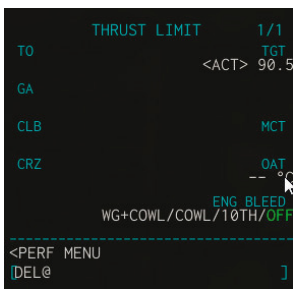


fig 17

When we see that DEL@ function on the scratchpad we can delete something, like e.g. this thrust limit or waypoints on the LEGS page (only there). The only thing we need to do to delete the limitation is just press 1RK. The TGT area will be blank again and we can have full thrust if that is what we desire.

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

- 23,000 ft and the 1000 ft alarm sounds. We are close. Put one hand on the throttles.
- We are near 24,000 and the plane starts to pitch down to level off. You will see how the magenta speed trend starts to scale up, so it is time to start easing the throttles of the plane, but at the same time continue increasing the speed.

- 24,000. The plane has levelled off and the speed is increasing. We are going to reach 0.75 Mach (the speed in Mach is on top of the speed tape (fig 18).

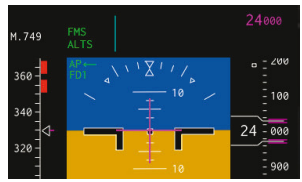


fig 18

- Be careful with the red squares. that appear on top of the speed tape. If the plane is too close to them it will start pitching up to be at a safe speed and not suffer structural damages.

Time to have a coffee or a refreshing drink! But don't relax too soon because we still have to do several things. The first item we need to take care of is to find out what the active runway is in Valencia. So we call Madrid Center to tell us.

- 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 in Valencia?)
- Si, claro. Es la 30. (Sure, it is rwy 30.)

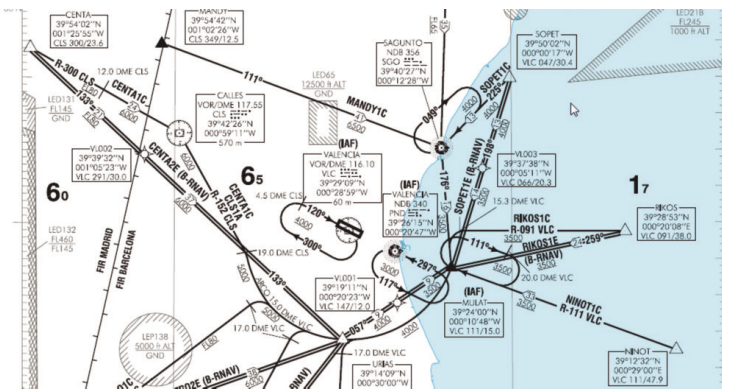
Ok, so now we can choose the STAR (standard terminal arrival route) for Valencia. Now is the best moment, I think, to insert the data because we are approaching and we can insert the STAR in a minute.

- We go to the DEP/ ARR page by pressing that very button on the FMS (fig 19). Because on this route there wasn't any SID option for LESA, just pressing the DEP/ARR button once will ring us to Arrivals.

fig 18

- When you choose SIDs the first thing you have to do is choose the runway and then the SID name. In this case it is the opposite.

First you have to select the STAR and then the approach. So, because the first waypoint of our STAR (i.e. the last point of our route) is CENTA, we open our arrival chart for LEVC.



We 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 the NEXT PAGE button. As we can see there are 6 pages of STARs we can choose from.
- We find CENT1C and press the Left Function Key next to that option. Everything else will disappear, but don't worry, this is because we are on a different page than before and the rest of the STARs disappear once you chose one. We must press the PREV PAGE button, until we are on PAGE 1/2 again (fig 19). CENT1C<SEL> will be displayed on the first page.

fig 19

If you would like to choose other STAR, maybe because you missed or were advised differently, all 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 is also possible for the approaches, transitions and SIDs.

- Now we must choose the approach. We want to use the ILS of rwy 30. Pressing 4RK will select it.
- For us there is only one Transition point (in other cases there could be more). We choose MULAT (fig 20).

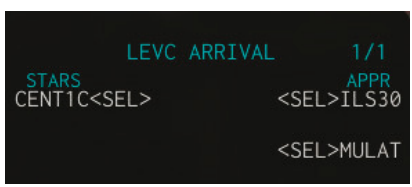


fig 20

- Now we are going to do the same with the STAR that we did when we checked the route at the beginning. It is important to insert the STAR before the last waypoint because once selected it will be active.

