X-PLANE 11 ADD-ON

AEROSOFT®

CRJ200

Manual

Developed by: JRollon Planes
Software Development: Philipp Münzel
Manual: JRollon Planes, Christoph Beck
Installation: JRollon Planes

Airport Paderborn/Lippstadt
D-33142 Büren, Germany

Tel: +49 (0) 29 55 7603-10
Fax: +49 (0) 29 55 7603-33

E-Mail: info@aerosoft.de
Internet: www.aerosoft.com

CRJ-200

Manual

Add-on for

XPlane 11

Content

Loading and Configuring

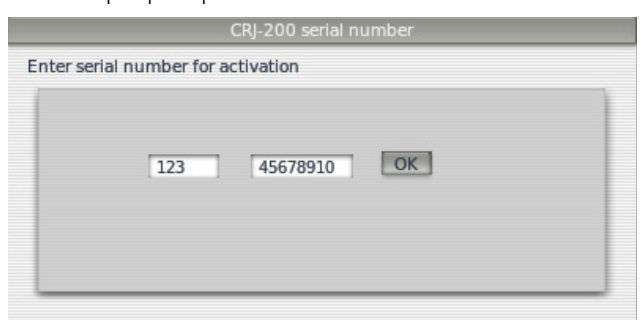
Welcome to the CRJ-200 Tutorial Flight. This tutorial will take you on a domestic flight in Spain, from Salamanca Matacan airport to Valencia. The flight will take about one hour, but you should prepare for at least 1:30h to complete this tutorial, because you will be taken through an extensive preflight. Inflight, you can always pause the sim to catch up with events. Especially in the departure and arrival phase you will be glad you have a pause button.
The tutorial assumes you have already installed the CRJ-200 v1.4 to your X-Plane simulator. The screenshots in this tutorial were taken on X-Plane 9, but you can fly this flight in X-Plane 10 without limitations.

Excursus: Activation

Along with your download or DVD purchase we have shipped a serial number which should look like this:

123-45678910

When loading the CRJ in X-Plane for the very first time you will see a window to enter this code. Enter the first digit sequence in the first input prompt and the second digit sequence after the dash in the second input prompt. Don't enter the dash.



The window should then look like this. Now press Okay.

Excursus: Navdata

The CRJ-200 ships with an initial set of navigational (AIRAC) data which that also includes terminal procedures. For this tutorial flight it is crucial to use this included navdata, otherwise airway or procedure names will be different. Once you have completed this tutorial and feel confident to fly on VATSIM or IVAO, you may update your navdata to be consistent with other network users. You can purchase a "cycle" on www.navigraph.com. Various data formats are offered. The one for the CRJ is labelled "vasFMC Flightmanagment/JRollon CRJ-200 – native**". Download it as zip file which you have to extract. The extracted data consists of various files (such as "Airports.txt" and folders. Drag all these, files and folders, into your X-Plane/Aircraft/CRJ-200/plugins/CRJAvionics/navdata folder. It will ask you to overwrite the content which is already there. Allow it to replace/overwrite the data. Now you will have the latest cycle installed.

Open X-plane 9.70 or 10 and load the plane with engines not running (more info below).

Excursus: Cold & Dark vs Engines Running

The tutorial assumes that X-Plane is configured to start up in cold &dark mode. You can find the option in Settings - Operations and Warnings where the checkbox says "Start each flight with engines running". If the checkmark is set, the CRJ will load completely configured and all systems are ready for takeoff. If the checkmark is not set, the CRJ will load the systems in a cold and dark state. We need the cold and dark state for this tutorial. See if the checkmark is set, uncheck it now and restart X-Plane.

- Go to Environment - Date and time and set 15th April, Local time 7:20h. Don't worry if it is dark, it will be a sunny morning when we are ready for takeoff.
- Now in Environment - Weather set 20°C (68°F) and Baro to 30.22 inches or 1023 millibars.

You have opened the main door (consult manual to know how) and entered the aircraft.

The first thing we need to know is the route we are going to fly. We will use a very nice webpage that I have been using for a long time:

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

Input LESA in the departure field and LEVC into destination. Change the FL330 prompts to FL240, and 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

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

LESA DCT UNSOL A33 CENTA STAR LEVC

The complete route is summed up in this little line and this line is what we are going to introduce in the FMS. This summary is called an ICAO route.

As you can see, the first waypoint is the airport LESA. We will take off going directly (DCT) to UNSOL where we will join the A33 airway until we reach CENTA. Here we will enter the STAR (Standard Terminal ARrival procedure) and approach one of the 2 runways at LEVC.

The page also tells us the total distance to fly which is 256.1 nautical miles. At this point it is good to remember the rule of thumb: a distance of 250nm for this aircraft is about one hour of flight at max altitude of approximately FL250. Easy to remember, or?

Now we need to fuel up the aircraft.

We are not going to fill it up to max capacity. It´s OK for cars but not for aircraft. The more fuel we load, the more expensive it is because of the increased weight. With a heavy weight the aircraft has to burn more fuel to be able to fly. How can we calculate the needed fuel?

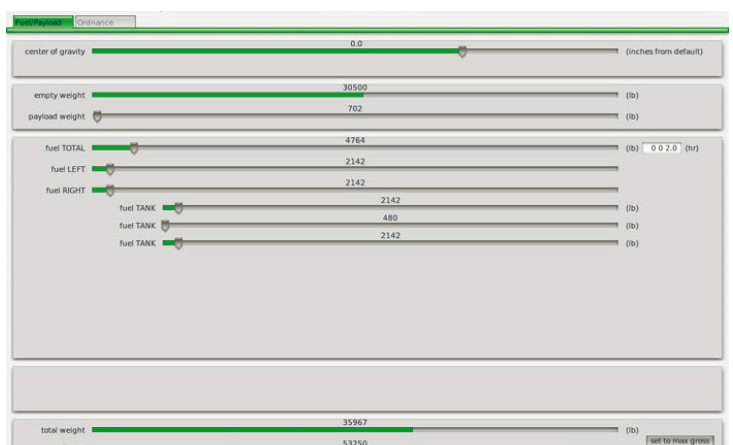
Total Fuel to Load= TAXI+BURN OFF+FINAL RES+ROUTE RES+ALTN

- TAXI: Fuel needed to Taxi and APU. Of course it is not the same on a bigger airport compared to a small one.
- BURN OFF: Fuel needed to travel to destination airport.
- FINAL RES: Fuel for 30 min holding at 1500 feet.
- ROUTE RES: 5% Burn off for Reserve.
- ALTN: Fuel needed to fly to Alternative. 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 an Alternate.

I know my flight will take 1 hour and I need more fuel for Taxi + 30 minutes of possible holding + reserve = 1h + 30min + 30 min = 2 hours of fuel.

In X-Plane there is an easy way to adjust the fuel amount needed for the time you are flying. Go to Aircraft menu - Fuel and Weight and adjust the settings as seen in the image below.

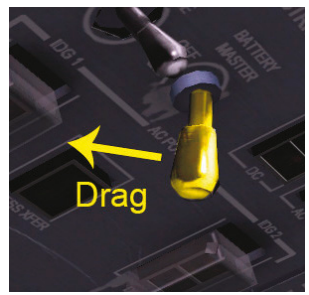


For flight stability it is necessary for the wing tanks to be filled up first and used up last. Upon aircraft load the CRJ will transfer fuel from the center to the wing tanks to ensure this.

Another thing to take into consideration is the payload weight, meaning all the weight loaded into the aircraft. Passengers and luggage, not counting the pilots. This is a rare ferry flight as we are going to deliver this plane to Valencia empty. Only 3 friends will be on board. Anton, Austin and Cameron. Philipp will be flying the plane with me. On the weight and balance sheet you will later see how the payload is calculated. For now just set the payload slider in X-Plane to a weight of 650lb. It is hard to set it that accurately, so somewhere around 650 to 700 is okay. The total fuel slider goes to about 8200lbs, and the CRJ will automatically take care of putting the fuel in the wing tanks rather than to fill the center tank as X-Plane indicates.

Safety Checklist

- Circuits Breakers, closed (red text means the item is not simulated so you can skip it)
- N/W Steering, off
- Hydraulic Pumps, All off
- Landing gear lever, down.
- Spoilers lever. Retracted.
- Flaps lever. zero degrees.
- Radar. Set to off.
- ADG Manual Release. In and stowed.
- Battery Master. I always set it on.



Once you switch the battery master switch on, the 2 central displays will appear and a warning and caution light will flash, accompanied by the warning and the caution sound.

Switch off the warning and caution flashing lights by pressing both buttons.

- APU / AC electrics, External Power.

Because fuel used by the APU is expensive we hook on to external power from the ground power unit as soon as possible. To receive ground power we do the following:

- Make sure the parking brake is set.
- Click the screen of the CDU (Control and Display Unit) to display the 2D popup window.

fig 1

Excursus: Pilot View plugin

All panels, including the CDU, can also be used in 3D view. However, mouse or keyboard navigation in 3D view is a bit cumbersome and slows down your reaction in complex situations such as an instrument approach. This is the reason why the CRJ comes with a configuration file for the pilot view plug-in which lets you use keyboard shortcuts to get fixed, 2d-like views of certain panel sections. To install pilot view, go to this webpage http://www.xpluginsdk.org/pilot_view.htm and download the latest version of Pilot View for your operating system.

Excursus: Remote CDU

As the CDU is probably the most needed popup panel during flight operations, we also made it available to be used on a second monitor, second PC, or a tablet computer device like the Apple iPad. Look at the files Manual/Remote-CDU-Howto.pdf for detailed instructions.

