

SUKHOI SUPERJET 100

...for MSFS-2004

This aircraft is part of **AEROPROYECTO** "Years of Work"

By Edgar Guinart López



*** Dedicated to the noble and laborious people of Russia ***

This project was made with tons of effort, and is possible thanks to the invaluable help of many collaborators. Please, if you want to help to develop the future versions of this project you can email me any documentation (images too) of the real SSJ-100. Thanks

Thanks!

To my friend **Ramsel**: For his enthusiasm and cooperation in all time, despite the distance between us.

To my friends **Adrián**, **Ricardito** and **Veguita**: Same thing above, but very much closer!

To my friend **Mely**: The best virtual test pilot that I know.

To **Igor**: For send me the real SSJ100 manuals; that's help!

To my beautiful wife **Edesa**: For her endless support, and amazing coffees!



Author words...

AEROPROYECTO is not a group of developers, with specialized programmers, designers, etc. AEROPROYECTO is only a name to group my FS aircrafts, making its identification or localization easy for the flight simmers. I'm developing aircrafts since 1999, and I began with little things for FS98, it was not only until a few years ago that I create this common name for all these projects.

All the realization of AEROPROYECTO aircrafts (original pack) and most of stuff are made or adapted by me. When some parts, developed by others, are included in the original pack it will be referenced. My lack of time and knowledge is the responsible for the imperfection of my projects, and I'm very sorry for that. However, the disinterested help of many enthusiastic people around the world have an important part in the materialization of my successful projects. So, thanks again to all these good people...

All AEROPROYECTO aircraft is released for free and uploaded to flight simmers servers like flightsim.com or avsim.ru

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Version

This is the 1.1 version of the AEROPROYECTO SSJ-100 project.

This version has many more systems than the 1.0 version, including a TCAS!

A new FBW (Flight by wire) system is included.

The flaps system was changed for better flight performances and is more like the real SSJ.

The general flight performances were adjusted.

The new Step-by-Step throttle system is included. This system is not full functionally yet, so in order to simulate it, a semi-automatic module (AI robot) performs part of the job. More information about this system can be found in Throttles section.

The 2D panels are based on a resolution 1600x1200 pixels background, much better than the previous version. Seven images were included to simulate the 360 degrees cockpit views; however they had a low quality due the lack of better images.

A coupled of effects were included: wings vortex at high Gs and high fuel flow engines smoke. You can found these effects in the provided Effects folder.

A new texture was included and applied to the APU exhaust.

New doors animation system was made. Now the main door and cockpit windows are independent animated from the rest of doors, service and cargo. Check the right way to open and close it in the All doors control section.

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Special Features

All doors control

Normally, in FS, the doors are open with two key combinations; Shift+E open the first door and Shift+E following by number 2 open the second. However, for an unknown reason, the second door don't open once you load the 2D panel of this aircraft. For solve this problem I put a coupled of buttons to open and close all the aircraft doors. This buttons are located in little menu at top-left of the main panel. The first button (MAIN DOORS OPEN) open's the left doors and the cockpit windows. The second button (CARGO DOORS OPEN) open's the right doors and the cargo hatches. This buttons only works on ground, or if the doors are opens on air; this prevents an accidental aperture on fly by clicking. The normal state of this two buttons is in gray color (doors closed), the orange color announce opens doors.



Operational Manual

Autopilot and Auto-throttle

This model has not an FMC (Flight Management Computer) however, in order to grant the basics functionalities of the autopilot lateral and vertical navigation and the auto throttle, the system automatically take the needed data of ambient and the flight stages.

The SSJ100 autopilot is quite similar to the Airbus series but its settings displays in the up zone of the PFD (Principal Flight Display) however some functions are most like Boeing. At this point I assume that you are familiarized with those philosophies in order to simplify the document. The AP is divided in four columns: Speed, Lateral Navigation, AP Masters, and Vertical Navigation from left to right.



Speed section has a Speed knob to select the desired speed and switch between Pilot mode and Computer mode, due the throttle position. CAS/MACH button overrides the speed mode displayed in the PFD when the pilot mode is set, in computer mode the displayed mode can't overridden. AUTO button force the computer to select the optimal vertical speed according to the thrust delivered by the engines at T/O and climb stages, avoiding the stall at any altitude.



Lateral Navigation section has a HDG/TRK knob to select the curse or the radial to follow. This knob acts like a button too for engage heading or radial navigation modes, both functions depends of the HDG/TRK button selection explained below. Only the NAV1 can be tracking in this version, the NAV2 only works to follow the selected VOR2 station. The HDG/TRK buttons selects between heading or radial navigation modes, and this selection is showed in the PFD. The LNAV button overrides computer lateral navigation mode that only works if a flight plan, previously created in the FS9 Flight Planner tool, is active. All lateral navigation functions will be disconnected if the yoke is moving in X direction (left/right).