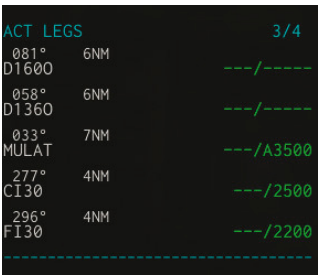


fig 21

- We go to the LEGS page and see all the points.
  By comparing them with the map we can see if the waypoints are correct. But there are some numbered points that we don't recognize. We can also see altitude limits that the plane must follow (fig 21).
- We don't know if those "strange" points are correct. Looking at the distances they seem ok, but we are going to use the full circle mode on the MFD to navigate through the STAR, in the same manner we looked at the route when we were on the ground.
- We check all the points with the arrow buttons on the FMS and zoom in on the MFD to see all the new routes clearly. We see that everything is perfect and that the computer has also loaded the Go Around procedures in case we need them (fig 22).

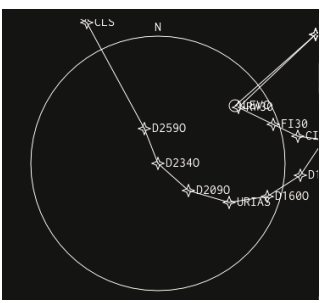


fig 22

- We go back to the ARC mode in the MFD and continue on our trip.

We are travelling fast and we are high. Soon we will need to descend. This plane does not (yet) have VNAV advisory so we have to calculate when to start the descent. There is an easy formula to do that.

Present altitude minus altitude we want to be at = (Altitude Difference/1000)x3

Well, it is easier than imagined. We are going to give you an example. 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:

24,000-10,000=14,000 (Altitude Difference= we need to descend 14,000 ft).
14,000/1,000 = 14;
14 x 3 = 42

We need to start our descent 42nm before we reach CENTA.

And the descent rate needed? Another easy formula:

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

We will see our ground speed when we are close to those 42 nm to CENTA. Ok, but there is no instrument that says "your plane is xx nm from CENTA"... so we have to calculate again.

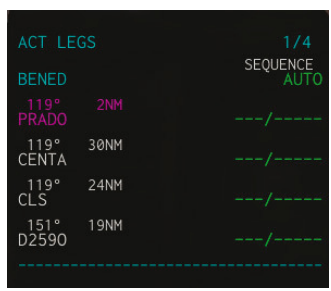


fig 23

- Go to the LEGs page. There you will see the distances from one waypoint to the next and the distance to your next waypoint.

8nm (from BENED to PRADO) + 30nm (from PRADO to CENTA) + 18nm (that we still have to go to reach BENED) = 56 nm

So when will our plane be 42 nm from our descending point CENTA? Easy...

When we still have got 4 nm to reach BENED

Why? Because it is 30 nm from PRADO to CENTA + 8nm from BENED to PRADO. That makes 38, so the point of descent must be 4 nm in front of BENED. Let's check again: 4 nm to BENED + 8 nm from there to PRADO + 30nm to CENTA makes BINGO! 42 nm. Right now we only need to set the altitude selector in the Autopilot command panel to 10,000 and wait until the plane is 4nm in front of BENED.

- Before reaching those 4nm to BENED we should read our Ground speed (fig 24).

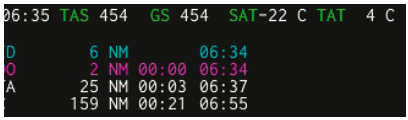


fig 24

In the top line of the MFD we can see that our plane is flying at a speed of 454 Knots. We remember the formula:

Descent rate = 454 / 2 = 227

227 x 10 = -2270 fpm

So, when we are 4nm from BENED (fig 90) we just select the Vertical Speed mode and set the descent rate to -2.3 (fig 25).

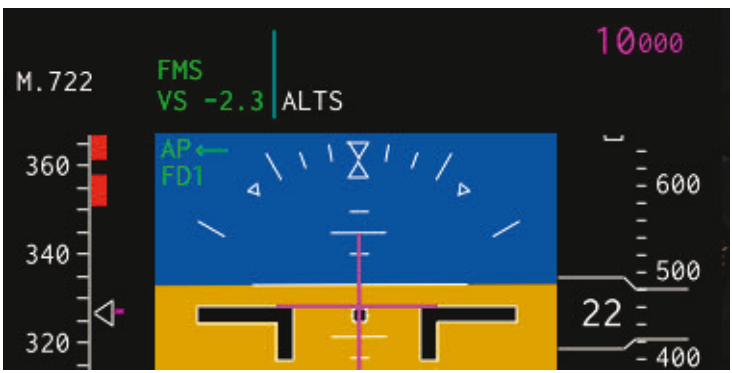


fig 25

The plane will start its descent to reach 10,000 at CENTA, but if we change the ground speed (and it will be changing) we must in principle also redefine our descent rate. Of course we also have to control thrust not to get into overspeed, but if we just take the easy formula looking at the ground speed and the VS indicator, we will reach more or less 10,000 feet over CENTA (it is not really necessary to exactly reach that altitude. We only need to be above 6000 feet. But the more we descend, the less we have to descend 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. We are still 34 nm from CLS so we have enough time.