- Press the MCDU MENU button.
- Press the Line Select Key (LSK) next to the <PLANE MENU label.
- Press the LLSK1 (Left Line Select key 1) next to the <EXT AC POWER label.
- The label will change to green indicating the ground power unit has been connected.

In spot view you can now see that ground power is connected.

Back in cockpit view look up to the overhead panel, and locate the ELECTRICAL POWER SERVICES panel in the upper left section. You will see the external AC available light in green (Fig 5). To connect AC power to the plane's AC buses, press that button so the label reads "IN USE" in white (fig 3).

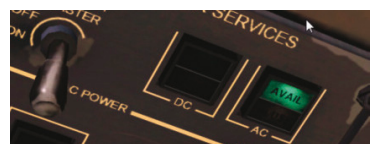


fig 2

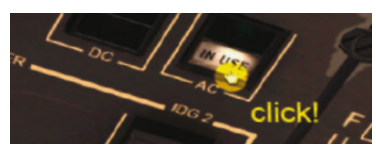


fig 3

You will notice that now all DUs (display units) have lit up – however the PFD (Primary Flight Display) and MFD (Multi Function Display) don't provide any useful information yet, since the IRS (Inertial Reference System) is still off. But for now, continue with the checklist:

- IRS (both) to NAV. Changed to Nav (fig 4).

fig 4

- Airplane documents. On board.
- Hydraulic 3A. set to On (fig 5)

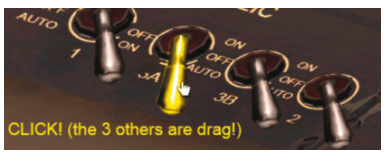


fig 5

Check the hydraulic pressure on the Hyd EICAS display (fig 6).

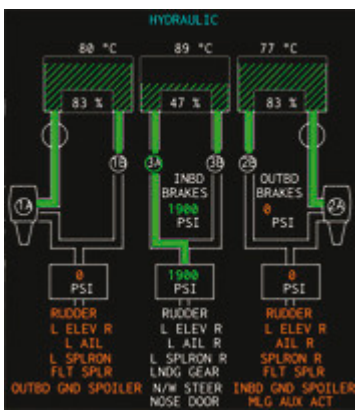


fig 6

Safety Check Checklist completed.

Accepting Checks

- Internal & External Pre-Flight Checks. Completed.
- Audio Warning Panel. Normal.
- Fire Detection, Fire monitor test. Completed.
- Annunciator light test. Checked (fig1).

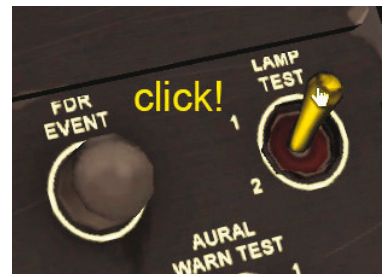


fig 1

The lamp test will light up all lights in the cockpit just as a Christmas tree. Click the test switch again to reset.

- Fuel Panel. Checked.

Open the Fuel EICAS page to see how the fuel is distributed in each tank. Fuel quantity between center and wing will be changing because the auto transfer will ensure that wing tanks are used first (usually while taking on fuel add fuel to wing tanks first). The total quantity however will not change, since we have not started the APU yet.

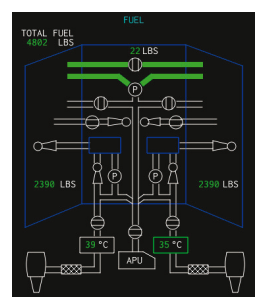


fig 2

- 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 heat. Low. (The 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 switch them on.)
- Standby Compass. Checked.
- Stall Test. Complete.
- GPWS Test. Complete.
- N/W Strings. Off.
- Clocks. Set.
- EFIS Control Panels. Checked.
- Instrument Panels. Checked.
- 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 Yaw Damper lights have to be OFF for the Yaw dampers to be ON)
- Lower Pedestal. Checked. Parking brakes are on.

fig 3

Accepting checks checklist complete!

Before Start Check

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

- Close Main Door. Closed (main flight attendant's voice).
- PASS signs. Both ON (Fasten Belts and No Smoking) (fig 4).
- Pressurization. Set to Altitude of destination airport (240 ft. for Valencia).

fig 4

This is an important one, because the value is used to calculate the correct pressurization profile. If you set a wrong landing elevation, the plane may not depressurize correctly meaning you will not be able to open the door after landing! To set the landing elevation call up the ECS or the STAT page on the EICAS display to view the pressurization parameters at the bottom of the display. The important value is LDG ELEV. (fig 5).
Use the LDG elevation knob in the CABIN PRESS panel on the overhead (upper right section) to set the value to 240ft. (fig 6).

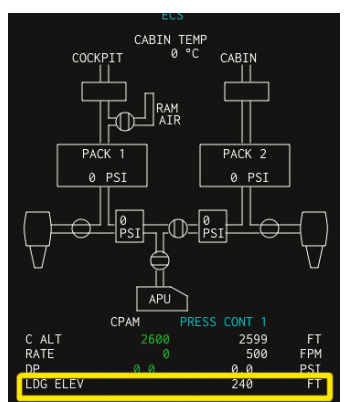
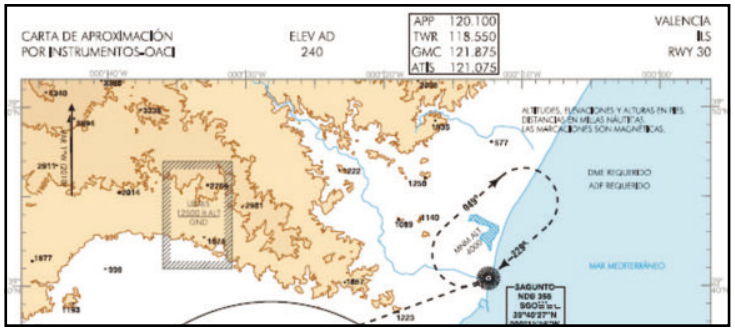


fig 5

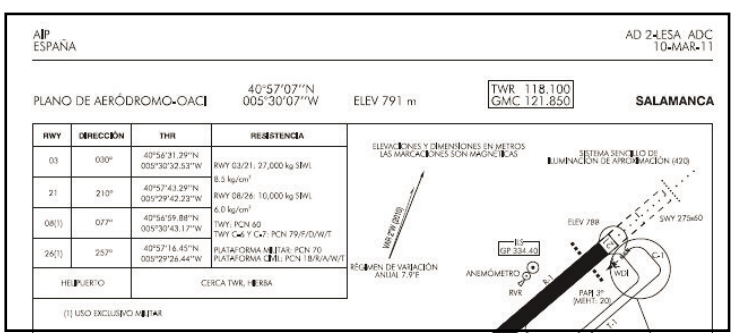
fig 6

Don't worry if you can't match the number precisely, the input is rounded up to 10's of feet. Wait, why did we know that number? We can find it on the approach chart of the destination airport:



(Chart 1)

Now it is time to listen to the ATIS for the altimeter setting. Salamanca however is a very small airport and doesn't have ATIS so we will have to contact ground.



(Chart 2)

As we can see the GND frequency is 121.850 so we tune this into the COM radio. We will now use the RTU (Radio Tuning Unit), later we will also learn how to tune all radios remotely from the FMS. Press the first right line select key (1RK) on the RTU to select the COM1 preselect frequency. (fig 7).

fig 7

Now tune to the frequency 121.850 in the preselect position using the rotary knobs. (Fig 18) Now press 1RK again to switch the preselected frequency with the active frequency. (fig 9).

fig 8

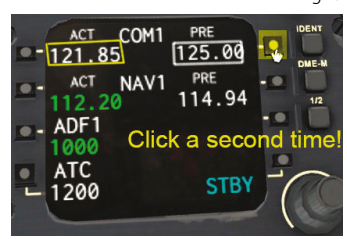


fig 9

- Salamanca Tierra, IB032 (spanish. ATC in Salamanca is of course spanish!) (- Salamanca Ground, IB032)
- Salamanca Tierra, IB032, adelante. (Salamanca ground IB032 go ahead)
- 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 IFR to Valencia. 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 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).

Now that we have the QNH, we can set the altimeter.

Go to the lateral left panel to find the Baro knob. Set it to 30.22 (to set the pressure in HPA press the button above the knob)

(fig 10).

fig 10

The barometer setting is visible on the PFD (fig 11).

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

This is an important one! As seen in Fig 11, red error boxes are shown in the PFD which is supposed to display navigational information. This is because the IRS (Inertial Reference System) has not been aligned yet. To do so, we have to give the IRS our initial position, in this case the coordinates of Salamanca so they are loaded from the database.

fig 11

Do this by once again opening the CDU popup and pressing the INDEX button. By pressing LLSK2 (left line select key in the second row) we get to the POS INIT page: (Fig 12).

fig 12

Enter the ICAO code for our departure airport, LESA. You can either do this by clicking the character keys, or you can use direct keyboard input. To activate keyboard input, click the upper left corner of the CDU popup where a small orange "K" will appear. Now all your key presses go will go straight to the scratchpad. Should you ever notice X-Plane's key commands not working any more, you will probably have forgotten to deactivate the CDU keyboard input. To deactivate, click the upper left corner again and the "K" will vanish, or just simply close the CDU popup which will also de-activate the keyboard.

When making a typing error entering the letters use the CLR key of the CDU, or with an activated keyboard input, the backspace key on your keyboard.