AP Masters section has an AP (Autopilot) button to turn on/off any armed Auto Pilot function. AP button will be disarmed when the yoke is moved certain number of degrees in Y direction (up/down). A/T (Auto-throttle) button engage or disarm auto throttle function. The A/T button is automatically turning on when the throttles reach NTO position and turning off when the throttles are setting to IDLE. There are other two buttons, LOC to engage localizer and APP to engage localizer and glide slope together. LOC button don't work, for approach use APP.



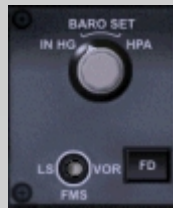
Vertical Navigation section has an ALT knob to select the desired altitude; it also permits to choose between two incremental scales 100 or 1000, but this function is not ready yet. METRIC ALT button show/hide metric altimeter in the PFD display. LVL OFF button permits the free aileron function in AP regime, moving YOKE in X direction (left/right) will disconnect this button too. VS/FPA knob selects the proper vertical speed mode or flight path angle mode, depending of the VS/FPA button, but this last function is not available yet. VS/FPA button function is also not available. VNAV button overrides computer vertical navigation mode that only works if a flight plan, previously created in the FS9 Flight Planner tool, is active. The VNAV also forces on AUTO mode. When flying in VNAV regime you can select the desired altitude with the ALT knob, like in pilot mode, but the system will choose and engage the best rate of climb/descend for the whole route, until destination.

Navigation display panel



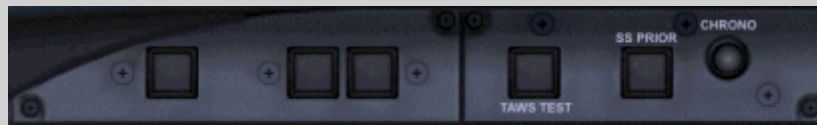
This panel controls the Navigation Display that is showed at Multifunctional Display (center). It had four buttons that show or hide various map items, CSTR, WPT, NAV AID and ARPT. RANGE is the knob for select different map zoom levels. MODE can switch different map modes but is inoperative in this version. WXR/TERR works only for TERR mode in coast lines. TCAS displays traffics on air, on ground works in stand-by mode. The other two switches put the selected NAV/ADF needle on the HSI display, bottom in the PFD.

Barometer panel



The knob selects the desired pressure in IN HG or HPA and had an additional feature, clicking in the center can set the actual FS9 pressure. The switch below put the HSI needle in function of NAV1 (ILS), FMS (planned route, if exists) or NAV2.

Other buttons in the frontal panel



The two center buttons are the Over-speed alarm and Stall alarm. SSPRIOR, CHRONOS and TAWS TEST buttons doesn't work in this version.

Watch and secondary altitude indicator zone



Backup altitude indicator works but none other buttons are functional in this version. On the Watch only the CHR button works in four positions: normal, chronometer ready, running, and stopped. On the plate with speeds references a hidden link will show/hide the brake panel. The handle controls the gears position. AUTO BRAKE had four buttons to set the brake action: LOW, MID, MAX and RTO used in take off and landing granting brake action when the throttles back to idle, like emergency cases. The other buttons on this zone are not available in this version.

Light and Wipers Panels



Except the RWY TURN OFF and EMER LT, the rest of lights works, however the two knobs for bright doesn't have any function. The cabin light is, temporally, on the ANN BRT position and keep brightens in dark cabin for ease localization. The windshield wipers doesn't work in this version, in spite of it's animated switches.

ANTI-ICE panel



Except WINDOW PROOF, the rests of heaters works. This knobs start in AUTO position that is its normal position.

AIR panel



CKPT and CAB knobs set the desired cockpit and passenger cabin temperature. Recirculation button don't work in this version, this function work automatically when any source of air is working. L AIR AUTO and R AIR AUTO are the valves for extract air of the engines stages, these buttons are in no OFF position when the panel is loaded. However you can turn on/off at will. APU BLEED button is the air bleed valve switch for the APU, this button start in on position too and can be switching at will. This air bleed valve provided the air supply for start the engines. The RAM AIR is not working in this version.

CAB PRESSURE panel



None of these buttons works in this version but the pressurization of the aircraft works automatically in conjunction with the AIR sources. The aircraft will also lose its cabin pressure if accidentally you open the doors in flight or turn off all of the air sources.

