DC DESIGNS SU-27 FLANKER

OPERATIONS MANUAL

Salut, *comrad*, and welcome to the *DC Designs* SU-27 *Flanker*. This manual will guide you through the operation of this aircraft, and ensure that you enjoy flying the airplane. Please do take the time to read all of the manual, so that you understand the operation of the aircraft systems and can then get on with flying this remarkable aircraft in Microsoft Flight Simulator.

CONTENTS

GENERAL PERFORMANCE TABLE

General characteristics

- **Crew:** 1
- **Length:** 21.9 m (71 ft 10 in)
- **Wingspan:** 14.7 m (48 ft 3 in)
- **Height:** 5.92 m (19 ft 5 in)
- **Wing area:** 62 m^2 (670 sq ft)
- **Empty weight:** 16,380 kg (36,112 lb)
- **Gross weight:** 23,430 kg (51,654 lb)
- **Max takeoff weight:** 30,450 kg (67,131 lb)
- **Fuel capacity:** 9,400 kg (20,723.5 lb) internal[145]
- **Powerplant:** 2 × Saturn AL-31F afterburning turbofan engines, 75.22 kN (16,910 lbf) static thrust per engine dry, 122.6 kN (27,600 lbf) with afterburner

Performance

- **Maximum speed:** 2,500 km/h (1,600 mph, 1,300 kn) / M2.35 ground speed at altitude

1,400 km/h (870 mph; 760 kn) / M1.13 at sea level

- **Range:** 3,530 km (2,190 mi, 1,910 nmi) At altitude

1,340 km (830 mi; 720 nmi) at sea level

- **Service ceiling:** 19,000 m (62,000 ft)
- **g limits:** +9
- **Rate of climb:** 300 m/s (59,000 ft/min) [149]
- **Wing loading:** 377.9 kg/m^2 (77.4 lb/sq ft) With 56% fuel

444.61 kg/m^2 (91.1 lb/sq ft)

- **Thrust/weight:** 1.07 with 56% internal fuel; 0.91 with full fuel

The *DC Designs* Su-27 *Flanker* is designed, like all *DC Designs* aircraft, to be as accurate as possible in its basic operation and flight model, but with accessible systems. In real life, the SU-27 is designed to be very simple to operate, as Russian pilots tend to get far less time in the air than their Western counterparts, and thus less time to train and become familiar with new aircraft types. Therefore, this ethos sits well with the type.

The aircraft in real life is perhaps most famous for its airshow performances, where the huge jet would perform both tail-slides and Pugachov's "*Cobra*". Both are possible in this rendition of the aircraft, and both require the correct method as per the real jet in order to carry them out.

AIRCRAFT FAMILIARISATION

There is no denying that the SU-27 *Flanker* looks the part. Built by *Sukhoi* as a counter to the American F-14 Tomcat and F-15 Eagle, the Flanker followed the equally famous MiG-29 *Fulcrum* as the Soviet's first fourth-generation fighters believed to be able to equal the best of anything the USA or NATO could put into the air.

The SU-27 is a huge aircraft, larger than even the F-14 Tomcat, and is equipped with two truly enormous engines to match that give it a close-combat performance equivalent to those aircraft fielded by the

West. However, Soviet combat doctrine differs from that of Western nations, in that aircraft are built for high-alpha, slow speed manoeuvering. In the huge SU-27, this allows for the massive aircraft to perform some truly remarkable manoeuvres at high Angle-of-Attack that would force other jets into a departure from controlled flight.

The aircraft is so large that it rarely needs to carry external fuel tanks, as the internal fuel load is so high. Even fully armed, the SU-27 has a considerable loiter time on Combat Air Patrol (CAP).

The Flanker is equipped with a full Fly-by-Wire control system and the latest in Russian avionics, allowing it to conduct Beyond Visual Range (BVR) engagements. The internal radar has been replicated in this rendition of the aircraft, allowing for radar intercepts in MSFS multiplayer scenarios.

