

# SUKHOI SU-31



**for Microsoft Flight Simulator**

**OWNER'S MANUAL**  
**Version 1.0.4 — Nov 2022**

Published by IndiaFoxtEcho Visual Simulations

This aircraft rendition is not supported or endorsed by the JSC Sukhoi Company.

## RELEASE NOTES:

### **Version 1.0.4**

1-Nov-2022

#### MINOR UPDATE

- Cockpit interface rewritten for SU10
- Fixed bug preventing battery switch to work on XBox
- Moved localization files to separate folder (in preparation for SU11)
- Solved minor rendering glitch on glass materials in external views
- Pilot now wears a flight suit
- Added male pilot figure (appears if pilot weight is set to 180 lbs or more)
- Reworked sound package, now with additional engine sound samples
- Moved manual to dedicated Docs folder

### **Version 1.0.3**

10-May-2022

#### MINOR UPDATE

- Fixed incorrect raindrop direction in the canopy
- Added text tips during loading

### **Version 1.0.2**

03-May-2022

#### MINOR UPDATE

- fixed minor glitch in the animation of the ailerons, causing them not to be perfectly aligned to the wing at rest in VC
- fixed scaling issue in the elevator geometry when viewed from the cockpit
- revised CG limits for the Weight And Balance interface
- lowered volume of mechanical sound effects inside the cockpit (user request)
- vastly increased volume of engine sounds at high RPM (user request)
- minor tweaks to fuselage dynamic parameters
- redone all thumbnails
- slight reduction in drag coefficient
- added missing special effects reference node in VC model
- fixed electrical systems needles (now reports bus voltage)
- fuel selector is now set to WING TANK upon loading the aircraft
- increased polycount of rear fuselage section in virtual cockpit

### **Version 1.0.1**

20-Apr-2022

#### MINOR UPDATE

- Changed engine gills outlet painting
- Increased smoke effect persistence and tweaked transparency and size
- Fixed engine sounds cones orientation
- Fixed position of wheelchocks
- Fixed throttle lever animation lenght
- Fixed minor misalignment in wing texturing
- Fixed minor modeling alignment in wing tip geometry

### **Version 1.0.0**

11-Apr-2022

#### INITIAL RELEASE

## **WELCOME**

The Sukhoi Su-31 is a Russian single-engined aerobatic aircraft designed by Sukhoi as a lighter and more powerful version of the Sukhoi Su-29.

The design of the aircraft started in 1991 as a single-seat development of the earlier Sukhoi Su-29 with a more powerful Vedeneyev M14PF engine and new landing gear. The low-wing cantilever monoplane first flew in June 1992 as the Su-29T and the first production aircraft flying in 1994.

## **MINIMUM HARDWARE REQUIREMENTS**

Due to the high-detail model and textures, we suggest to use the SU-31 on systems that meet or exceed the following requirements:

CPU: 3.0GHz dual core processor or better

GPU: at least 4Gb dedicated memory, Nvidia 960 or better recommended

RAM: 4.0Gb minimum

Hard Disk: 1Gb required for installation

## **INSTALLATION**

**NOTE: IF YOU HAVE A PREVIOUS VERSION OF THE SU-31 INSTALLED, IT IS RECOMMENDED TO DELETE IT BEFORE INSTALLING A NEWER ONE.**

**This package is distributed both on the Microsoft Marketplace and by external vendors.**

### **MARKETPLACE PURCHASE**

If you have purchased the package through the Marketplace and you have followed the on-screen instructions, no further action is required from your end. The plane should be available in the aircraft selection menu as the other default planes.

### **IMPORTANT!**

If the product update fails in the Marketplace, please close Flight Simulator, delete the aircraft folder manually (it will be located next to the Asobo packages) and download it again.

### **EXTERNAL VENDOR – APP**

If you have purchased the package from an external vendor that uses an add-on management app, such as Orbx, just follow the app instructions to download and install the file, or update it.

### **EXTERNAL VENDOR - FOLDER**

If you have purchased the package from an external vendor and the product comes with an .exe installer, the installer will ask you to provide the location of the COMMUNITY folder. The exact location of the folder will depend on your selection when you have installed Microsoft Flight Simulator. Once you have indicated where your COMMUNITY folder is, just follow the on-screen instructions.

The aircraft will be available in the aircraft selection menu next time you start Flight Simulator. If Flight Simulator was running during the install process, you need to close it and restart it for the aircraft to appear. See below on how to locate the Community folder (or look for tutorials on youtube)

### **EXTERNAL VENDOR - FOLDER**

If the aircraft is provided as a .zip file without any installer, just unzip the content of the file into your COMMUNITY folder.