ELEC panel (electrical)



In this version the four batteries work as one. They can be disconnected, but at the beginning are on. The batteries will discharge depending of the electrical load. The only way to re-charge the batteries, in order to start APU or engines, is turning on the EXT PWR button that grants non-limited electrical power aboard, connecting the ground power plan. However if the aircraft is moved or the parking brake is released, the ground power plan will un-linked. The APU GEN engages the electrical generator of the APU when it's running, but this action must be performed manually. The APU generator is the primary source of electrical power. L GEN and R GEN engages the same generators on each engine, this action must be performed manually, once the engine is started. GALLEY don't work in this version and INV occurs automatically.

BAT VOLTAGE panel



This section only has a knob to select one of the four batteries and show it's charge on red screen.

APU panel



The MASTER SW energize the APU system, when this switch is turned off all APU function will shutdown, except the bleed valve, and is the right way to perform the APU shutdown. START/STOP button start or stop (case of wrong start) the APU engine if the system is energized by the master switch.

FUEL panel



The XFEED button open/close the valve that permit the flow of fuel from left wing tanks to the right engine and vice versa. This process only occur if a differential pumped fuel exists, it means, if all pumps of the one of sides are off. If cross feed valve is off each engine get fuel of the same side wing fuel tank. Both side main fuel pumps are turning on with the

MAIN buttons, same thing for AUX buttons. Both MAIN and AUX buttons must be on before starting the engines. The ADD buttons is a backup fuel pump that runs with direct current (DC) and only must be turned on in case of failure of the both MAIN and AUX fuel pumps of same side. The APU is connected to the left lines of fuel, so only left pumps must be on before start the APU, however if you turn ON the XFEED button the APU will get fuel of the right side. The engines and the APU need, at least, one fuel pump active to start. The APU need fuel pumps active to keep running, but the engines will work by gravity fuel flow at positive G forces.

HYD panel (hydraulic)



HS1, HS2, HS3 and PTU are hydraulic systems that supply all the demands in the aircraft. HS1 and HS3 are power up by both engines and are reinforced by electrical ones. HS2 is power up by ELEC2A and ELEC2B two electrical pumps. PTU is the electrical pump that reinforces the gears retraction in case of main engines failures. In all cases ELEC knobs start in AUTO position but can be set manually at will. PTU button acts automatically as a backup in case of failures of any hydraulic pumps but can be forced manually too.

Multifunctional Display control panel



The only section that works, in this version, is the middle section. There are the buttons that show/hide the multiple systems state on the Multifunctional Display (MFD). ENG/APU button displays the remaining engines indicators, the principal engines indicators are showing on the EICAS Display, and the APU indicators too. AIR button display the air system. HYD button displays the hydraulic system. ELEC button displays the main electrical circuit. FUEL button displays all the fuel system. Doors button displays all the doors state. PCTL/BRK button displays some features about control surfaces and brake states. CLEAR button hide the current displayed system and left the main navigation display only. The rest of buttons doesn't work in this version.

Audio panel



VHF1 and VHF2 toggle the audio of COMM1 and COMM2, in order. MKR toggle audio of approach markers. 1-VOR-2 toggle audio ID of 1-2 VOR. 1-ADF-2 toggle audio ID of the 1-2 ADF. The rest of buttons doesn't work. Both audio panels are the same.

Radio panel



The double knob select the desired radio frequency, the outer knob is for gross selection and the inner for fine selection (fraction). In case of the ADF stations the outer knob selects the first two digits of the frequency and the inner knob the last ones. VHF1 and VHF2 buttons displays COMM1 and COMM2 frequency on the radio displays, main-standby. NAV buttons set ready the radio for work with nav-aids frequencies, but in this version this action is performed automatically when you press any of the nav-aids buttons, in order to save time. VOR and ILS buttons displays NAV2 and NAV1 in order, the twist order it's not an error! The two ADF buttons is my improvement for grant the use of the two ADF receptors, ADF1 and ADF2 in left-right order. On/off switch turn on-off the whole radio. Rest of buttons is not functional in this version. Both radios are the same.

Spoilers



The spoilers are formed by two main groups of surfaces over each wing, the airbrakes and the spoilers. When the aircraft is on air only the airbrakes (outer surfaces) will deploy depending of lever position, very useful for keep proper speed at descend. In this case only works half extension with the mouse, or total extension with both mouse and keyboard. When the aircraft is on ground all spoiler surfaces, outer and inner, will deploy in the same way. GND SP ARMED position is used for take off and landing procedures or simply for

taxing. This position only can be set with the mouse which grants deflection of all brake surfaces on ground if the airspeed exceeds 30 knots and the throttles are on IDLE.

