## THE **SU-27 SK**

## FLIGHT SIMULATION & COCKPIT

# FOR FLIGHTGEAR.ORG

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## **Introduction**

This is an implementation of the SUKHOI's  $\,$  SU-27 4th generation fighter aircraft made for simulation in FlightGear 2017.2.1 and later  $\,$  .

This  $4^{th}$  generation fighter aircraft was built and planned initially to work in the Soviet Air Force as an air superiority fighter, and as a competitor for the  $4^{th}$  gen US and generally the west/NATO air forces superiority fighters, especially the Variants of the F-15 Eagle.

the **SK** variant of the fighter made first in the USSR and then in Russia & still in service in Russian and many air forces in the world, NATO reporting name: <u>Flanker B</u>.

You can get more information in Wikipedia by visiting this Page.

This aircraft have a stunning flight capabilities in combat maneuvers or in aerobatic shows , it was especially known by its amazing aerodynamics . It's also obvious that it was an icon in the USSR and Russia aerospace industry .

This variant as a **commercial/export** version has been even manufactured under license in India and China . And since it flies outside the soviet Geo-space , got a lot of upgrades and modified avionics and systems especially :

- GPS navigation capability.
- Navigation using standard VOR/NDB/TACAN frequencies bands.
- Improved Flight Control System .
- A lot of other upgrades that you can find in details by Googling for: "SU-27 upgrades".

### Before starting the docs:

This work uses a lot of models and scripts and other works made by

- \* the FGUK-team for their SU-27 prototype,
- \* MIG-29 developers,
- \* The F-15 developers, (their svg HUD was a huge help ),
- \* The Mirage2000-5 developers,
- \* A lot of FG Aircraft's developers,

So Greetings and THANKS to all of them.

<u>Greetings also flies to the FlightGear simulator Developers</u> (The simulator Core developers, as they like to call themselves;) ) who spent a lot of time and efforts to bring a such beautiful piece of software.

The current aircraft package is at version 0.4 (as of feb/2019), so this is a "DEVELOPMENT" version, just published for Fun, Tests, and may be some contributions.

## **General flight characteristics**

- Crew: 1
- Length: 21.9 m (72 ft)
- Wingspan: 14.7 m (48 ft 3 in)
- Height: 5.92 m (19 ft 6 in)
- Wing area: 62 m<sup>2</sup> (667 ft<sup>2</sup>)
- Empty weight: 16,380 kg (36,100 lb)
- Loaded weight: 23,430 kg (51,650 lb) with 56% internal fuel
- Max. takeoff weight: 30,450 kg (67,100 lb)
- Fuel capacity: 9,400 kg (20,724 lb) internal
- Power-plant: 2 × Saturn AL-31F turbofans
  - Dry thrust: 75.22 kN (16,910 lbf) each
  - Thrust with afterburner: 122.6 kN (27,560 lbf) each

#### **Performance**

- Maximum speed:
  - At altitude: Mach 2.35 (2,500 km/h, 1,550 mph)
  - At sea level: Mach 1.13 (1,400 km/h, 870 mph[103])
- Range:
  - At altitude: 3,530 km (2,193 mi; 1,906 nmi)
  - At sea level: 1,340 km (800 mi; 720 nmi)
- Service ceiling: 19,000 m (62,523 ft)
- Rate of climb: 300 m/s[107] (59,000 ft/min)
- Wing loading:
  - With 56% fuel: 377.9 kg/m<sup>2</sup> (77.3 lb/ft<sup>2</sup>)
  - With full fuel: 444.61 kg/m<sup>2</sup> (10,550.75 lb/ft<sup>2</sup>)
- Thrust/weight: 1.07 with 56% internal fuel; 0.91 with full fuel
- Maximum g-load: +9 g

<sup>\*</sup> A lot of informations cited above were taken from Wikipedia.org

# <u>Part 1:</u>

# **Cockpit**

## **General cockpit overview**

## <u>Pic N°:1:</u>



- 1. HUD (Head Up Display).
- 2. HUD color and brightness control panel.
- 3. Armament pylons indicators .
- 4. HDD Head Down Display : Navigation & radar screen.
- 5. Angle of attack (left needle)and G load indicator(right needle).
- 6. Air speed indicator (in Km/H).
- 7. Attitude indicator(pitch,roll,bank and navigation indicators).
- 8. Vertical Velocity indicator(M/s).
- 9. Engines tachometer (RPM %).
- 10. Fuel quantity indicator(\*1000 Kg).
- 11. Cockpit magnetic compass.
- 12. EKRAN (Early warning system) display.

- 13. Status leds indicators panel (canopy, radar, drag-chute,...etc..).
- 14. Radar Warning System display device (RWS/RWR).
- 15. Radar Altimeter (M).
- 16. Pressure Altimeter (M for big needle/M\*1000 for the small).
- 17. Horizontal Situation Indicator (HSI).
- 18. FOD Engines Intakes position indicator.
- 19. Exhaust temperature indicators (°C).
- 20. Gears control lever.
- 21. Flaps/Gears/Slats/Air Brake deployment indicator .
- 22. Clock watch & Chronometer.
- 23. Inner & outer radio navigation markers indicator lights (for ILS landing ops).
- 24. Hydraulics and pneumatic systems pressure indicators.

## **The Autopilot panel:**

#### PIC N°2:



1 : **LAND:** by activating the AP (switch n°9) and pressing this button ,the LAND mode will be engaged .

Correct runway localizer frequency must be already set in NAV1(use radio dialog , press F12 to show the dialog).and check the beacons indicator lights ON if in range . You should also be at max 25° deviation from the localizer course at 1820m (6000 ft ) of altitude when entering localizer zone . keep your speed below 500 km/h , touchdown at about 270 km/h of airspeed .

- 2:<u>NAV</u>: This is for the lateral radio NAV hold (Experimental, please test).
- 3:**NAVIG**: This button make an active AP (switch 9) follow the navigation route, route should be set and ACTIVATED from the route manager dialog.

- If no active route found the ACS (AP) will fail and a warning light will be lit (N°4 under the HUD see "pic2"). The AP then should be RESET by pressing button8 from the same panel . 4: AUTO: This button make an active AP (switch 9) maintain the current attitude (Roll & Pitch).
- 5:**RADAR ALT**: Radar altitude hold (Or Terrain follow: NOT Yet Implemented).
- 6: **VERT**; Vertical Speed hold mode ,(NOT Yet Implemented).
- 7:**ALT-HOLD**: Barometric altitude hold mode, This button make an active AP (switch 9) maintain the current barometric altitude, no matter what roll commands entered by the pilot.
- 8: **RESET**: This button reset the AP, thus, disengaging any already active mode and solves the ACS failures due to lost route or localizer .use it generally when you see light N°4 (PIC2).