

SUKHOI SUPERJET 100

Release 2.0 for FS9 (FSX Compatible)

To the noble and laborious people of the Soviets

Along 30 years the Soviets people provide us, the Cubans, with the best flying machines they built. I want to offer this modest effort as a little piece of my personal gratitude.

Thanks!

To my friend Ramsel: For his enthusiasm and cooperation all the time.

To my friends Adrián, Ricardito and Veguita: For the invaluable help with images and documents.

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

To Igor Bayrachniy and Eduardo Alatríste: They supply me with SSJ-100 system documents and data.

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

- Very special congrats to all the enthusiast people that help me with this project along the time
- Very special congrats to all the re-painters along the word, for multiplying by thousands my effort!

Version

This is the 2.0 version of the AEROPROYECTO SSJ-100, maybe the last FS9 native I will release. Finally, after a very long delay, this is a FSX compatible model. However the TCAS remains FSX incompatible because was provided by thirds just for FS9.

This manual is simpler than the previous version because I lost the original sources. However I try to offer the most important changes and the essential information in this new one. If you want more info about the systems of this aircraft you can check it out in the SSJ100 release 1.1c manual, but remember that much of stuff was changed.

The most improving areas from the previous version were:

- FSX programming compatibility (XML)
- Modeling refinements and new elements
- Many texturing corrections in parts like fuselage and engines. **This means that previous texturing schemes are not longer suitable! In that way I want to apologize in front the many re-painters that had made fantastic jobs for previous versions, however this steep was necessary in order to improve the model appearance. I really hope that they put their hands on this version with the same enthusiasm ... ☺**
- New systems and improved avionics functionality
- Auto-Throttle and FBW performance
- Additional wide screen panel
- Minor dynamics corrections
- Sounds refinements and few additional cockpit sounds. APU turbine sound was included as well.

Contact

For more AEROPROYECTO develops or contact me: <http://aeroproyecto.freetzi.com>

Email: edgar.guinart@gmail.com

Aeroproyecto Facebook group: <https://www.facebook.com/Aeroproyecto-1651893431551895/>

My Facebook: <https://www.facebook.com/edgar.guinartlopez.5>

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Special Features and Aids

Throttle/Thrust behavior - This is very important!

The full usage of the thrust is via keyboard, not via throttle levers on the yoke. That happens because it is not possible to reach the takeoff positions, NTO (Normal takeoff) or APR (Automatic power reserve), using the yoke levers. For reaching NTO or APR positions you must use F4 key, for leaving those two positions you must use F1, F2 or Page Down keys. You can also use F3 or Page Up to increase the thrust levers within the free zone.

In spite of the previous, the yoke levers still useful for taxiing or by controlling the manual thrust on flight within the free zone. Additionally, a little movement of it will de-engage the takeoff positions, if any is engaged, and disconnect the AT, useful thing at landing stage.

Of course, “dancing” yoke levers provokes problems with this feature. In that case I recommend that, at takeoff, you set the levers to top, and only then set NTO or APR via F4; do not touch the levers again while AT is needed. Top positions of yoke levers just to be the most steadies ones. Another way to prevent the AT disconnection via yoke lever is turning on the button AT DISC OFF.

FMC limitations

The Flight Management Computer (FMC) provided here has two mayor limitations. The first drives the second, the database used by the FMC is the FS9/X native one. It means that has many limits that I can't improve. The second limitation is that Arrival and Departure procedures are changed by fixed points that FMC calculate in function of the both runways coordinates and heading on the active route. The points are named DEF (Departure Fix) and IAF (Initial Arrival Fix) followed by FAF (Final Arrival Fix). Those point acts like vectors that guide the pilot or the Autopilot through those stages of the flight. Saying this, I want to remark that this FMC was improved with more flexibility and additional features on this particular matter.

Doors control

For the proper operation of Exit Doors you must call a panel in the upper-left corner of the screen. The first button PAX DOORS OPEN opens the left doors and the cockpit windows. The second button BAG DOORS OPEN opens the right doors and the cargo hatches. These buttons only works on ground, or if the doors are open on air; this prevents an accidental aperture in fly by clicking. The normal state of this two buttons is in gray color (doors closed), the orange color announce open doors.

Keyboard flight

The Fly-By-Wire of this SSJ-100 works well when you are using a yoke because the system is engaged when the both signals, X and Y, are close to the center position. However, such a system fails when you are flying via keyboard because the elevators can't be center like ailerons, or rudder. To prevent the possible complications of this behavior I create a KEYBORAD USING button which forces to centers the elevator using "center ailerons and ruder" action (Num5).

Spoiler assistance tool

This button triggers a function that helps the pilot to control the diving speed of the aircraft. The activation of this feature doesn't imply that you can use the spoiler. Despite the activation of this function, when you set manually the middle or the full position of the spoilers this feature go down until you return back the handle to zero or Ground Armed positions. I strongly recommend you arming this function at the very beginning of the flight.