Flaps and Slats



The flaps and slats work together depending of lever position. In this version, the first position of flap lever has two configurations: 1 or 1+F. In this position the slats goes to 18 degrees and the flaps goes to 3 or 9 degrees automatically, depending of the airspeed. In this position, when the speed is increasing over 210 KIAS, the flaps setting goes to FLAP 1, when the speed is decreasing below 210 KIAS this setting goes to FLAP 1+F. The 2, 3 or 4 (Full) lever positions drive the flaps on 16, 25 and 36 degrees in order. Near 250 KIAS the flaps will be fully retracting, whatever it's deployed angle is.

The flaps positions 1, 1+F and 2 define the approach stage. The flaps positions 3 or 4 define the landing stage. Depending of flight stages, the A/T, in Computer mode, will set the proper speeds for these stages. If for any reason the flaps are stuck, the computer will not set the proper speed. Then you must pass the control of the A/T speed to Pilot mode. See Autopilot and Auto-throttle section above.

The flaps setting for takeoff is FLAP 2, which ever the weight is. The flaps setting for landing is 3 or 4, for any weight. Flaps 4 (FULL FLAPS) provide a better attitude for the landing. Flaps 3 provide a better performance in case of one engine is off.

ENG MASTER panel



Both, left and right handles, unleash the start procedure of the engines or stop it (right click, for security). This process only works depending of the position of the knob ENG START. On CRANK position only dry start will be performed, on IGNITION position the engines will start. If the starting process has beginning and the knob is setting OFF the process will interrupt. This knob must be turned to OFF position after finished the start procedure, an alarm will displayed on EICAS display. L MAN and R MAN are for performing the starting process if the normal way doesn't work, those buttons had lights for indicate that the starting is running.

Transponder



Before setting new transponder code you must first clear the screen with the C button. When flying with FS9 traffic controller you must type the code, this will not be set automatically when you reply the ATC order. In the real SSJ the transponder code is setting on FMC.

CKPT DOOR panel



This switch will lock the cockpit door; an alarm will displayed on the EICAS display.

Trimmer's panel



RUD RESET button set the rudder trimmer in null position. STAB handle set the elevator trimmer. TRIM handle set the ailerons trimmers. RUD knob set the rudder trimmer. All this procedure only works on ground or if the FBW system is off, otherwise those will be driven by the FBW.

Throttles



First and important thing: Here is an AI robot that helps you to control the Step-by-Step Throttles movements. Due to the impossibility to find the right way to control the Step-by-Step Throttles beyond the A/T engagement (large number of attempts), I opt for a semi-automatic system that help you to control this, once the A/T is ON. How it work?

You can move the throttles freely with keys or yoke device, but once the levers reach the NTO position the A/T will engages (is normal), and then you lose the control of the levers. At this moment an AI robot will take the control of the throttle levers and operate its depending of the stages of the flight. For example, in the ground, depending of departure airfield height and hot index, the levers will set to NTO (Normal Takeoff) or APR (Automatic Power Reserve). This “mechanism” is the best way to perform the whole flight; the AI robot will release the control of the throttle levers at about 20 meters over the ground (RETARD signal will flashing on the PFD) permitting you to recover the control just before landing. However, if for any circumstances, you want/must to get the control of the Throttles, there is two ways to recover it: Turning off the AT button (While retard the levers few times) or, changing the A/T control to Pilot mode, explained in the Autopilot and Auto-throttle section.

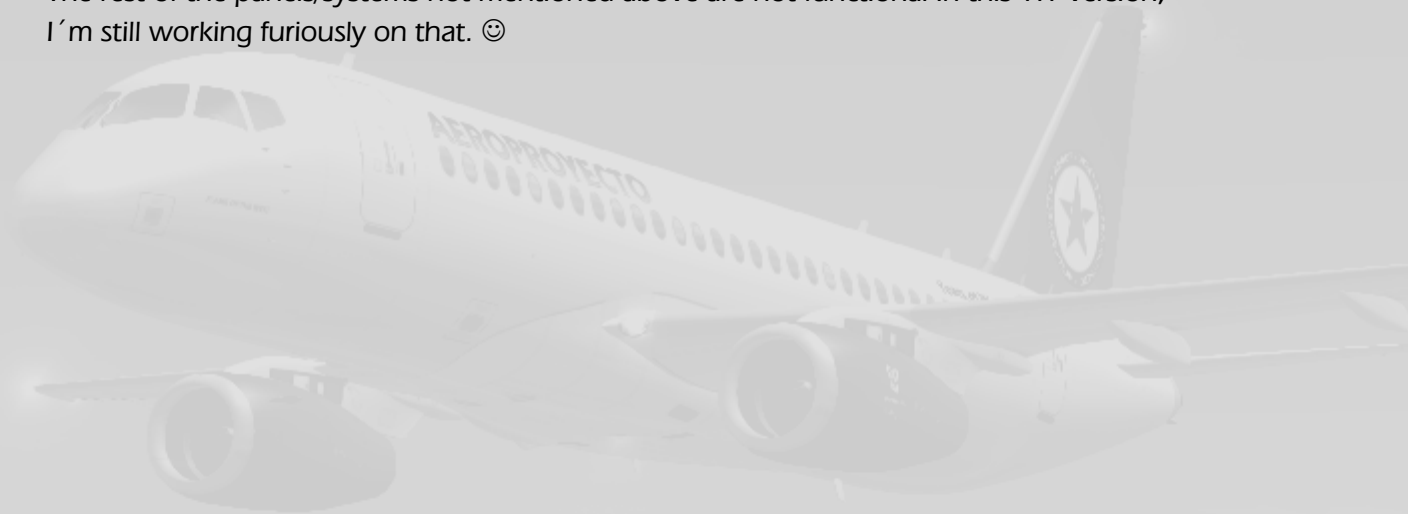
This is a temporary solution while I perform better one; however is not an ease task with XML possibilities only. The next explanations are for normal usage, without the AI robot assistance, so here in most the (Automatic in this version) chart will appear to indicate the intervention of this AI help.