The aircraft will be available in the aircraft selection menu next time you start Flight Simulator. If Flight Simulator was running during the install process, you need to close it and restart it for the aircraft to appear. See below on how to locate the Community folder (or look for tutorials on youtube)

## HOW TO LOCATE THE COMMUNITY FOLDER

The COMMUNITY folder is the folder, on your PC, in which you have to put the ADD-ON package for Microsoft Flight Simulator.

The location of the folder will depend on your system, whether you have purchased it through Steam or Microsoft Store, and your installation preferences.

**If you don't know where your COMMUNITY folder is, you can locate it with the following procedure (procedure is valid for Sim Update 8 – current release at the time this manual was written):**

1. Go to **Options / General**.
2. Click on **"Developers"** which you will find at the bottom of the list on the left.
3. Switch **Developers Mode** on.
4. On the **Dev Menu** select **Tools -> Virtual File System**.
5. The COMMUNITY folder can be accessed by clicking on the **"OPEN COMMUNITY FOLDER"**
6. You may want to switch the **Developers Mode** Off.

## CREDITS

Dino Cattaneo .....Additional 3D modelling, texturing, system, sound and avionics programming, project management and project lead.

Original 3D mesh by AlienPioneer, acquired through TurboSquid.

We'd like to thank the Beta testing Team and everyone who supported this project and IndiaFoxtEcho.

For questions, support and contact:

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## SPECIAL CONTROLS

### WHEELCHOCKS



Wheelchocks application/removal is controlled by the PARKING BRAKE command. When wheelchocks are applied and the electrical switches are turned off, the model will show covers on the pitot tube and the visual reference devices on the wings.

### SMOKE SYSTEM



A basic white smoke system can be activated with the LOGO LIGHT command.

### GPS



A simple, touchscreen-based, GPS system can be mounted / unmounted in the canopy by clicking the area highlighted in blue in the figure above.



## **GENERAL CHARACTERISTICS**

Crew: 1

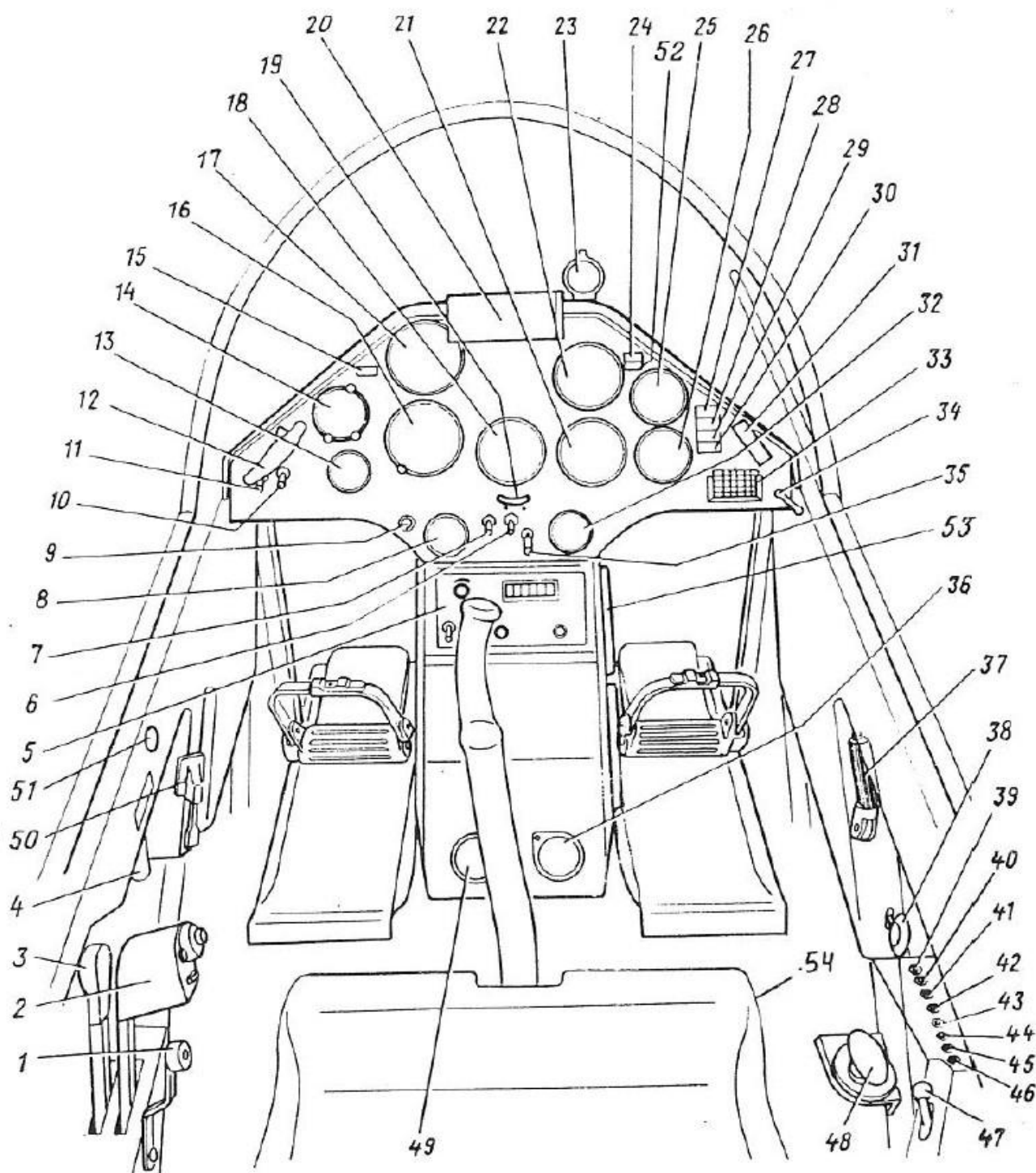
Length: 6.83 m (22 ft 5 in)  
Wingspan: 7.8 m (25 ft 7 in)  
Height: 2.76 m (9 ft 1 in)  
Wing area: 11.83 m<sup>2</sup> (127.3 sq ft)