FSX Acceleration effects bad behavior

At least in this FSX version, a bad behavior was observed on effects position. An inexplicable offset shows the lights effects a bit far from it real position. The coordinates of all lights and effect are right, how are displayed on FS9, so do not try to correct it editing the coordinates, the problem is not in the aircraft configuration.

External power service

An additional tool was included in the configuration menu, the EXT PWR SERV. This option acts just like an external power service call; however, the electrical power will be not ready until the aircraft is stopped and the parking brake engaged. You can make the call whenever you are on ground, on airborne the calling will be stopped.

Lef-side panel of lights

On the wide screen was included a light panel that is not operative.

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

SSJ-100/95B (98 pax @ 32" pitch) 1,645 nm 3,048 km

SSJ-100/95LR (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

SSJ-100/95B

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

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

SSJ-100/95LR (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)

SSJ-100/95B 101,150 lb 45,880 kg (SSJ-100/95LR 109,019 lb 49,450 kg)

Maximum Landing Weight (MLW)

SSJ-100/95B/95LR 90,390 lb 41,000 kg

Maximum Zero Fuel Weight (MZFW)

SSJ-100/95B/95LR 88,185 lb 40,000 kg

Maximum Fuel Capacity

SSJ-100/95B/95LR 4,175 US gal 15,805 l

Normal Checklist

BEFORE START

Cockpit prep.	Complete
Gear pins and covers	Removed
Signs	On/Auto
Fuel quantity	Check
Flight plan	Set
Barometer ref.	Set
Windows & doors	Close
Beacon	On
THR. levers	Idle
Parking brakes	As req.

AFTER START

Anti Ice	As req.
ECAM status	Check
Rudder trim.	Zero

BEFORE TAKEOFF

Flight controls	Check
Flight Inst.	Check
Briefing	Perform
Flap setting	Conf
V1, VR & V2	Check
ATC	Set
ECAM memo Nothing	RED
- Auto brake	RTO
- Signs	ON
- Cabin	Secured
- Spoilers	ARMED
- Flaps	TO

AFTER TO / CLIMB

Landing gear	Up
Flaps	Retracted
Barometer ref.	Set

APPROACH

Briefing	Perform
ECAM status	Check
Seat belts	On
Barometer ref.	Set

LANDING

Cabin crew	Advised
A/THR	As req.
ECAM memo	Nothing RED
- Landing gear	Down
- Signs	ON
- Cabin	Secured
- Spoiler	ARMED
- Flaps	Set
- Auto brake	Set

AFTER LANDING

Flaps	Retracted
Spoilers	Disarmed
APU	Start

PARKING

APU bleed	On
Engines	Off
Seat belts	Off
Ext. lights	As req.
Parking brakes	As req.

SECURING AIRCRAFT

APU bleed	Off
No smoking	Off
APU & bat.	Off
Fuel pumps	Off

Quick Operational Guide

Note

The intention of this chapter is to guide the simmer to perform a successful flight. This is like a normal procedures but including some flying tips. Even if you are an experienced user I suggest you to read this guide.

Initiating the aircraft

- The aircraft will reload all XML programs at beginning but you must assure of this opening all panels at beginning.
- You must calibrate your yoke! The FBW system of this aircraft is very sensitive. As well the AP is disconnecting if the yoke is moved beyond certain number of degrees.
- All trimming will be force to neutral position if the aircraft is grounded and engines are off. Once any engine is starting the trimming systems will be released; notes that FBW (airborne) and Autopilot systems will override this.

Planning the flight and setting up the FMC for a minimum data.

- Set speed in TAKEOFF reference. Clicking on left keys for V1 and VR will establish those references speed for takeoff performances, instead of you can set different speeds at will but is not recommended.
- Set DERATE-FLEX data in TAKEOFF reference. The first Click on right key for DERATE-FLEX will establish F15° (15Celsius for Flex) for normal takeoff (NTO). However, you can set another data manually, entering D or F immediately before the magnitude of the reduction.
- Set the FMC needed data for planning the route to destination on RTE. This FMC only can set one route so, if you need to go around to alternative destination, you must re-enter your new route to new destination.
- On PERF INIT the FMC will calculate the quantity of fuel needed BLOCK-TO-BLOCK, depending on length of the route; clicking on right key of BLOCK will define this quantity. Remember to include the fuel for alternate airport in RESERVE quantity. The fuel data can be checked on FUEL pages on FMC and MFD. In this page you can establish the CZR ALT as well in Flight Level format.

- On APPR REF you can establish the Minimum Decision Altitude for landing, depending on the existence of the planning route. If a route is established on FMC the MIN BARO will calculate depending on destination altitude (LDG ELEV) if not you must manually enter the MIN RADIO altitude. In this page you can also set LDG CONF mode between full Flaps or Flaps 3 configurations to perform the landing.