The philosophy of this system, like the airbus series, is to release the pilots of the engines controls in the most critical stages of the flight. The throttle levers had stuck on certain positions like IDLE, CLIMB, NTO (Normal Takeoff) and APR (Automatic Power Reserve) sending to computer the proper speeds for each flight stage. On the ground, when the

throttles reach the NTO or APR position the A/T system will engage and set the speed for the take off (TO). NTO set speed for ease and quiet TO and APR set speed for fast TO/GA. When the aircraft reaches FUSS altitude, about 1300 feet, you must set the levers to CLIMB (Automatic in this version) and then retract the flaps to 0, in this CLIMB position you can make the rest of the flight. On CLIMB position the A/T will set speeds depending of the flying level and the aircraft attitude and its configuration. When you are flying under 10000 feet of altitude (or 4000 feet above ground), and the flaps are fully retracted, the system will set near 250 KIAS, over this altitude and under 32000 feet, 280 IAS. Over 32000 feet, the target speed will be 0.78 MACH. When you set the flaps 1 the system get the landing intentions and set a traffic speed of 180 IAS. When the flaps reach position 3 the system set a landing speed based on the weigh, heights and nearby temp of the aircraft, this speed will be around 120 IAS. In case of "Go Around" before RETARD signal you, must pull yoke gently to obtain positive climb while retract the gears and then set Flaps 2. Referenced speed will be increase up to 180 KIAS to perform a new climb.

Resume

The rest of the panels/systems not mentioned above are not functional in this 1.1 version, I'm still working furiously on that. ☺



Aircraft Generals

Speeds

Maximum operating limit speed VMO: 570 km/h (308 knots) CAS.

Maximum operating limit Mach number MMO: 0.81 M.

Typical cruise speed: 0.78 Mach (830 km/h)

Stalling speed: 195 km/h (105 knots) CAS.

Design Diving Speed VD: 660 km/h (356 knots) CAS.

Design Diving Mach number MD: 0.88 M.

The maximum flaps extended speeds (VFE) for 16°: 372 km/h (200 knots) CAS.

The maximum flaps extended speeds (VFE) for 36°: 334 km/h (180 knots) CAS.

Landing gear extension speed (VLO extend): 400 km/h (216 knots) CAS.

Landing gear retraction speed (VLO retract): 400 km/h (216 knots) CAS.

Landing gear extended speed (VLE): 475 km/h (256 knots) CAS.

The design speed for spoilers' extension (VDD): 660 km/h (356 knots) CAS.

The design speed for flight speed brakes extension (VSP): 420 km/h (227 knots) CAS.

Climbing Speed Reference

250 KCAS -1,500 feet to 10,000 feet

Accelerate to 280 KCAS

280 KCAS to 32,480 feet

0.78 Mach at 32,480 feet and above.

Landing Speed Reference

250 KCAS under 10,000 feet

190 KCAS traffic and initial approach

135 KCAS final approach

Limit Maneuver Load Factors

Flight configuration: Positive: +2.50g; Negative: -1.00g.