When LESA is shown in the scratchpad, press LLSK1 to set the departure airport. Note the coordinates will show next to it. Copy these coordinates to the scratchpad. To do so, press RLSK1 and you will see the coordinates appear in the scratchpad. Insert these coordinates in the SET POS entry prompt by pressing RLSK5.

Great! In a few minutes we will have all our instruments fully functional.

If you take a look at the PFD now, you will see the message "IRS ALIGN DO NOT TAXI". This must be taken seriously, because the IRS acceleration sensors must calibrate on zero acceleration now.

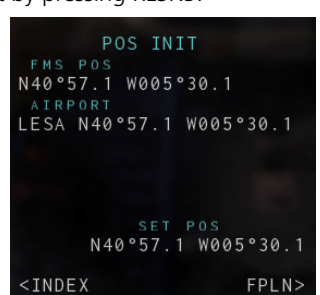


fig 13

If you wait for changes on the PFD you will see how it first shows the altitude and speed tapes, and later the artificial horizon. But we are not going to sit and wait as we now need to program our route into the FMS.

To program the route go to the FPLN page. Press the FPLN button every time we use the FMS to reach that page. Remember our route:

LESA dct UNSOL A33 CENTA star LEVC

Because we have already entered our departure airport on the POS INIT page, this information will be already there (if you later start the plane with aligned IRS, you can also insert the departure airport on the FPLN page in the LLSK1 prompt).

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

To enter the destination, type LEVC into the scratchpad and press RLSK1. The direct distance will be displayed in the middle of the first row.

fig 14

Now insert the flight number for visual reference (it will also appear on the EICAS as a reminder). Type IB032 into the scratchpad, and press RLSK5R.

The first leg of our flight plan is "direct UNSOL". Type the waypoint name "UNSOL" and press RLSK4 to insert it as the first "to" waypoint. Note that "DIRECT" will appear on the left, indicating that we are going "direct" to this waypoint as Salamanca has no published SIDs (Standard Instrument Departures). The flight plan page now looks like this. The next leg is the A33 airway to the waypoint CENTA. But we don't have any more input space left on this page! You might have noticed that on the top right the indication has changed from 1/1 to ½, displaying that a second page of flight plan information is available. Press the NEXT PAGE button.

Enter the airway identifier A33 into the scratchpad and press LLSK1 to insert it into the flight plan. You will notice a discontinuity appearing.

That means the FMS doesn't know in which direction we are taking the airway and where we are going to leave it. To delete the discontinuity enter the waypoint CENTA and press RLSK5 to fill the prompt. Now the discontinuity will have vanished and the FMS knows we are taking the A33 airway from UNSOL to CENTA.

fig 16

By the way, did you notice the word "EXEC" appearing in the message line below the scratchpad? The blue ACT designator of the flight plan was replaced by a white MOD. Whenever you edit the flight plan by inserting or deleting points or airways, by changing runways or procedures or performing directs, you modify a temporary flight plan while the plane on autopilot will still follow the old flight plan. This way you can review your changes and make sure your new route is correct before the autopilot starts tracking it. To set a route to active for the autopilot to follow you must execute it. Do this by pressing the EXEC button. If you are however dissatisfied with a change you have made because you've inserted a wrong waypoint, go back to the old active route by pressing the LLSK6 when there is a "<CANCEL MOD" prompt next to it. This will revert all your changes since the last EXEC and you can start fresh with editing.

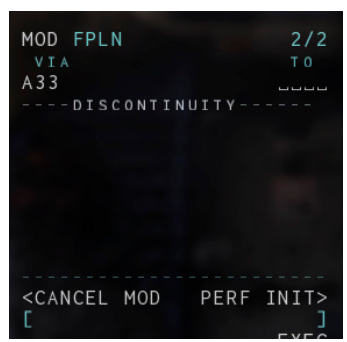


fig 17

We will now review our route and press the LEGS button to bring up the LEGS page on the CDU.

Note the 1/3 indication on the top right. Just as on the FPLN page it says there is more information available on the other pages. To check all legs of the flight plan, use the PREV PAGE and NEXT PAGE buttons. It is standard procedure to check if all waypoints in the flight plan (from the routefinder website in our case) match with the ones picked by the FMS.

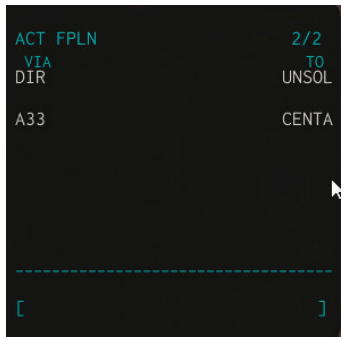


fig 18

When we are satisfied with the indication on the LEGS page, there is one more check we can do with the route: a visual one. The MFD (Multi Function Display) has a mode to display the flight plan and follow it through all the legs while we are safely sitting on the ground.

To do this, we are going to use one of the modes of the Multifunction Display (MFD). To select the mode we must go to the left panel and rotate the big (outer) FORMAT knob.

fig 19

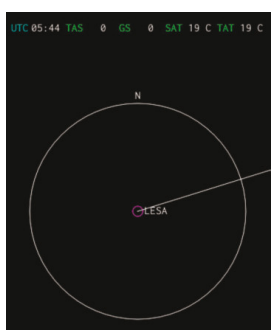


fig 20

When you see an image like the one on (Fig 20) you have the desired MFD format. It will be centered on the first airport of the route. In our case LESA.

We want to zoom out a bit, but how? It´s easy!. Remember the big knob on figure 19. Go for the smaller (inner) one!

fig 21

Now we can navigate through this view by changing the waypoint that serves as the center on the MFD. To pan the view press the up or down arrow keys on the CDU.

fig 22

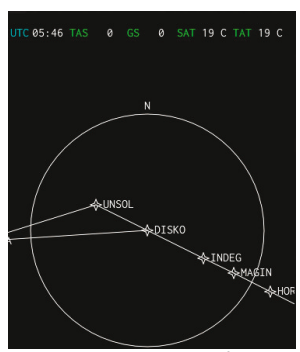


fig 23

We are happy with our route to CENTA, so we can press EXEC. Note that the route will change from a dashed line to a solid line on the MFD. A dashed line denotes a temporary flight plan which the autopilot will not follow! Only if the flight plan is executed and there is a continuous the line, the autopilot will follow it.

The last thing left to do is to tell the FMS from which runway we are going to take off at LESA. Press the DEP ARR button. Then press LLSK1 to go to the departure screen of LESA. Press the RLSK adjacent to runway 03. Don't forget to press EXEC again to activate the change.

Once we have checked that everything including the route correct we are going to leave the MFD mode, the one shown in figure 24, by turning the outer MFD format knob back one position (fig 24).

As we are happy with our route, we are going to save it in case we want to fly this route again (it is always a good idea to fly the tutorial more than once to get the hang of it). To save the route press FPLN to get to the flight plan page. Enter a name for the route in the scratchpad. Type LESALEVC. Now press LLSK5 to copy the active route to the file.

fig 24

The routes are stored in the CRJ-200/plugins/CRJAvionics/routes folder. If you want to load the route later, type the name into the scratchpad and press LLSK2 to load it as a company route.

- Radios and Nav Aids. Set for departure.

The CRJ has an auto-tuning feature on the FMS so verify that it is on. You can access the page with the RADIO Button.

fig 25

We have to check that the radios are in AUTO (cyan color is selected option). In our case we can see that both NAVs have been tuned to frequency 112.20 , the one near LESA - BBI VOR. If we want to tune other frequencies, insert a frequency here and the mode will change to manual. Note that the auto-tuning mode will not set VORs by your flight plan or even tune the ILS for you – it is merely there to make sure the FMS has DME information from known stations in the vicinity to update the calculated position. Remember the CRJ-200 doesn't have a GPS so it relies on the IRS and position updating through DME stations. That's the sole purpose of Auto-tuning.

On the PFD we should now see if the Navaid is tuned correctly. The first thing we need to change is the Nav Source if it is not already on NAV1. To do that, go to the right panel NAV SOURCE knob and rotate it until we see NAV1 on the PFD .

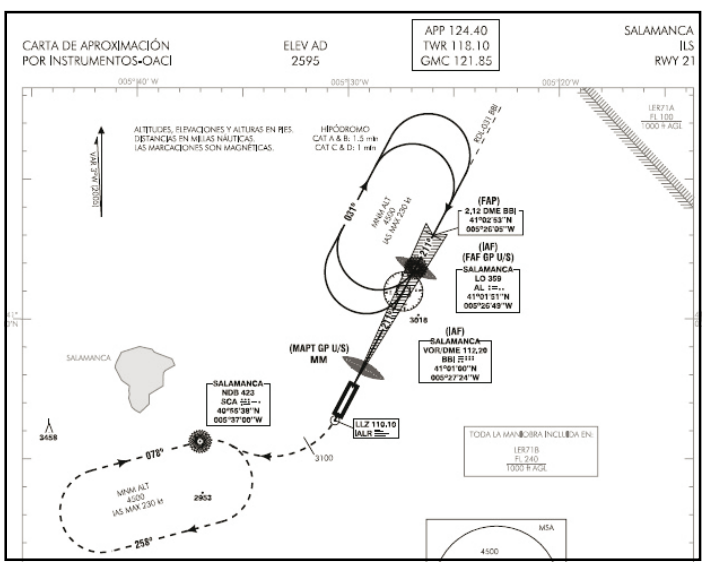
To show the bearing pointers for the tuned Navaids press the BRG buttons. One push shows VOR bearings and a second push shows the ADF bearings. A third push hides the pointers.