Empty weight: 700 kg (1,543 lb)  
Max takeoff weight: 1,050 kg (2,315 lb)

Powerplant: 1 × Vedeneyev M14PF 9-cylinder air-cooled  
radial piston engine, 300 kW (400 hp)  
Propellers: 3-bladed constant-speed propeller

### **Performance**

Maximum speed: 331 km/h (206 mph, 179 kn)  
Stall speed: 106 km/h (66 mph, 57 kn)  
Never exceed speed: 450 km/h (280 mph, 240 kn)  
Range: 1,100 km (680 mi, 590 nmi)  
g limits: +12 -10  
Roll rate: 401 deg/s - 7 rad/s  
Rate of climb: 24 m/s (4,700 ft/min)



CC-320A

Aircraft Cockpit

## Cockpit Equipment

Mounted in the cockpit are:

- aircraft controls;
- controls of the equipment installed in the aircraft;
- instruments for monitoring the flight conditions and operation of the aviation materiel.

The instrument panel mounts:

5. Radio
6. GEN Switch
7. GROUND, BATTERY Switch
8. Main Tank Single-Pointer Fuel Quantity Indicator
9. LAMP TEST Button
- 10, 11. MAGNETO RIGHT LEFT Switches
12. Canopy Hinged Portion Emergency Jettison Handle
13. Voltmeter
14. Clock
15. SMOKE Annunciator
16. Altimeter
17. Airspeed Indicator
18. Pressure-Vacuum Gauge (Supercharging)
19. Slip Indicator
20. Map Holder
21. Three-Pointer Engine Gauge Unit
22. Engine Tachometer Indicator
23. Magnetic Compass
- 24, 27, 28, 29, 30. CHIP IN OIL, FUEL REST 7 L, EXTRA T. EMPTY,  
EXTRA T. 100 L, FUEL USE Annunciators
25. Engine Cylinders Heads Temperature Indicator
26. Carburettor Inlet Air Temperature Indicator
31. Fuel Fine Shut-Off Valve
33. Compass Error Correction Table
34. Fuel Usage Valve Control Lever
35. PITOT Switch

36, 49. Accelerometers

52. GEN Annunciator

53. Map Pocket

The cockpit left side mounts:

1. Throttle Lever and Propeller Pitch Control Lever Locking Lever.

2. Throttle Lever

3. Propeller Pitch Control Lever

4. Elevator Trim Tab Control Knob

50. Engine Start Control Lever

51. Pneumatic System Pressure Gauge

The cockpit right side mounts:

37. Engine Cooling System Gills Opening/Closing Knob

38. Oil Cooler Doors Control Knob

47. Landing Gear Tail Support Wheel Locking Lever

48. Engine Hand Prime Pump

Panel mounting button-type circuit breakers:

39. GEN

40. GROUND, BATTERY

41. RADIO, START

42. INST, IND

43. FUEL SYST

44. NAV

45. SMOKE

46. PITOT

54. pilot's seat with provision made for re-adjustment so as to suit the pilot's "low", "medium" and "high" height, the "medium" height is standard.