Capacity

Flight Crew 2

Minimum Cabin Crew 2

Passengers 98 (up to 108)

Engines

Type 2 PowerJet SaM146 turbofans

Thrust 15,400 (68.5 kN) to 16,100 (71.6 kN) at NTO

17,500 (77.9 kN) to 17,800 (79.2 kN) with APR

Flat Rating 86° F (ISA + 15° C)

Range

SSJ100/95B (98 pax @ 32" pitch) 1,645 nm 3,048 km

SSJ100/95LR (98 pax @ 32" pitch) 2,470 nm 4,578 km (Not present in this version)

(Pax with bags @ 220 lb (100 kg), LRC, ISA, zero wind, typical reserve policy.)

Airfield Performance

SSJ100/95B

Takeoff field length (MTOW) 5,679 ft 1,731 m

Landing field length (MLW) 5,348 ft 1,630 m

SSJ100/95LR (Not present in this version)

Takeoff field length (MTOW) 6,732 ft 2,052 m

Landing field length (MLW) 5,348 ft 1,630 m

Ceiling

Maximum operating altitude 40,000 ft 12,192 m

Configurations

Standard Dual Class 87 pax (12C/75Y @ 38"/31" pitch)

Standard Single Class 98 pax (98Y @ 32" pitch)

External Dimensions

Overall length 98 ft 2 in 29.94 m

Tail height 33 ft 8 in 10.28 m

Wingspan 91 ft 2 in 27.80 m

Internal Dimensions

Cabin length 67 ft 11 in 20.42 m

Cabin aisle height 6 ft 11 in 2.12 m

Cabin width (floor level) 9 ft 11 in 3.00 m

Cabin width (centerline) 10 ft 7 in 3.24 m

Cabin aisle width 20.0 in 0.51 m

Seat width 18.1 in 0.46 m

Overhead bin volume per pax 2.1 ft³ 0.06 m³

Cargo volume per pax 7.8 ft³ 0.22 m³

Doors

Passenger Door (LH, fwd)

Height 6 ft 0 in 1.83 m

Width 2 ft 9 in 0.86 m

Passenger Door (LH, aft) & Service Doors (RH, fwd; RH, aft)

Height 5 ft 4 in 1.65 m

Width 2 ft 5 in 0.76 m

Cargo Doors (RH, fwd; RH, aft)

Height 2 ft 11 in 0.89 m

Width 4 ft 0 in 1.22 m

Weights

Maximum Takeoff Weight (MTOW)

SSJ100/95B 101,150 lb 45,880 kg (SSJ100/95LR 109,019 lb 49,450 kg)

Maximum Landing Weight (MLW)

SSJ100/95B/95LR 90,390 lb 41,000 kg

Maximum Zero Fuel Weight (MZFW)

SSJ100/95B/95LR 88,185 lb 40,000 kg

Maximum Fuel Capacity

SSJ100/95B/95LR 4,175 US gal 15,805 l

General Check List

Check list table

BEFORE START		APPROACH	
Cockpit prep.	Complete	Briefing	Perform
Gear pins and covers	Removed	ECAM status	Check
Signs	On/Auto	Seat belts	On
Fuel quantity	Check	Barometer ref.	Set
Flight plan	Set		
Barometer ref.	Set		
Windows & doors	Close	LANDING	
Beacon	On	Cabin crew	Advised
THR. levers	Idle	A/THR	As req.
Parking brakes	As req.	ECAM memo	Nothing RED
		- Landing gear down	
		- Signs ON	
		- Cabin secured	
		- Spoiler ARMED	
		- Flaps set	
		- Auto brake set	
AFTER START			
Anti Ice	As req.		
ECAM status	Check		
Rudder trim.	Zero		
BEFORE TAKEOFF		AFTER LANDING	
Flight controls	Check	Flaps	Retracted
Flight Inst.	Check	Spoilers	Disarmed
Briefing	Perform	APU	Start
Flap setting	Conf		
V1, VR & V2	Check	PARKING	
ATC	Set	APU bleed	On
ECAM memo	Nothing RED	Engines	Off
- Auto brake RTO		Seat belts	Off
- Signs ON		Ext. lights	As req.
- Cabin secured		Parking brakes	As req.
- Spoilers ARMED			
- Flaps TO		SECURING AIRCRAFT	
		APU bleed	Off
AFTER TO / CLIMB		No smoking	Off
Landing gear	Up	APU & bat.	Off
Flaps	Retracted	Fuel pumps	Off
Barometer ref.	Set		

Quick Operational Guide

Introduction

The intention of this chapter is to guide the flight simmer to perform a successful flight with this aircraft. This guide is like a Normal Procedures but a little different and with some flying tips. Note that this version is not a finished product, some tricks and shortcuts were adding, trying to match the performance of the real SSJ-100. This guide was made based on the results of my successful flights, more than 40 without counting hundreds of test flights. Even if you are an experienced flight simmer I must suggest you to read this guide. Thanks.