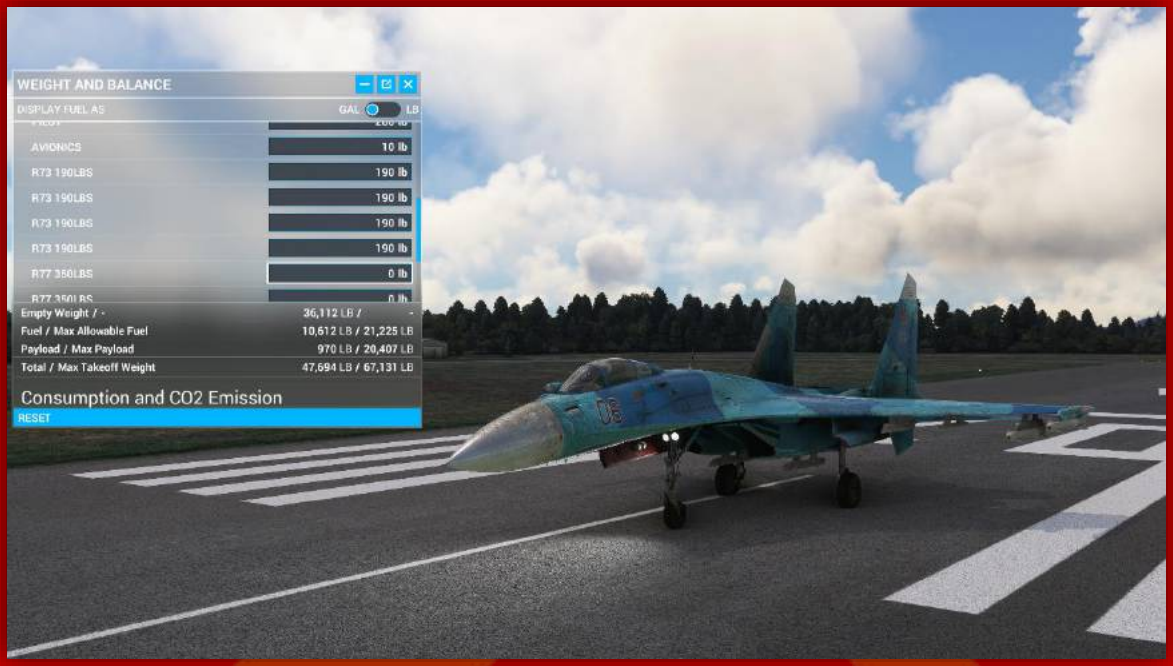
MAIN PANEL LAYOUT

The SU-27 *Flanker* has a fairly modern cockpit layout, although some of the instrument layouts and methodology will not be familiar to those more used to Western aircraft. The following pages will show the main instrument panels and features of the aircraft, as well as how to use the simulator's Interactive Checklist in order to find your way around the cockpit.

Please note that all cockpit text is in *Cyrillic* (Russian) to make the experience more immersive. However, the tool-tip texts are all in English, thus providing alternative methods of identifying what each panel of controls does.

Please ensure that you use the Interactive Checklist to locate all necessary controls and switches for correct operation of the aircraft. This will prevent you from not being able to understand where to find the instruments you require when trying to start the aircraft from a cold and dark (parked) location.