Ok? Now you can continue with the Checklist!

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

The 4500ft is taken from the airport chart and it is the go-around and holding altitude at LESA (LESA doesn't have any published standard departures, so this is the value we're using). If we encounter any kind of problems, e.g. a bird strike which is fairly common in X-Plane, we need to go back to BBI VOR and hold until ATC gives us further instructions.

A quick look at the approach plate of LESA gives us this info:



IMPORTANT NOTE: As said, there is game, birds and random failures which appear in X-Plane. I think it is important to stress that before anyone thinks there is a problem with the aircraft (bug) because a failure has come up, first check if you have activated the random failure function of X-Plane. It is nice to have it activated as it makes the flight more challenging. But when beginning, please deactivate it. The CRJ has a very complex systems simulation and what you might think is a failure because it is not working might be because you didn't follow the procedures correctly.

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

Before Start Check completed!

Cleared to Start Check

- APU. On.

To start the APU, bring up the STATUS page of the EICAS by pressing the STAT key. Right now, it only will show the Trims and some information about the pressurization.

- On the APU panel press the PWR FUEL button to open the fuel Valve to the APU (fig 1).

fig 1

- Two gauges without any needle will appear on the STATUS page and the label DOOR OPEN will be shown (fig 2).

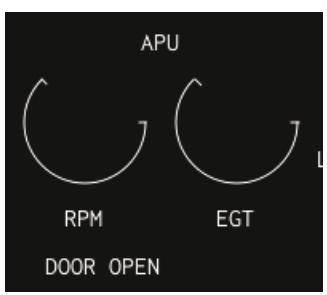


fig 2

The air inlet door will have opened as you can see from the spot view.

- Press the START/STOP button next to the PWR FUEL you've pressed before to start the APU. Two green needles will appear on the APU gauges and will start increasing RPM and EGT (fig 3).

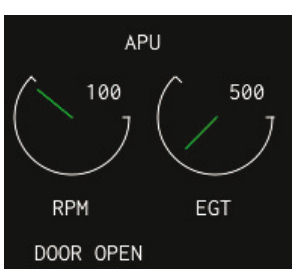


fig 3

Once the RPM has reached 100%, the green AVAIL light will be visible on the START/STOP button (fig 4).

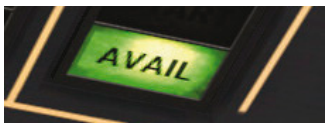


fig 4

Now we are burning fuel so we better hurry up! With the green light on, we can now feed the plane from the APU generator.

- Go to the Overhead panel and turn on the APU GEN switch (fig 5).

fig 5

Then switch of external power.

- Go to the ELECTRICAL POWER SERVICES panel and click the AC button which is lit with the white IN USE label. It will change to the green AVAIL.
- Press the MCDU MENU on the FMS and select Plane Menu then press the 1LK next to EXT AC POWER to turn it white.

This will cause the GPU unit to be removed from our aircraft. This is important as we don't want to start taxiing with this thing dangling from our nose!

In fact we have built a little safety mechanism here: You will not be able to release the parking brake if the GPU is still connected. So if you start wondering why you can't release the brakes, you probably forgot to either close the doors or to disconnect the GPU.

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

We are going to change the Autopilot command panel to set it for a good take off.

First switch on the Flight Director servos as they will guide us manually or automatically.

- Press the FD button on Autopilot command panel. a magenta cross will appear on the artificial horizon immediately (fig 6 and 7) and the label FD1 will also appear.
- Now activate the HDG mode (but do not switch on the Autopilot yet. The aircraft must at least reach an altitude of 100 feet above the ground before you can swith on the Autopilot). Press the HDG button. A magenta bug will be shown on the HSI pointing at our present heading (fig 8 and 9)

fig 6

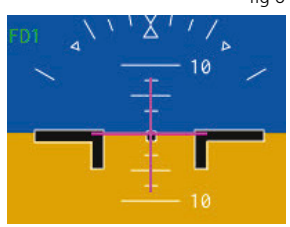


fig 7

fig 8

fig 9

- Rotate the HDG knob until we can see that the HDG bug is on the 30° (runway heading) make sure this value is also shown on the PFD (fig 10 and 11).

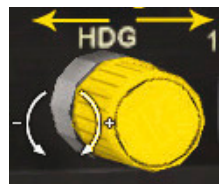


fig 10

fig 11

- Now set the Altitude and press the mode to later climb to this altitude. Press the ALT button and then rotate the Altitude knob until it reads 4500 on the magenta number over the altitude tape on the PFD (fig 12 and 13).

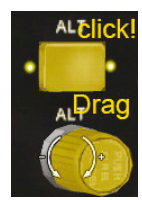


fig 12

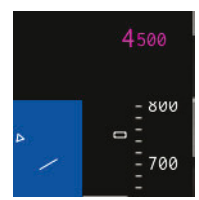


fig 13

- Doors. We already closed them before pressurization.
- Beacon. On. (fig 14)

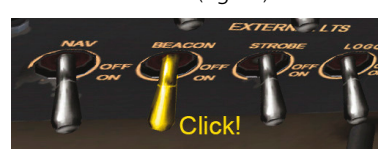


fig 14

- Fuel Pumps, Gravity XFlow & Quantity. On, and check quantity. (fig 15)

fig 15

Check the opened valve of Gravity crossflow on the Fuel EICAS page and also the fuel pumps (fig 16 and 17).

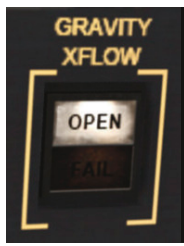


fig 16

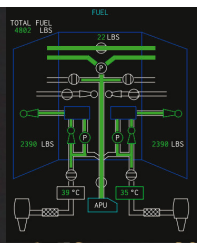


fig 17

- Hydraulic Pumps. Auto (fig 18).
- Parking brake. On.
- Packs for start. Off (by default they are off but it is better to check).
- Ignition A (on an odd day, B on an even day). Arm.

fig 18

We now begin with the engine start procedure. Because we can taxi straight ahead from our parking position we do not need pushback service and we can start the engines right now.

Take a look at the Primary EICAS display. All the gauges will be reading zero values, except for the ITT which will read close to ambient temperature or higher if the aircraft was flown before cool-down (fig 19).

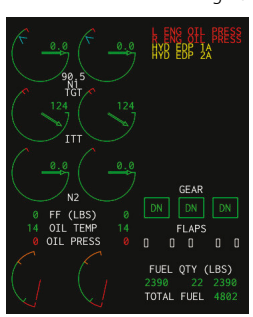


fig 19

- We press the ARM IGNITION A (or B depending on the day) (fig 20).

Open APU bleed air valves to let the air coming from the APU drive the starter of each engine.

Go to the 10Th Stage panel and click 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 going to the engines. If we had the PACKS open the pressure to the engines would be lower so we could have trouble starting them. This is why they are off (fig 22).

Now we can start the engines.

- Start with the right engine. Press the START button. (fig 60) The N2 gauge of the right engine will show a rising rpm in % (fig 24).

fig 20

When the N2 % is over 17 we can proceed to open the fuel valves for the right engine. Do this by pulling the right red lever to unlock the throttle (fig 25).

You will see how the N1, ITT and N2 gauges are increasing until they stabilize. The oil pressure will also start to increase (fig 26).

- Once we have started the right engine we repeat the procedure on the left engine by selecting the left buttons and levers respectively.

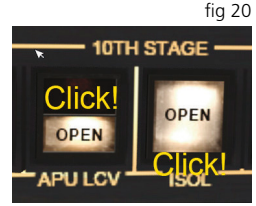


fig 21

At the end the Primary EICAS display will show the gauges in this way (fig 27).

Maybe you noticed that once oil pressure for both engines is in the green arc only the numerical indication will remain and the gauges will be replaced by the vibration gauges.

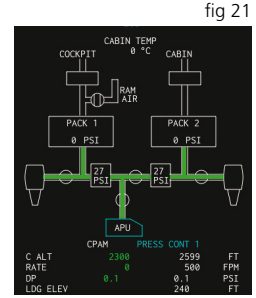


fig 22

A word of caution: Never pull the cutoff levers before N2 has reached about 17% or you will experience a hot start. You will notice this by a rapidly increasing ITT indication, probably going into the red zone. If you see this, abort the start and close the cutoff valve immediately because an engine fire is imminent.

At last we have started the engines!

Cleared to Start Checks Complete!

fig 23

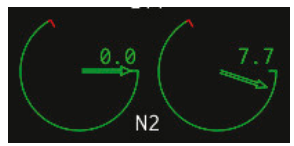


fig 24

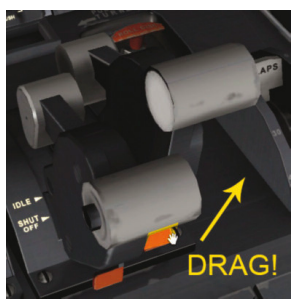


fig 25

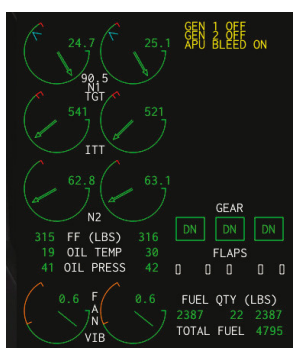


fig 26

After Start Check

- Engine generators. On.

It is time to connect the engine generators to take over the load from the APU.