Loading aircraft

- The aircraft will reload all XML programs at beginning but you must sure of this opening and closing all panels before any thing.
- Once the panel is loaded the service and cargo doors, right side doors, can't be open or close for an unknown reason. You can operate these doors like is explained above, in All doors control.
- You must calibrate your yoke! The FBW system in this aircraft is very sensitive. As well the AP will disconnect if the yoke move beyond certain number of degrees.

Planning the flight

Despite the absent of an FMC, the FMS of this aircraft automatically gather the needed data to perform the flight. In the case of the lateral navigation (LNAV) and vertical navigation (VNAV) systems, additional information is needed; a flight path, planned on the FS9 flight planner tool. The way to program this flight path is important, so few useful considerations are expressed below.

- Depending of the actual winds the FS9 flight planner will chose the active runways for takeoff and landing, so you must chose your weather before create the flight plan.
- You must avoid very near points because, despite the agility of this aircraft, the tighten turns will become the flight unstable. I recommend not less than five nautical miles between points, unless you don't have any other near point that you can use.
- Is impossible to create approach procedures with the FS9 flight planner BUT you can simulate this approach procedures using available ground aids or fixed points near the most of the big airports. Some of these aids are exactly in runways course and are perfect for this purpose. With this method I've simulate very nice automatic approaches. Avoid the narrow corners, especially near the airport.
- Chose the cruiser altitude in the flight plan very carefully! Since you can't chose the different altitude for every planned waypoint you'll find that some altitudes near the airports are very high for perform adequate approaches, if you enter normal cruise altitude, like 37000 feet. If you enter 0 altitude in the flight planner, the waypoints will get ground altitude, which is unacceptable too. So you must select this altitude depending of the available waypoints. This problem will increase when arrivals are surrounded by a hilly ground.

- The flight path can be changed in flight, with the FS9 flight planner, but the new one must have the same departure and the new points must be forward of aircraft current position, otherwise the aircraft will return to intercept the passed new point.
- The FMS will calculate the quantity of fuel needed, depending of planned flight in FS9 flight planner tool. However you must stay on the ground and the engines are off, otherwise the calculations will be incorrect. This quantity of fuel will be show bottom in the FUEL sheet, on Preselected Fuel value. Calculations includes 200 nm to alternate airport and 45 min of extra flight, so whatever the flight plan length is, you'll ever count with more than one hour of fuel-flight.

Before start

- Secure the aircraft putting the parking brakes and setting throttles on IDLE
- Turn ON the cabin lights (Night time)
- Set ON the navigation lights
- Engage the external power plant switch
- Check anti-ice and hydraulic knobs on AUTO position
- Check hydraulics in HYD sheet on MFD
- Check flaps and spoilers fully retracted
- Set throttles to IDLE
- Set ON cabin signal (No smoke and seat belt)
- Check closed doors and windows in DOOR sheet on MFD
- Check fuel in FUEL sheet on MFD
- Set AUTO CKPT DOOR switch

Starting APU

- Turn on the left fuel pump MAIN and AUX
- Check pumps displaying FUEL sheet on MFD
- Set ON APU master switch (This open automatically the APU door)
- Set ON START/STOP APU switch
- Check APU starting in ENG/APU sheet on MFD
- Engage APU generator
- Check APU BLEED is ON

Starting engines

- Set ON beacon lights
- Release parking brakes and perform push back as needed
- Turn on the right fuel pump MAIN and AUX
- Check pumps in FUEL sheet on MFD
- Set IGNITION the engine starting knob
- Push R engine valve
- Check right engine starting in ENG/APU sheet on MFD and EICAS display
- Engage right engine generator
- Push L engine valve
- Check left engine starting in ENG/APU sheet on MFD and EICAS display
- Engage left engine generator
- Set OFF the engine starting knob

- Turn off APU master switch (This close automatically the APU door)
- Turn off APU BLEED
- Check external power plant switch off
- Check electrical system in ELEC sheet on MFD
- Check air system in AIR sheet on MFD

Rolling out (taxing)

- Set TAX taxi lights
- Check "black cockpit" All signals must be off, except cabin signals
- Set flaps to FLAP 2 Position (Normal configuration for any take off weight)
- Set spoilers to GND SP ARMED
- Check brakes, tires and control surfaces in PCTL/BRK sheet on MFD
- Deliver some gas until the aircraft walks. Don't exceed 50% N1
- Taxing speed in turns must not exceed 15 KIAS
- Set autopilot initial altitude manually