- First of all we must open the HOLD page by pressing the HOLD button (in fig 26 you can see we have a DEL@ label in the scratchpad. We must clear the scratchpad so we press the DEL button again).

fig 26

- Now we could make the holding right where the plane is by pressing 1LK (but this is not what we are supposed to do) or just copy CLS from the list by pressing the left function key that is near CLS waypoint). If it is not on the current page, then you can navigate through the pages with the NEXT PAGE and PREV PAGE buttons.)

fig 27

- Once we have selected CLS it will appear in the scratchpad. The only thing needed now is to press 6LK, so the holding over CLS will be programmed (fig 27) and the Holding icon will appear over the point we chose on the MFD (fig 28).

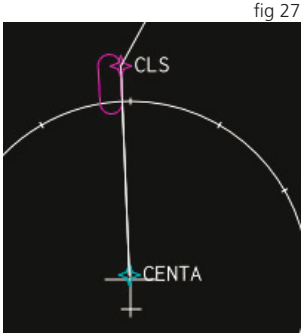


fig 28

- We can choose between doing fig 28 a left turn holding or a right turn holding. We are going to choose the default option to the left, so we don't have to change anything.

- We are descending and everything is going smoothly. We are close to CLS and almost at 10,000. We have reduced thrust and even applied the spoilers a little to be closer to 250 knots. We have also changed our final altitude to 6000 ft (fig 29).

fig 29

We are at CLS and the plane is starting its holding turn to the left, and the plane is at 6,000 ft. Everything is going perfectly (fig 30). We expect 10 minutes of holding, so if every holding takes around 4 minutes to complete, then we should expect 2-3 turns...

fig 30

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

- IB032, puede continuar ruta. (IB032, you can continue the route.)
- Procedemos de nuevo a ruta. IB032. (We will go back to route. IB032.)

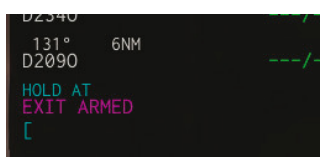


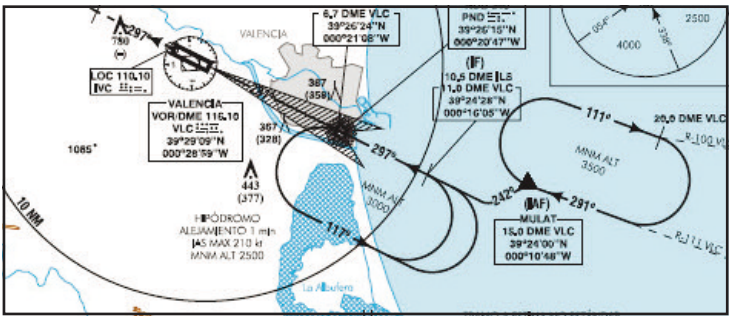
fig 31

So we must ARM the exit. We go to the Holding page on the FMS and we press 6LK next to Exit. EXIT ARMED will appear in magenta (fig 31). The plane will proceed to complete its full third turn before exiting the HOLD pattern, because we armed the exit after passing CLS for the third time.

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

It is now time to configure the ILS approach.

- First we need to tune the NAV1 (or NAV2) radio to the ILS frequency. From the Approach chart we can read that the ILS frequency for runway 30 in LEVC is 110.10.



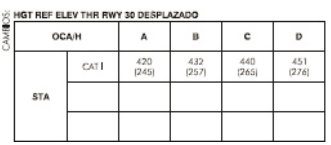
- But remember we have the autotune function on the FMS and we are still far from Valencia. So we must set NAV1 radio to MANUAL mode.

fig 32

We press 4LK and MAN will be illuminated in cyan. We can now tune the NAV1 radio. If it is in AUTO mode and we try to tune it, it will automatically change to the closest radio aid (fig 32).