- Switch on Engine Generators and switch off the APU Generator (fig 1).
- Switch off the APU Bleed Air Valves. We press APU LCV and ISOL to close the valves.

fig 1

You will notice on the STAT EICAS page the
APU EGT will decrease a bit because it no longer has to supply bleed air. Allow the EGT to decrease (30 seconds should definitely be enough) and then shut down the APU:

- Turn off the APU by pressing the START/STOP button again.

Watch the APU spool down on the EICAS and when the RPM gauge is safely below 30% switch off APU Fuel which in turn will also close the APU door.

- Press the PWR FUEL button. The APU gauges will disappear from the STATUS page and the label APU DOOR CLOSED will be visible.

We have now shut down the APU.

- Ignition A (or B). Off (if we were in icing conditions we would now select continuos ignition).
- Left and Right Packs. On. (Yes, our friends complain of bad air in the cabin. Let's refresh them) (fig 2).
- Anti Ice. As required, Off.
- Probes. Probe heat on (fig 3).
- APR. Tested. Armed.
- Electronics. Checked. We take a look to the ELEC AC and DC pages on the EICAS to see if everything is normal (green indications around).
- Rudder. Chequed pedals motion.
- N/W STRG. Armed.

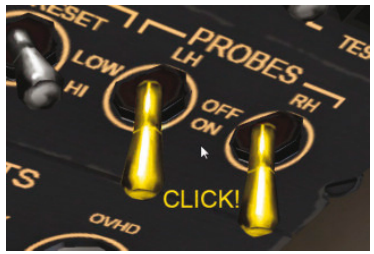


fig 2

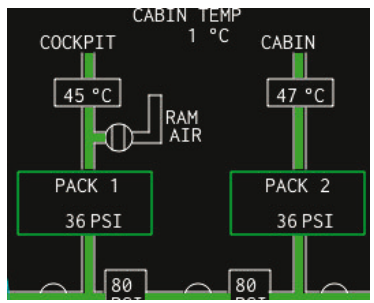


fig 3

After Start Check completed!

Taxi Check

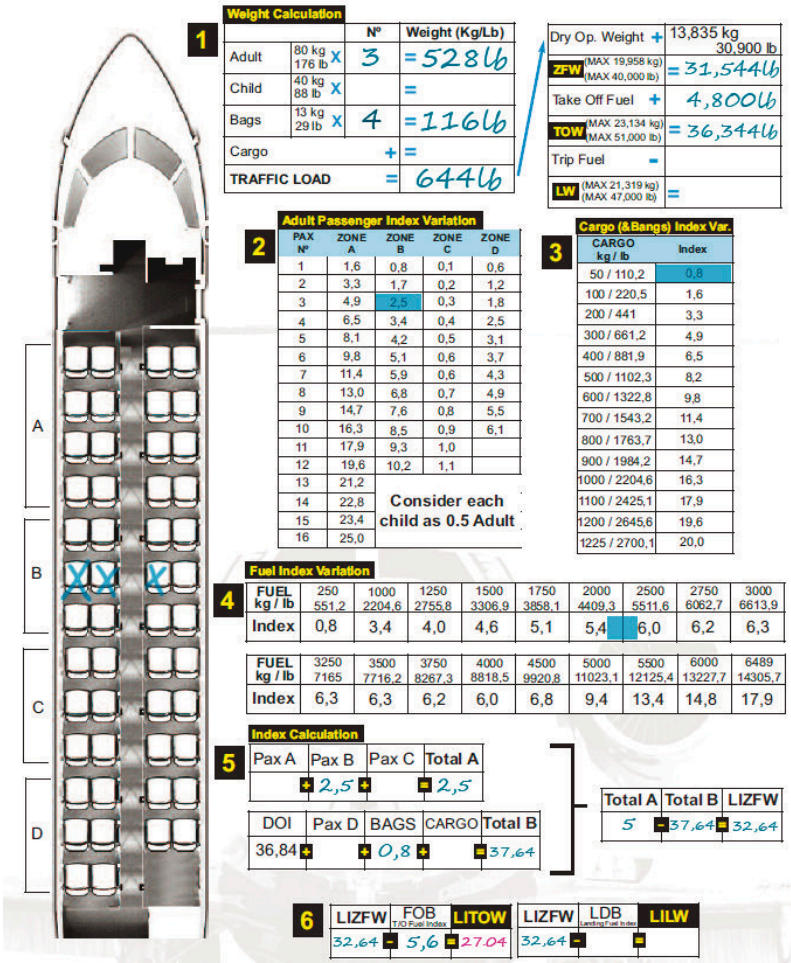
- Flaps. Set 8° (fig 4).
- Fligth Controls. Checked. Yoke and pedals move correctly.
- Trim and Stab. Set and green.

fig 4

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

Trims

For calculating the Pitch trim necessary for take off we must go to the page 4 of the pilot manual (you can find it in your Aircraft/CRJ-200/Manual directory). I recommend to print out this page for every flight you make and write down the calculations. Here is an example of the calculation. Please observe the yellow correction boxes because we had to revise the fuel flow with new data from our consulting pilot.



Here's how you do it:

1 We put in the number of passengers (adults and children) and the number of checked in bags and multiply with the standardized weights. The whole sheet calculates in pounds rather than kilograms because the input in X-Plane is always pounds, regardless of the local setting. On our delivery flight we have 3 passengers so the weight reads 3x176lb=512lb. We also have 4 bags in the cabin. 4 x 29lb = 116lb.

The sum of both numbers = 644lb. Remember the payload screen where we set the payload weight close to 700lbs (because the slider in X-Plane is not that accurate).

Continue with the arrow and add 644 + dry Op Weight (30,900lb) = 31,544lb.

Next we add that to the Take Off Fuel which is close to our boarded 8200lb.

So it is 39,744 lb.

We can make this simplification of initial fuel = take off fuel at Salamanca because it is a small regional airport with not much traffic while taxi from the parking position to the runway only takes 3 minutes. If we were to plan a departure from a busy international airport we should calculate for taxi fuel which will make up to half an hour on really big airports.

2 Now look at the passenger manifest to see where our friends seated. The flight attendant marks the occupied seats on the paper so we can continue calculating. They are in zone B and as they are 3, the index to the passengers will be 2.5.

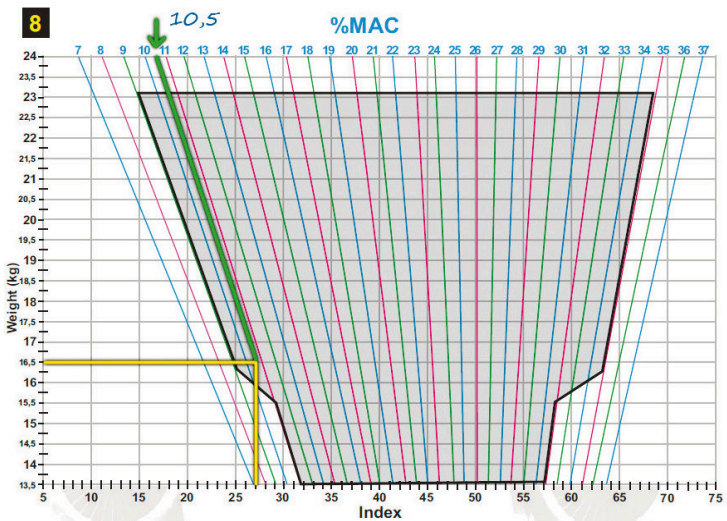
3 The weight of the bags is 116lb so the index is 0.8.

4 The take off fuel index corresponding to 8200lbs is 6.2.

5 Add up the indices: Our table reads that our 3 passengers in zone make a 2.5 and this completes the Total A sum. Add the bags/cargo index to the dry operating index (DOI) we a and get 37.64. Making the subtraction we get the (absolute value) of our Load Index at Zero Fuel Weight LIZFW of 32.64

6 Subtracting the 6.2 load index for the fuel we get a Load Index at Take Off Weight (LITOW) of 26.44

8



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

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

With the LITOW (26.44) we can calculate the Pitch Trim setting. Go to the %MAC chart on page 5 of the Pilot Manula and calculate the %MAC. This chart is in kg so we need to convert the take off weight to kg making it 18062kg. Start on the left side at the weight of 18 and on the bottom at 26.4 load index and cross those lines.

Where those lines cross, we follow the nearest blue, red or green line to read the % MAC (mean aerodynamic chord) on the top of the graph. We end at roughly 11%.

Now look at the table to get our stabilizer trim setting. With a bit of linear interpolation, we get 7.8. Finally, this is our trim setting for take off!

Using the X-Plane trim up command (either on our joystick or on keyboard) we move the stabilizer trim so that the Stab Trim tape on the STATUS page shows 7.8. (fig 4).

Too much calculation for such a little number? Well that is what pilots do in real life. Most of them have company software to do it on their notebooks in cockpit and modern aircraft like the A380 can do it right in the FMS but all pilots need to know how to do it by hand if all else fails.

I have to thank our great real-life CRJ pilot who showed me all this! Thanks Ed!

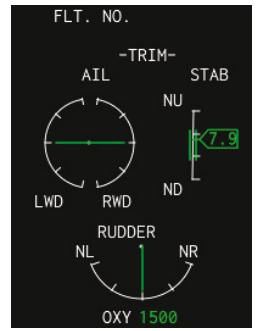


fig 4

Now continue with the checklist...

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

Now check the autopilot panel again to see if everything is programmed and set the VSpeeds on the PFD.