Line up, run and takeoff

- Set ON strobe, landing and wing lights, put taxi lights on TO
- ARM auto-brake RTO button
- Check "Nothing red" on EICAS
- Display radar screen on MFD
- Set TCAS standby (Will set active automatically on air)
- Set the radar scope as you desire in order to check the flight path (Max 320 Nm)
- Deliver gas about 60% of N1
- When in moving, push the throttles to APR or NTO steep
- Check A/T is engage (Green light must beam)
- Check green "APR" or "NTO" signs on PFD (Autopilot section)
- Check clear red "NO TAKEOFF" alarm on EICAS
- Check engines performance on EICAS
- Check V1, VR and V2 values on PFD (Below airspeed strip)
- Near VR rotate the aircraft between 10 – 15 degrees of pitch
- When positive climb, retract the landing gears
- Check landing gears state on EICAS
- Relax the yoke pressure to null (The aircraft must stay near same pitch)
- At about 1300 feet over ground, retard the throttles to CLIMB steep (Automatic in this version)
- Check green "THR" signs on PFD (Autopilot section)
- Check AP speed reference on 180 IAS (Climb speed with flaps)
- Reduce the pitch slightly
- At about 140 IAS retract the flaps to 0
- Check flaps status on EICAS
- When flaps reach 0, check speed up to 240 IAS (Climb speed without flaps)

Climbing

- Perform maneuvers to intercept the horizontal flight path
- Check initial altitude setting or change it as desired
- Relax the yoke pressure to 0

- Disarm auto-brake RTO button
- Set spoilers to RET position
- Press LNAV and VNAV and check its green signs on PFD (Autopilot Section)
- Set AP engage (Green light must beam)
- Check the interception of the horizontal flight path
- Check the auto climb performance (Green A appear over VS strip on PFD)
- Set autopilot final altitude manually
- Over 10000 feet, set OFF strobe, landing and wing lights, put taxi lights on TAX
- Over 11000 feet, check AP speed reference on 280 IAS
- Over 32500 feet, check AP speed reference on 0.78 Mach

Cruising

- Check establish at final altitude
- Check establish at normal cruise speed of 0.78 Mach
- Check systems periodically
- For new altitude just set the new one manually
- For new speed press the SPEED knob and set new Mach manually
- For abandon LNAV just set new curse and press HDG/TRACK knob
- For abandon VNAV just set new altitude, or not, and press ALT knob

Descending

- With active flight plan, blinking "Desc. Rate" message will show on MFD
- Chose the best descend rate (Economics descend between 2300-2500 ft/min)
- Once there, set inferior or destination altitude for straight descend
- Check automatic vertical speed with "Desc. Rate" value
- Set half spoilers at will in order to maintain the referenced speed
- Watch hi-speed under 10000 feet (Level the aircraft if over 250 KIAS)
- Set ON strobe, landing and wing lights, put taxi lights on TO

Approaching

- When ready for landing, set FLAPS 1 and check state on EICAS
- Check the AP speed reference on 180 IAS (approach speed)
- Below 210 IAS check FLAPS 1 + F on EICAS (Automatically set)
- ARM auto-brake as needed (Not needed for regular runways)
- Set spoiler on GND SP ARMED
- Below 200 IAS, set FLAPS 2 and extend the landing gears
- Check flaps and landing gears state on EICAS
- Below 190 IAS set FLAPS 3 (Check state on EICAS)
- Below 180 IAS set FLAPS FULL, if both engines running (Check state on EICAS)

Landing

- Near the ground pull out gently (autopilot will disconnect and alarm will sound)
- Descend softly and wait for RETARD sign on PFD (Autopilot section)
- With RETARD blinking, retard the throttles to IDLE (Automatic in this version), and perform the touchdown
- After touchdown, set full reverse (Check state on EICAS)
- Below 60 KIAS stop reverse action

- Fully retract the flaps to 0 (Check state on EICAS)
- Set spoilers to RET position (Check state on EICAS)
- Set required power to taxi out of runway

Taxing to ramp

- Out of runway set OFF strobe, landing and wing lights, put taxi lights on TAX
- Perform steepers for start the APU, if needed
- Watch taxing speed in turns (Not exceed 15 KIAS)
- After stop, set parking brakes
- Engage the external power plant switch
- Set OFF electrical systems like radios and transponder
- Pull both engine valves to stop (right click)
- Check full stop engines on EICAS
- Set OFF beacon lights
- Set OFF both engine generators
- Set OFF all fuel pumps (unless the APU is running)
- Set OFF cabin signals (No smoke and seat belt)
- Open all doors (Check the DOOR sheet on MFD)
- With empty aircraft, turn off APU and remaining fuel pumps
- Check full stop APU the ENG/APU sheet on MFD
- Set UNLK CKPT DOOR switch
- Turn off remaining switches or systems
- Check "black cockpit", before abandon the aircraft