Before start

- Secure the aircraft putting the parking brakes and setting throttles on IDLE
- Turn on the batteries and inverters (Before, you must lift the covers by right clicking)
- Turn ON the cabin lights (Night time)
- Set ON the navigation lights
- Engage the external power plant switch (EXT PWR SERV option must be active)
- Check fire extinguish system on TEST buttons
- 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 (That opens 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 (That closes 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 on taxi lights, set turn lights as desired
- Check “black cockpit” All signals must be off, except cabin signals
- Set flaps to FLAP 2 Position (For all of takeoff weight)
- Set spoilers to GND SP ARMED
- Check brakes, tires, yoke and control surfaces at PCTL/BRK sheet in MFD
- Deliver some gas until the aircraft move on (Don’t reach takeoff positions)
- Set autopilot initial altitude

Line up, run and takeoff

- Set ON strobe, landing and wing lights, put taxi lights on TO
- Set LNAV and VNAV on, and check green signs on PFD (If a route is specified on FMC)
- ARM auto-brake RTO button
- Check “Nothing red” on EICAS (Also can press TO CONF button for confirmation)
- Display radar screen on MFD
- Set TCAS on (Standby on ground)
- Set the radar scope as you desire
- Deliver gas at about 50% of N1
- At about 30 knots, push throttles to NTO steep (Use APR for emergency, or rapid takeoff)
- Check A/T is engage (Green light must beam, and green A/T message will appears on PFD)
- Check green “TO” or “GA” signs on PFD (Altitude 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 maintain pitch)
- Adjust the speed near the green arrow by varying the pitch
- At about 1500 feet AGL retard the throttles to CLIMB zone (Wait TO signal start to blink)
- Check green “SPEED or THRUST” signs on PFD (THRUST is a VNAV function)
- Check AP speed reference on 250 IAS
- Retract the flaps to 0
- Check flaps status on EICAS
- Reduce the pitch to keep the acceleration

Climbing

- Check initial altitude setting or change it as desired
- Relax the yoke pressure
- Disarm auto-brake RTO button
- Set spoilers to RET position
- Check LNAV and VNAV signs on PFD
- Set AP engage (Green light must beam)
- Check the interception of horizontal flight path
- Check the auto climb performance (On excessive climbing, push ALT knob to set the VS manually. Then try again with VNAV)
- Set autopilot cruise altitude (Manually or in FMC)
- Over 10000 feet, set OFF landing, wing, taxi and turn lights if connected
- Over 10500 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
- To change the altitude use ALT knob or VNAV pages on FMC
- To change the velocity use SPEED knob on AP
- To change the curse use HDG/TRACK knob

Descending

- With an active flight plan, blinking message “DESC PATH” will show on MFD
- Begin the descend at rates between 2000 and 2500 (Set inferior altitude or destination altitude)
- Compare the automatic vertical speed with “DESC PATH” value
- Use spoilers at will to maintain the target speed (Avoid full spoilers)
- Watch high-speed under 10000 feet (Limit 250 KIAS)
- Set ON strobe, landing and wing lights, set taxi lights on TO position

NOTE: There is three ways to begin the descent. Setting inferior altitude using the ALT knob in AP, setting inferior altitude on CRZ ALT cage (VNAV pages) or activating DESC NOW function in the DEC page, both on the FMC. This last option automatically sets the destination altitude taken from the active route.

Approaching

- When ready for landing, set FLAPS 1 (Avoid VS reach the 1000 feet!)
- Check the AT speed reference of 180 IAS (approach speed)
- Below 210 IAS check FLAPS 1 + F on EICAS (Automatic setting)
- ARM auto-brake as needed (Avoid MAX configuration if not necessary)
- 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)
- Set the auto-brake at will

NOTE: In case of GA set throttles to NTO or APR and then climb as in takeoff procedure. With airspeed increasing, retire flaps by steps.

Landing

- Near the ground pull out gently (AP will disconnected with a sound)
- Descend softly and wait for RETARD sign on PFD (SPEED section)
- With RETARD blinking, retard the throttles to IDLE, and perform the touchdown
- After touchdown, set full reverse (Check state on EICAS)
- Below 60 KIAS stop reverse action
- Use brakes to taxing speed
- Fully retract the flaps (Check state on EICAS)
- Set spoilers to RET position (Check state on EICAS)

NOTE: When you are using the keyboard as YOKE on AP regime, you have been careful when disconnect the AP because the plane can jump due to none neutral elevator position. Just check this before the AP disconnection at Flight Controls screen, or center the elevator if you have the KEYBOARD USING option on.

Taxing to ramp

- Out of runway set OFF strobe, landing and wing lights, set taxi lights on TAX, set turn lights as required
- Perform steps for start the APU
- After stop, set parking brakes
- Engage the external power plant switch
- Set OFF electrical systems and radios
- Pull both engine valves to stop (Use right click)
- Check full stop engines on EICAS
- Set OFF beacon lights