Just remember our TOW. It is 39740lb as we calculated for finding the %MAC. Go to the Take of Performance Data Tables on the pilot manual to calculate the VSpeeds. Take the card for 18000kgs (approximately 39700lb).

We are going to take off with 8° flaps as we are not so heavy this flight. We now have:

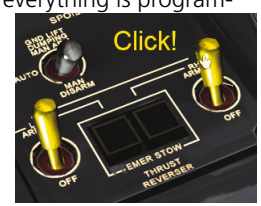


fig 5

Ok, so we will have:

V1: 122kts (with correction 123kts)

VR: 125kts (with correction 126kts)

V2: 137kts and

Vfto: 153kts

Check that we have to correct the V1 by one knot because of a temperature of 20°C at 791 ft (elevation of Salamanca.

Now set the speed bugs on the PFD accordingly:

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!

- Go to the left side panel and play with the SPEED REFS knob. First check that the big knob is on the TGT position to set the Vfto. If we want to modify Vspeeds drag the rotary to the VSPDS position (fig 6).

fig 6

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

fig 7

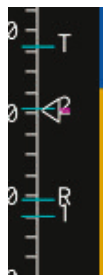


fig 8

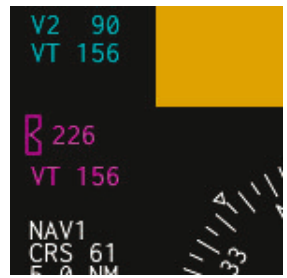


fig 9

- To set the Vspeeds you turn the big knob to the VSPDS as said and then start tuning them with the little rotary like the Vt speed. When you have finished with one select next Vspeed with the SEL button over the rotary (fig 7). The sequence is V1, Vr, V2 then goes back to V1 again.
- Continuing with the checklist:
- FMS. Autotune (radio).
- BTMS. Checked.

Taxi Checks Completed!

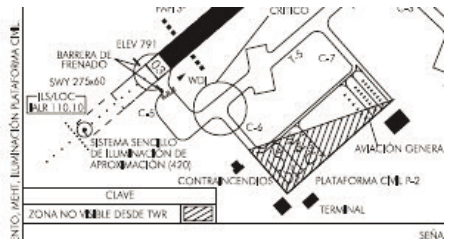
We are now ready to call Ground to ask for the taxi clearance to holding point of rwy 03.

- IB032.
- Adelante IB032. (Go ahead IB032).
- Estamos listo para rodar, IB032. (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 holding point runway 03 from your position via C6, Tango, C5. when ready contact tower on 118.100). Squawk 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 ready, IB032).

(chart insert)



From our position, see the map with the route the aircraft has to taxi to HP of RWY 03. We have taxi clearance so we continue with our procedures.

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

The transponder setting can either be set on the RADIO page on the CDU or on the RTU as we do here: Press the 4LK function to select the ATC number and with the rotaries set the Transponder code to 5372. Be sure that the transponder is on Standby (fig 10).

fig 10

- Parking Brakes. Off.

Apply a little bit of thrust on both engines until the plane starts moving and control the turns using the pedals. LETS ROCK AND ROLL! When we reach the holding point of 03 we tune to the tower on the radio and call.

- Torre de Salamanca, IB032 (Salamanca Tower, IB032).
- Le veo, Puede entrar y mantender, IB032. Responda on Charlie. (Visual. Taxi into position and hold, IB032. Set Squawk mode Charlie).
- Entramos y mantenemos, IB032. (Position and hold, IB032).

Before Take-off check

- Press 4RK on the RTU to change the transponder mode from Standby to Charlie mode (R in cyan).
- Switch on the Emergency Lights.
- Landing Lights on.
- Taxi Lights off.
- Strobe Lights to on.
- Elapsed timer start.

You should use the Pop-Up screen for the PFD so open it.

Hint: if you want hide the frame of the displays you can go to Aircraft/CRJ-200/plugins/CRJAvionics/Resources folder, and rename the file DisplayFrame.tiff to DisplayFrame.tiff.off.

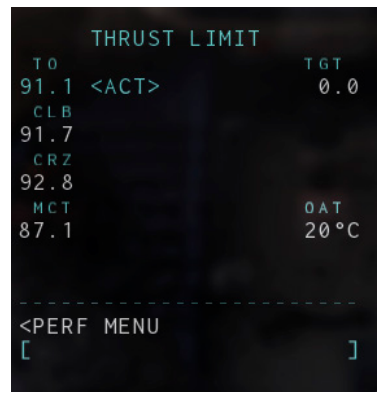
- IB032 permiso para despegar. Viento en calma QNH 30.22. Llame en el aire. IB032 cleared for takeoff. Winds calm. QNH 30.22. Report airborne).
- Llamaremos en el aire, IB032 (We will call airborne, IB032).

When I was following tutorials such as this one it was often said, "once you reached this point press pause mode if you need it". I really do think it is necessary in most cases. But the main idea is once you are in the air and are controlling the aircraft manually while using trim it and your are on a steady climb, you can then continue with autopilot modes. Note that it is not a good idea to let the autopilot kick in on a badly trimmed aircraft.

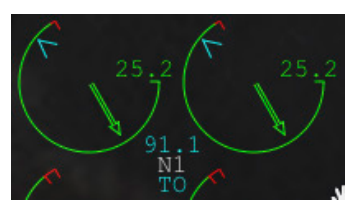
But there is one little thing we need to do before pushing the throttles to full forward and that is to set the thrust limiter. You don't need full power for take-off. Your boss won't like full-power take offs because not only does it consume more fuel, it also adds considerably to engine wear and will shorten maintenance intervals and overall engine lifetime.

Go to Pilot Manula and look for Reduced Thrust Take-off setting %N1 in page 17. We are at 790 feet and the temperature is 20°, so with a bit of interpolation between the cells you will see the required thrust is ca 91.2% N1.

To set and confirm this with the FMC, press the PERF key, go to the Thrust Limits page and enter outside air temperature. Type 20 into the scratchpad and press RLSK4. Roughly 91.2 percent will appear in the T/O field (depending on whether you use X-Plane 9 or 10). To activate the limit, press LLSK1 so the limit is marked ACT.



Take a look at the primary EICAS and you will notice the limiter mark on the N1 gauge. The FADEC controller will keep the N1 at or below the limit.



Ready to rumble!

Take-off

- Push the throttles about a third of their way forward and observe the engine indications. If all show a steady upward manner with little or no asymmetry between them, call "Stable!" and push the throttles full forward. Do not jam the throttles forward, just a nice steady push will do. The limiter will catch the N1 and hold it at the preselected value.
- Once we are over 40 knots the speed tape will start to move. We will see the bugs of Vspeeds coming into view. Call "Airspeed alive!"
- Crossing V1 we need to commit to takeoff. No matter what happens now (X-Plane's game showing up on the runway, for example).
- Crossing Vr speed we gently pull the yoke (or stick) and pull the nose up to a 15° pitch up, taking perhaps 4 seconds to go from 0° to 15° pitch.
- With a glance over the vertical speed indicator and the radio altimeter tape (next to the baro alt tape) we announce "Positive rate" and put the gear lever in the UP position.
- Hold speed at V2+15 = 152kts and trim if necessary.
- Press SPD, HDG and 1/2 BANK button on the autopilot.
- At 600ft RA you may activate the autopilot
- At 1500ft RA (Flap retraction altitude) retract the flaps, set the autopilot speed bug to 200kts and press 1/2 BNK again to de-select it.
- With flaps retracted, we continue climb to 3000' with 200kts.
- Disarm the auto-reversers.

Climb

Ok, you have autopilot active which is following a heading of 30° and climbing to 4500 feet. We are drifitng away from the route but don't worry.

- Set the NAV source selector to FMS, by dragging it again as shown in Fig 38. So that the indication on the PFD becomes that of Fig 1.
- Passing 3000ft, turn the autopilot speed bug to 250kts (the limit below 10000').

fig 1

We notify 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 on the COM radio we tune that frequency and call.

- Madrid Centro, IB032. (Madrid Center, IB032).
- 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 it is time to catch the route again. First we need to arm the NAV mode. Just press the NAV button on the autopilot panel and the FMS route will be armed as shown on the PFD. We are still flying in heading mode (if you activated NAV mode away from the route) so turn the aircraft directly to intercept the route at an angle between 20° and 60°.
- Turn the HDG knob on the autopilot panel and point to intercept the route (in most cases you will be given the heading by ATC).

Note that this manual intercept is only necessary because we didn't have a route to track from our runway to our first waypoint. Remember Salamanca is a little regional airport and has no published SIDs. At a major airport, you would be tracking the SID right from the runway and would not need to intercept it manually.

- the aircraft will start turning (to the right in our case).-

- When almost back on track the plane will change from HDG mode to FMS mode (shown on the PFD) and the aircraft will start its turn to the left to catch the route.

We have probably reached 4500ft by now and the aircraft will pitch down. Pull back the throttles! The CRJ-200 doesn't have auto-throttle so once the autopilot changes from SPD to ALT CAPture mode, the plane will accelerate. So ease back the throttles and use the magenta trend vector on the speed tape of the PFD to find a thrust that will hold 250kts.

WE ARE ON ROUTE!

- Turn the ALT knob on the autopilot to 24000 ft.
- Next, we press SPD mode. The speed bug will reset the speed to the actual speed the aircraft is travelling now. Turn the speed knob as necessary for a setting of 250kts.
- Nothing has changed with the green CLB 250 label on PFD and ALTS on white armed.
- How do we start to climb? Just push the throttles. The aircraft will have more thrust and as the speed mode is selected and with the aircraft having to maintain that speed, it´s the only way to start climbing. If we use, for example, the speed mode for descending, then we should do the opposite. Just pull the throttles back. The aircraft will maintain the speed with a pitch down. Easy, isn't it?