## NORMAL CHECKLISTS

### **Aircraft External Inspection**

|                            |                              |
|----------------------------|------------------------------|
| Fuel, oil, air.....        | Check serviced               |
| Covers, blanks, clamps.... | Check removed                |
| Aircraft structure.....    | Inspect for damage and leaks |
| Landing gear tires.....    | Check pressure               |
| Wheelchocks.....           | Check in place               |

### **Before Entering Cockpit**

|                              |                           |
|------------------------------|---------------------------|
| All switches and magnetos    | Off                       |
| Turn propeller manually..... | 3 to 5 revolutions        |
| Windshield and canopy.....   | Check condition           |
| Cockpit.....                 | Free from foreign objects |
| Seat.....                    | Check                     |
| Parachute Harness.....       | Adjust                    |

### **After Entering Cockpit**

|                              |                |
|------------------------------|----------------|
| Stick and rudder.....        | Check movement |
| Trim lever.....              | Check neutral  |
| Throttle and prop levers.... | Check          |
| Parachute harness.....       | Put on, adjust |

|                                          |                         |
|------------------------------------------|-------------------------|
| Headset block.....                       | Connect and stow        |
| Canopy.....                              | Check movement          |
| Fuel.....                                | Quantity IndicatorCheck |
| Flight Instruments.....                  | Check condition         |
| Altimeter.....                           | Set                     |
| Accelerometers.....                      | Reset                   |
| Battery.....                             | On, check 24V min       |
| Warning Lights.....                      | Test                    |
| Battery.....                             | Off                     |
| External Power Supply.....               | Connect if available    |
| If Extern. Power is connected Check load |                         |
| Battery.....                             | On                      |
| RadioOn.....                             | check                   |
| Generator.....                           | On                      |

### **Before Engine Start**

|                          |                   |
|--------------------------|-------------------|
| Fuel Shut-off Valve..... | Open              |
| Throttle.....            | Set to 1/3 travel |
| Prop pitch lever.....    | Set to LOW pitch  |
| Engine gills.....        | Close             |

|                 |                |
|-----------------|----------------|
| Prime pump..... | Fill cylinders |
|-----------------|----------------|

## **Engine Start**

|                          |                       |
|--------------------------|-----------------------|
| Area near propeller..... | Check free, no people |
|--------------------------|-----------------------|

|                  |                                 |
|------------------|---------------------------------|
| Wheelchocks..... | Check in place with ground crew |
|------------------|---------------------------------|

|                  |                    |
|------------------|--------------------|
| Ground crew..... | OFF THE PROPELLER! |
|------------------|--------------------|

|                         |      |
|-------------------------|------|
| Engine start valve..... | Push |
|-------------------------|------|

|                      |               |
|----------------------|---------------|
| Hand Prime Pump..... | Use as needed |
|----------------------|---------------|

|               |                                 |
|---------------|---------------------------------|
| Throttle..... | Move to attain steady operation |
|---------------|---------------------------------|

|                        |                                            |
|------------------------|--------------------------------------------|
| Magnetos switches..... | Engage as soon as engine starts to operate |
|------------------------|--------------------------------------------|

|                 |                                    |
|-----------------|------------------------------------|
| Prop lever..... | Set to 70%, check steady operation |
|-----------------|------------------------------------|

|                 |                  |
|-----------------|------------------|
| Prop lever..... | Set to LOW pitch |
|-----------------|------------------|

|               |                                  |
|---------------|----------------------------------|
| Magnetos..... | Disengage one, assess speed drop |
|---------------|----------------------------------|

|               |                     |
|---------------|---------------------|
| Magnetos..... | Engage both for 20s |
|---------------|---------------------|

|               |                                        |
|---------------|----------------------------------------|
| Magnetos..... | Disengage the other, assess speed drop |
|---------------|----------------------------------------|

|               |                     |
|---------------|---------------------|
| Magnetos..... | Engage both for 20s |
|---------------|---------------------|

|                |            |
|----------------|------------|
| Propeller..... | Test speed |
|----------------|------------|

|             |                  |
|-------------|------------------|
| Engine..... | InstrumentsCheck |
|-------------|------------------|

|                     |      |
|---------------------|------|
| Throttle lever..... | Idle |
|---------------------|------|