- We can now set NAV1 to 110.10 on the FMS radio page: Just write 110.10 on the scratchpad and then press 3LK.

- Now we are going to set the decision height which we get from the bottom of the approach chart. Our CRJ 200 is a C class plane so we read 265, which means we must set the Decision Height to 265.


HGT REF ELEV THR RWY 30 DESPLAZADO

CAMBIOS	OCA/H		A	B	C	D
STA	CAT I		420 (245)	432 (257)	440 (265)	451 (276)

fig 33

- First of all we must get the DH label into the PFD. We go to the left panel, and press the thinner DH/MDA knob (fig 34). Immediately the current DH will be visible. We rotate the thin knob and adjust the altitude to 256 (fig 35).

fig 34

We are descending to 5,000 ft (our goal is a progressive descent to 2,200 ft where the Glide Slope will become active) (fig 36).

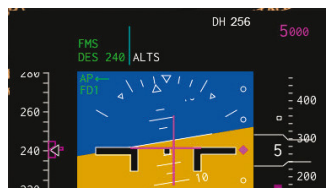


fig 35

If we are in a holding, making 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 by deleting some waypoints from the LEGs page. We have to delete the waypoints between MULAT and the next active waypoint. It is not good to delete that active way point, because once deleted the course is going to change immediately and the plane will turn towards the next active waypoint. Once we have programmed the EXEC function this will only happen after pressing the EXEC button.

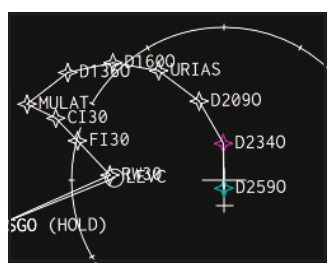


fig 36

- Because right now we are flying between D2590 and D2340 programming a direct to MULAT could be done in two different ways:

1. We write MULAT on the scratchpad and just "paste" it by pressing the left function key that is next D209O. That way MULAT will be the next waypoint after D234O. But still the "other" MULAT programmed before will still be on the legs page, so if we just did this "paste" only, the plane would go like this:

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

   So we should delete the points after the first MULAT: D209O - URIAS - D160O - D136O - MULAT.
   Just delete the points between D234O and MULAT. D209O - URIAS - D160O - D136O.

   How we do this? Easy. Just press the DEL button and when DEL@ appears on the scratchpad you have to press the Left Function Keys next to MULAT, D209O, URIAS, D160O and D136O. For every waypoint to be deleted you have to press the DEL button again and repeat the process.

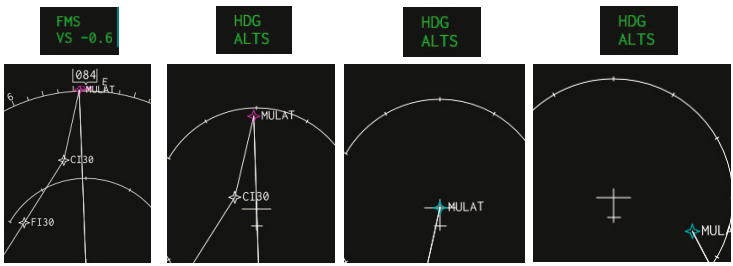
   When you do that, the route will look like in figure 37, and the plane will start its turn to MULAT when reaching D234O.

fig 37

   We should reach MULAT at 3,500 ft so we set the Altitude to 3,500 and start the descent while flying to MULAT.

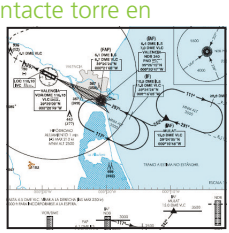
   We are flying to MULAT and we are going to deactivate the Navigation mode. While we are flying a straight line to MULAT we activate the HDG mode to synchronize HDG with the plane's actual course. We are ready to press the HDG button when we are about 8nm from MULAT. Why do we do this? Because if we allow the Navigation mode to navigate the plane it will turn left when reaching MULAT to follow the route. However, the angle between current course and the new one is too wide and the plane would take relatively long to intercept that new course.

2. The better way is to pass MULAT and fly 1 minute at the same Heading. After that program the Approach mode and turn to the right to intercept it. This will be more precise than the Navigation mode.