You control pitch angle with the thrust of engines.

ENJOY!

When crossing 10,000 feet it is time to set the altimeter to a standard setting of 29.92. It is easy, instead of tuning to 29.92 just press the BARO knob. We may also now increase our climb speed to 280kts.

The aircraft is close to UNSOL and is going to start its turn to the next waypoint DISKO.

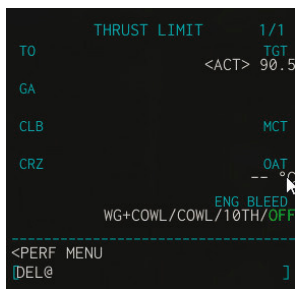


fig 17

- Turn off Landing lights and set the seat belt signs to off so the folks can move around and visit us in the cockpit (FAA, eat your hearts out!).
- We are going to release the CRJ from the thrust limit. To do so, go to the thrust limit page on the FMS again and on a clean Scratchpad press the DEL button. DELETE will appear on Scratchpad. (fig 82) When we see this DELETE function on the scratchpad we can delete all kinds of entries like this thrust limit or waypoints on the LEGS page or airways on the FPLN page The only thing we need to do to delete the limitation is press 1LLSK. The indication on the EICAS will blank out and we will have full thrust if we desire it (at higher altitudes it is harder to get too much power from the engines because of the thinner air).

Cruise

We are nearing DISKO and should be close to our final altitude. The aircraft is still climbing so we must take care of it.

- 23,000 feet and the 1000 feet alert sounds. We are close. Put one hand on the throttles.
- Nearing 24,000 the aircraft starts to pitch down to level. You will see how the magenta speed trend vector starts to go up. It is time to start pulling back the throttles of the aircraft while letting it continue to increase the speed.
- 24,000. The aircraft has leveled out and has increased the speed. We are going to reach 0.75 Mach (the speed in Mach is over the speed tape)
- Be careful with the red band that appears on top of the speed tape!

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

First we need to do is to find out the active runway at Valencia. Call Madrid center to find out.

Madrid Centro, IB032. (Madrid Center, IB032).

IB032 adelante. (IB032 go ahead).

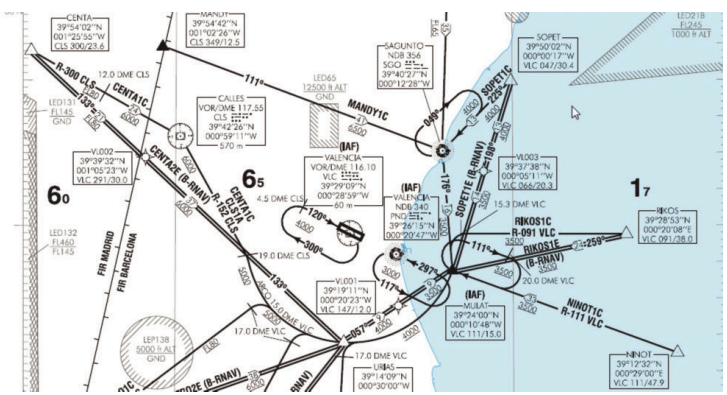
Si. ¿Nos podría decir la pista activa de Valencia? (Ah, May we know the active runway at Valencia?)

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

Ok, so now we can selected the STAR (Standard Terminal Arrival Route) for Valencia.

- Go to the DEP/ARR page pressing the same button on the FMS and then press RLSK2 to see all arrivals for Valencia (fig 19).
- When you are selecting SIDs you have to select the runway first and then the SID. Selecting is the opposite way round. You have to select the STAR first, then the approach. Because our first waypoint of the STAR (which is the last waypoint of our route) is CENTA we take a look at the LEVC charts to see how the arrival works.

fig 18



We are going to select CENTA1C.

- 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 select from.
- Find CENT1C and press the Left Line Select Key next to that option. Everything will disappear, but don't worry, that's because we are not on the first page and the rest of the STARs disappear once you have selected one. Press the PREV PAGE button until we are on page 1/2 again (fig 85). CENT1C<SEL>.

fig 19

- If you want to select another STAR because maybe you missed the correct one, or because ATC assigns you to a new one, press LLSK1 (the Left Line Select Key next to the selected STAR) and all the available STARs will appear again. This is also possible with the approach and also the departure runway and the SID.
- Only one Transition appears (could be more for other approaches). We have to select it nonetheless so press the RLSK next to MULAT

Note that both the STAR and the Approach selection require you to select a transition even if there is only one, to become active. If you enter a STAR and wonder why it doesn't appear on the LEGS page, make sure you selected a transition, by pressing PREV PAGE until you see the list of transitions. European airports don't have STAR transitions, so there was none we could select for CENT1C. In the U.S. STAR transitions are common however and you must make sure to select one.

fig 20

- Now, in the same fashion as we checked the route before, we are going to check again as we have selected the STAR, before we activate it.

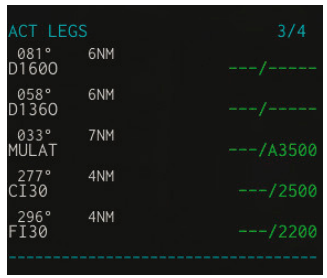


fig 21

- Open the LEGS page and view all the waypoints Comparing these with the chart we see the arc transformed into the Dxxxx points, but judging by course and distance only it is hard to see if everything is correct. We can also see altitude limits which the aircraft must follow (fig 21).
- To verify the arc waypoints, we turn the MFD mode selector to the right (PLAN position) and zoom in or out as necessary with the range selector (the inner knob).
- Using the arrow keys on the CDU, navigate through the route and verify that the approach is correct including the missed approach which ends in a holding (fig 22).
- When satisfied with the new flight plan, press EXEC to activate it. Note that the procedures on the arrival page will change from selected (SEL) to active (ACT).
- Turn the MFD mode selector back to ARC mode.

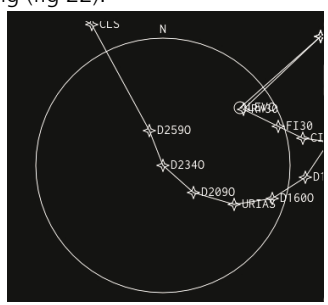


fig 22

Descent and Holding

We are going fast and we are going high. Soon we will need to start our descent. To calculate the the top of descent we use this easy formula:

Distance = (Altitude Difference/1000)x3

For this flight: We are at 24.000 ft and looking at the STAR chart. We need to be be above 6000 between CENTA and CLS. We choose to be 10000 over CENTA (or ATC tells us so). But when do we start the descent?

Altitude Difference=24,000-10,000=14,000 (we need descent 14,000 feet)

14,000/1,000 = 14

14 x 3 = 42

We need to start our descent 42nm before CENTA. And the descent rate needed? Another easy formula:

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

We will see our ground speed closing in on the 42 nm to CENTA. Ok, but there is no instrument that shows "your plane is xx nm from CENTA". We have to calculate again.

As you can see on figure 23, we are 18 NM from BENED:

fig 23

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

But when will we be 42 nm from CENTA? Easy...

When we are 4 nm from BENED

Because 30nm from PRADO to CENTA + those 8 from the aircraft at that moment to PRADO, equals 38 + 4 from BENED; 42nm. Set the altitude on the autopilot to 10,000 and wait for the aircraft to reach 4nm from BENED.

Before reaching those 4nm from BENED read the Ground speed display. (fig 89) We can see on the top line of the MFD that our plane is flying at 454 Knots. Now remember the formula:

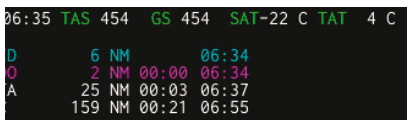


fig 24

Descent rate = 454 / 2 = 227

227 x 10 = -2270 fpm

When we pass BENED it will be in the "from" line of the MFD, displayed in cyan color. When the distance shows 4 we start out descent by pressing the VS button on the autopilot and turning the thumbwheel for the vertical speed until the indication on the PFD is -2.3 for 2.300ft/min. (fig 25).

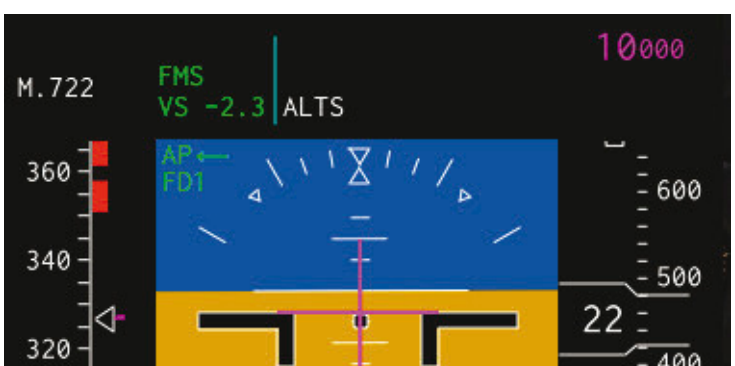


fig 25

Of course we need to reduce the thrust drastically to avoid goint into overspeed. Remember, there´s no auto-throttle on this aircraft!