### **Before Taxi**

|                     |                  |
|---------------------|------------------|
| Wheelchocks.....    | Command removal  |
| Tailwheel lock..... | Not engaged      |
| Brakes.....         | Operate smoothly |

### **Before Take-off**

|                       |                   |
|-----------------------|-------------------|
| Tailwheel lock.....   | Engage            |
| Compass.....          | Check with runway |
| Prop Pitch Lever..... | Set to LOW pitch  |

### **Take-off**

|                        |                                           |
|------------------------|-------------------------------------------|
| Clock.....             | Engage upon takeoff clearance             |
| Control stick.....     | Pull fully                                |
| Wheel brakes.....      | Released                                  |
| Engine Speed.....      | Increase to 82%                           |
| After 15 to 20m.....   | Raise aircraft tail                       |
| Engine power.....      | Increase to takeoff level                 |
| Lift off.....          | 120 to 140 km/h                           |
| Prop Pitch Lever.....  | Once airborne operate set 70 to 80% speed |
| Max rate of climb..... | 170 to 180 km/h                           |

## **Climb and Cruise**

|                        |                                      |
|------------------------|--------------------------------------|
| Every 15 minutes.....  | Check fuel quantity and switch tanks |
| Every 15 minutes.....  | Check flight and engine instruments  |
| Pitot Heat switch..... | Set to ON in icing conditions        |

## **Before Aerobatic Flying**

|                        |                                                            |
|------------------------|------------------------------------------------------------|
| Prop pitch lever.....  | Set to HIGH pitch                                          |
| Engine speed.....      | 82% minimum, 100% for 5 minutes maximum                    |
| Airspace.....          | Inspect attentively                                        |
| Weather.....           | DO NOT FLY IN THE CLOUDS AND IN THUNDERSTORM ACTIVITY AREA |
| Pitot Heat switch..... | Set to ON in icing conditions                              |

## **Turn Eight**

|                            |            |
|----------------------------|------------|
| Engine speed.....          | 70% to 82% |
| Entry speed.....           | 200 km/h   |
| Time of turn with 60° bank | 20s        |

## **Chandelle**

|                           |                 |
|---------------------------|-----------------|
| Engine power setting..... | Maximum         |
| Entry speed.....          | 280 to 290 km/h |
| Typical climb.....        | 300 to 350m     |
| Minimum Speed.....        | 135 km/h        |

## **Zoom**

|                     |                       |
|---------------------|-----------------------|
| Entry attitude..... | 30 to 60 deg pitch up |
| Entry speed.....    | 280 to 290 km/h       |
| Minimum speed.....  | 135 km/h              |

## **Hammerhead Stall**

|                                |                      |
|--------------------------------|----------------------|
| Entry speed.....               | 260 to 290 km/h zoom |
| Speed for Hammerhead.....      | 145 km/h             |
| Speed for level flight recover | 170 km/h             |

## **Diving**

Dive angle..... 60 deg, check with wing position

Control stick..... Avoid abrupt pulls

Speed for level flight recover 320 to 330 km/h

## **Half-Roll**

Engine speed..... 70% to 82%

Entry speed..... 170 km/h

Speed for level flight recover 270 km/h at the end of recovery

## **Normal Loop**

Engine speed..... 70% to 82%

Entry speed..... 280 to 290 km/h

Speed for level flight recover 190 km/h maximum

## **Immelmann Turn**

Engine speed..... 70% to 82%

Entry speed..... 280 to 290 km/h

Minimum speed..... 135 km/h

## **Landing Approach**

Base turn speed..... 170 to 180 km/h

Prop Pitch Lever..... Set to LOW pitch

On final..... Set aircraft for 160 km/h

## **Landing Touchdown**

Prop Pitch Lever..... Set to LOW pitch

On final..... Set aircraft for 160 km/h

5 to 6m from ground..... Initiate flare-out

During flare-out..... Smoothly reduce power

1m from ground..... Three-point touchdown

Wheel Brakes..... Apply only below 80km/h

Tailwheel lock..... Disengage

## **Shutdown**

Throttle..... Idle

Prop pitch lever..... Set to LOW

Fuel Shut-off Valve..... Closed

Avionics and radio..... Off

Generator..... Off

Mags..... Off

Battery..... Off