So we pass MULAT and start the chronometer. We are not going to change the heading for 1 minute. Now is the time to change the NAV source to NAV1 and set the course of the ILS to 297º (you can get the course from the chart). Of course before we do this we'd better have this approach authorized 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 the glideslope at 2,200 ft, we set that altitude on the Autopilot and press the APPR button to arm LOC1 and GS (the armed GS mode won't appear yet because ALTS is armed (fig 38a and b).

fig 38a

fig 38b

Soon the LOC1 mode will become active and we will be ready to descend to 2,200 ft (fig 39 a and b) and when we reach that altitude the GS mode will be armed and you will have to take a look at the magenta diamond to the right of the artificial horizon. We also set the flaps to 8º when we are below 200 knots. You will see the red marks for flap security speed appear.

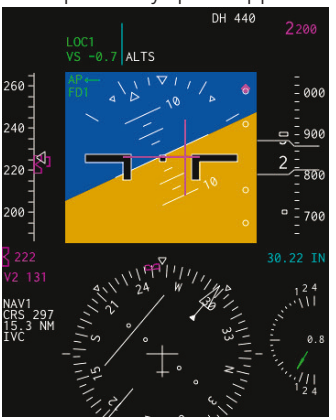


fig 39a

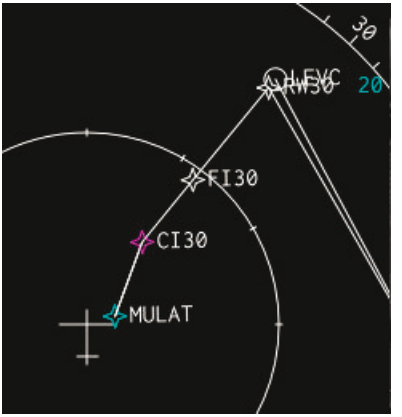


fig 39b

Oh no, I have not forgotten the VSpeeds and Trim configuration, but I am not going to explain them again in too much detail because the tutorial is long enough anyhow. You only need to check how much fuel you have left right now and with that you can go to the sheet to calculate the %MAC and then the pitch trim. VSpeeds are the same. Check your weight (i.e. the weight of your plane which – apart from the fuel that you burned– should not have changed too much unless your friends decided to leave the aircraft too early) and look at the temperature in Valencia and the altitude of the rwy.

Once you have the VSpeeds and Trim you can set the speed bugs.

Why do we set Vr? Because we might have to make a go around.

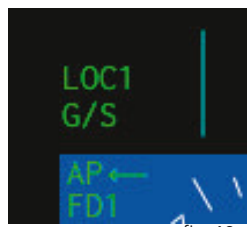


fig 40a

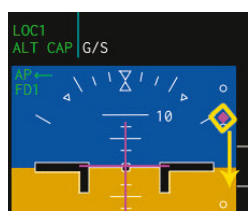


fig 40b

- When we are getting close to intercepting the Glideslope, the magenta diamond will start moving down. When the diamond is at the zero altitude line, we will capture the glideslope and be in GS mode (fig 40).
- Now as we are descending directly to the runway, we set full flaps and extend the landing gears (fig 41).
- We also set Auto reverse thrust and arm the auto spoilers.
- Set the altitude selector to the go around altitude. In this case it is 3,500 ft.


fig 41


LANDING LTS
LEFT
NOSE
RIGHT
PASS SIGNS
EMER LTS


AIR NOSTRUM
COMUNITAT VALENCIANA
EC-JRM

At 100 feet from the ground the Autopilot deactivates automatically and you have to take control of the plane. It won't be difficult if there aren't any turbulences. When you are about to touch down you pull the yokes a little and set the thrust to idle to let the plane "drop".

The thrust reversers will activate when you touch down (you have to do a nice landing to auto-deploy the reversers. It can happen that the reversers don't activate after a hard landing. Be careful, and when the plane has slowed down to 80 knots we deactivate the Thrust reversers (it's best if you assign a button to toggle the thrust reversers. If you don't have any button assigned then you have to set the thrust reversers to idle AND push the 3D thrust levers a little (not your hardware joystick).

We exit the runway and contact Ground. Switch the transponder to Standby position, switch off the Landing Lights and turn on the Taxi Lights. Ground gives us clearance to park wherever we want so we just taxi and park in a good parking place. Around us we can see the planes that made us spend time in the holding...

Now we have to shut down the engines by switching the red levers into the cutoff position. Turn the engine generators and hydraulics off and that's it.
If you pressurized the plane you will be able to open the main door. If not we will have to eat our lunch inside the plane until it is depressurized or until you press the emergency depress button.

And here we are! I hope you enjoyed the tutorial. It was not easy to make it and I hope it was worth the effort.

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

Javier Rollon Moran

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