When reaching more or less 10,000 feet over CENTA, ATC comes back to us (it is not necessary to reach that altitude. We only need to be above 6000 feet. But the more we descend now, the less trouble we have during the STAR 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. So much for our arrival on schedule... We are going to dance a little! So we must prepare the holding. Still we are 34NM from CLS, there´s enough time.

fig 26

- Press the HOLD key on the CDU. This will display the ACT FPLN HOLD page and it shows the holding parameters for the Holding after our eventual missed approach. But we don't want to edit the missed approach holding, so we press RLSK5 "NEW HOLD"

- Now we see the LEGS page again, but with a prompt of five boxes at the bottom. Here we need to insert the waypoint for our holding. We could also make a holding at the present position of the aircraft by pressing RLSK6 (present position), but we don't want this.

fig 27

- Press the LLSK adjacent to CLS waypoint. Be sure to select CLS, not the (CLS) waypoint, because that's a DME intercept waypoint. We want the CLS VOR itself! (fig 28).

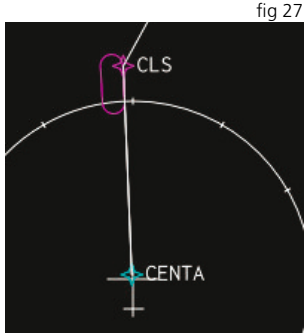


fig 28

- Press LLSK6 to enter CLS at the prompt. Now the MOD FPLN HOLD page will appear where we can see all parameters.
- Remember we were requested to make a left holding! To make a left turn, enter /L (slash L) into the scratchpad and press LLSK3.
- When you are satisfied with the parameters, press EXEC. You can now see the holding on the MFD display (fig 29).

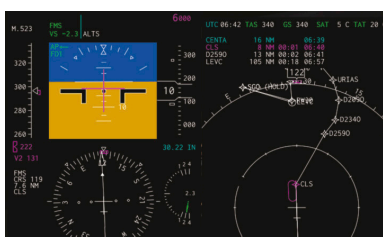


fig 29

We are descending and everything is easy going. We are getting close to CLS and are almost at 10,000ft. We have reduced thrust to idle and even employed the spoilers to slow down to 250 knots. We have changed our final altitude to 6000 feet (fig 30).

fig 30

Turn on the Landing Lights, and switch on the Seat-Belt signs. We are at CLS and the aircraft starts its holding turn to the left now the aircraft is at 6,000 feet. Everything is going perfect. As each holding takes 7 minutes (2 minutes each turn, and 1.5 minutes each leg) we are somewhere in our second holding when ATC calls us.

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

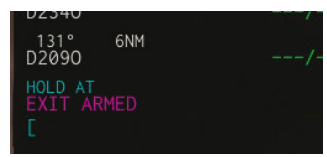
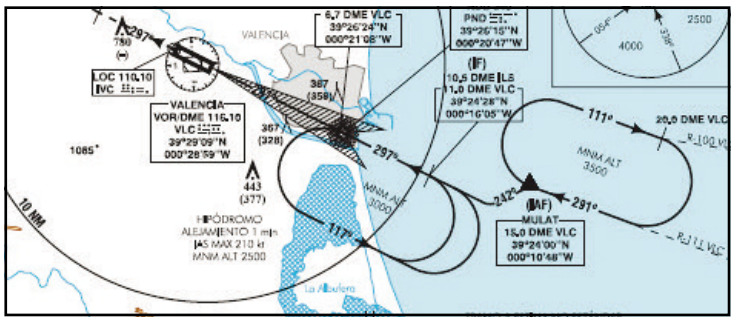


fig 31

ARM the exit. Press the HOLD key and you will see the HOLD LIST page. Press the LLSK1 to select the holding at CLS (remember the other holding is the one from the missed approach). On the ACT FPLN HOLD page we press RLSK6 to arm the exit (the prompt changes so another press would cancel the exit again).

The aircraft will proceed to complete the second holding and once over CLS again, resume tracking the rest of the route.



STAR and Approach

It is time now to configure the ILS approach.

fig 32

- First we need to tune the NAV1 (or Nav2) radio to the ILS frequency which is 110.10 as we can read on the Approach map of runway 30 in LEVC.
- On the RADIO page of the CDU, type 110.10 into the scratch-pad and insert it with LLSK3 to NAV1. Note that the label at LLSK4 will change to indicate that manual tuning is active.
- Next we are going to set the decision height. Looking at the approach plate, we find that the decision height for the ILS30 into Valencia for a category C airplane is 265ft.

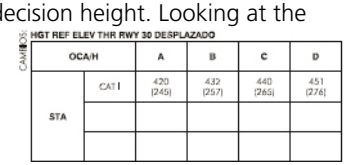


fig 33

- On the left side panel click the DH inner knob to make the label appear on the PFD.

- Turn the inner knob to set the DH to 256 as indicated on the PFD (Fig 99). (If we were to set a barometric minimum descend alt, we would first have to turn the outer knob to the right).
- We are descending through 5,000 feet (our goal is a progressive descent to 2,200 feet where the Glide Slope will turn active) and slow down to 220kts. Below 230kts we can set flaps 8 (Observe the red checkerboard marks that show the speed limit).

fig 34

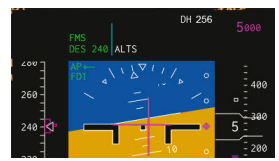


fig 35

(The direct-to mode explanation is left out here because it makes the final turn into the approach more complicated. Direct-To is explained in the cruise chapter).
When we are on our last leg to MULAT and at 2200ft, ATC calls us again:

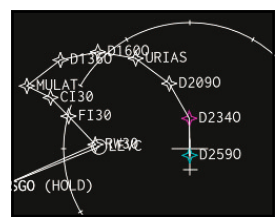


fig 36

- 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).
- Press HDG mode and press the center of the HDG button to de-activate FMS navigation. FMS navigation for approach is prohibited in this airplane and it is also not certified to make PRNAV approaches for example.
- Slow down to 190kts and lower the flaps to 20°.

Landing

- This is the time to change the NAV source (to NAV1) and the course of the tuned 110.10 ILS frequency which is 297° (you can see it on the chart).

On the side panel, turn the NAV source selector to NAV1, and on the glareshield panel (autopilot panel) turn the CRS1 selector to 297°.

- Continue after MULAT with an intercept course 30° to the approach course (roughly HDG 260).
- Press the APPR button on the autopilot panel to arm LOC1 and G/S.
- Slow down to 160kts, lower the flaps to 30°.
- Observe the magenta diamond on the right side of the PFD. See the glideslope come alive. When it nearly reaches the center, G/S mode will change from armed to active (white to green) (fig 37).
- Descending down the glideslope, lower the flaps to 45° and slow down to...

fig 37

Here's how you get the target speed for the final approach: You need to know the aircraft gross weight, which is the ZFW plus the fuel on board (FOB). ZFW is unchanged after takeoff (unless you threw out a stowaway enroute...) and you have calculated it already before takeoff. Fuel on board can be seen on the Primary EICAS or on the FUEL page of the secondary EICAS. Add those two numbers, and look up the landing card in the Pilot Manual on page 20 or after.

Then set the speed bug selector to VT (left position) and turn the inner knob to set the bug to Vref.

- Extend the landing gear no later than 1300ft RA. You probably want to extend it earlier because it helps slowing down to Vref.
- Arm the Auto-Spoilers.

- Set the autopilot altitude to the Missed Approach altitude of 3500ft.

You should be on a stable final approach, speed near Vref (plus gust component, but we are flying on a fine day with no gusting winds), gear down and three greens, flaps 45.

Now it is time to disconnect the autopilot. Because the aircraft is not certified for Autoland you would be in for a nasty surprise if you´d try one. So catch your breath and disengage the autopilot no later than 200ft AGL (the certification limit is 80ft, but many airlines set themselves a higher limit by company regulations).

- At about 50ft, slowly retard the thrust levers to idle and with only a bit of back pressure on the yoke (the CRJ doesn't like much nose-up in this condition or it will "balloon" endlessly until dropping harshly when you hit the stall) gently settle it on the runway.
- Press the reverser toggle key to open the thrust reversers. Idle reverse is already enough, no need to scare everyone by screaming engines at full reverse on a runway built for bigger airplanes!
- Gently apply the brakes and slow down. No later than 60 knots, toggle reverse thrust again to stow the reversers.

We exit the runway and contact ground control.

- Turn off the landing and strobe lights.
- Taxi lights on.
- Transponder to Stby (4RK on the RTU panel).
- Flaps up.
- Spoilers in and disarm.
- Stop the elapsed timer.
- F/D off.
- Probe heat off.

Ground gave us clearance to park where ever we want so we just taxi and park in a good position.

Around us we can see the aircraft that made us go into the holding...

Depending on whether you want to fly the return leg directly you can choose to switch on the APU now and put the aircraft on APU power. But I'm leaving you here with a shutdown:

- Hydraulics Off, Except 3A.
- Fuel pumps off.
- Engine generators off.

Shutdown the engines. Simply pull the red cutoff switches down and lock the throttles. The engines will spool down.

If the aircraft depressurized correctly (remember you had to set the correct landing altitude) you can now open the main door. If not, we will have to eat the lunch inside the plane until the plane has depressurized, or you can press emergency depress button.

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

Javier Rollon Moran Philipp Münzel

AEROSOFT®

FLY

with the right hardware!

Speed Link – PHANTOM HAWK Flightstick

T.Flight Rudder Pedals

Speed Link – AIRROW Flightstick

Thrustmaster TWCS Throttle

Thrustmaster T.16000M FCS Hotas

Speed Link – BLACK WIDOW Flightstick

More hardware at **www.aerosoft.com**