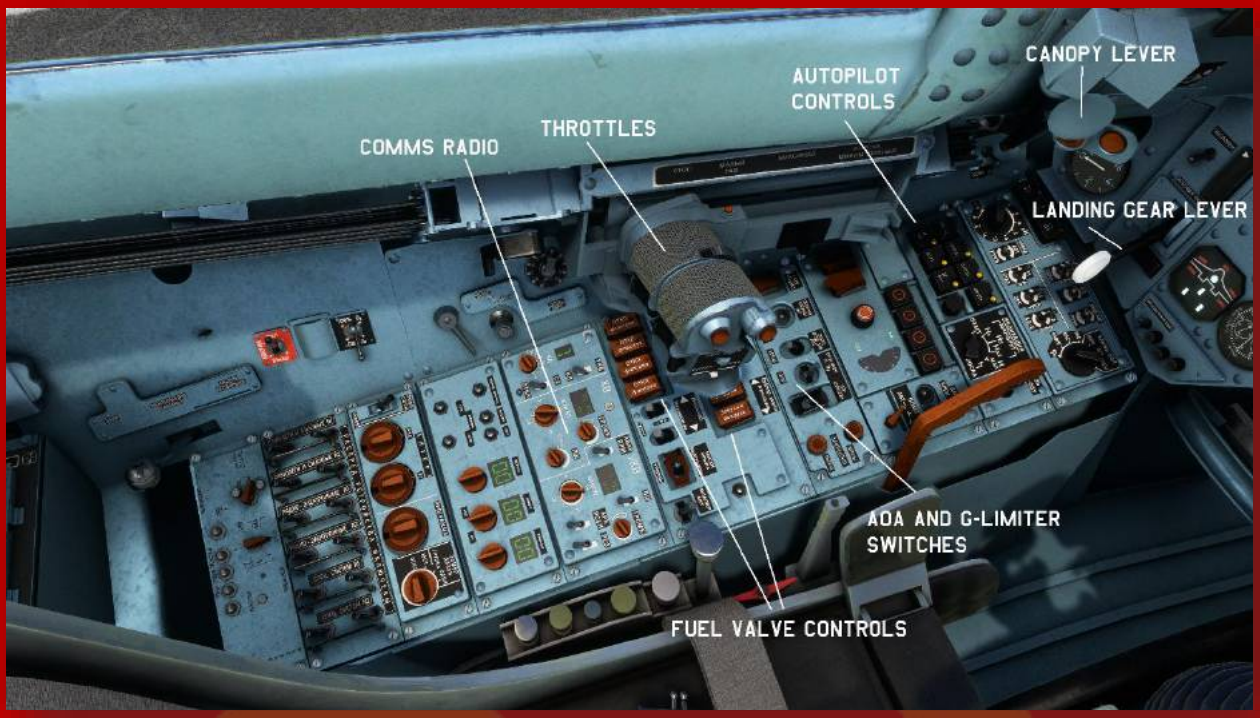
Likewise, the simulator menu also contains a loadout selection, which allows you to select both fuel loading and fit weapons to your aircraft (PC only). By selecting the relevant station and applying the stated load, you will see the weapon appear on the relevant station pylon.



Above, the user has selected four R-73 missiles, each with a weight of 190 pounds. Below is a full missile loadout.

Above, the primary flight instruments are shown. Most are very similar to Western aircraft. The main difference is the artificial horizon set up. Pitch operates in the normal way, but the horizon does not “roll” with the horizon itself – instead, the aircraft icon rolls against a static horizon. This can take some getting used to for those used to the normal “free-rolling” artificial horizon seen on Western jets.

The radar has a maximum range of 50 nautical miles, and can include ground features as well as air-to-air contacts in multiplayer.



The left side panel contains all comms and auto-pilot controls, as well as fuel switches and the parking brake (the large red lever).

Importantly, this panel also includes the Angle of Attack and G-force limiting switches. These govern the Fly-By-Wire system's AoA and G-limiters, which must be switched off in order to perform manoeuvres like the tail-slide and "*Cobra*".

The switches to the rear of the panel govern various fuses and power settings and are not required to be used on the aircraft.

The right hand side panel contains the navigation radios, avionics and power switches, lighting, transponder, electrical panel and also the engine control switches. Most of the engine start-up routine can be conducted via this panel.

TACAN navigation has been included in this aircraft. Although not present on the real SU-27 Flanker, we have included it here for functionality purposes within the framework of Microsoft Flight Simulator, to allow the jet to navigate with reference to military airfields.

The warning light system is somewhat scattered in the SU-27 and consists of various warning lights governing control trim, emergency lights, and general annunciators. These lights should be memorized in order for the pilot to know what they mean.

Those of highest priority, the emergency lights, are located beneath the HUD control panel. Those to the right and lower are annunciators and alert the pilot to such things as spoilers extended, canopy open, and so on.

Unlike previous generations of Soviet-designed aircraft, the SU-27 Flanker features good rearward visibility, allowing the pilot to more easily maintain visual contact with an enemy opponent during a dogfight. In addition, full internal night-lighting is included in the SU-27 Flanker cockpit.

FLYING THE SU-27 FLANKER

The SU-27 *Flanker* is an aircraft that has a quite unique profile in terms of its aerodynamics and its close-combat capabilities. Although for many years something of an enigma, Western pilots were finally able to study the aircraft closely (and some even to fly it) after the fall of the Berlin Wall and the collapse of Communism in Russia during the 1990s. What they reported was an aircraft that was supremely capable in a close WVR (Within Visual Range) fight, despite its immense size. A Royal Air Force fighter pilot who flew the aircraft reported that he was able to maintain a sustained loading of 6G at just 270 knots in full afterburner at low altitude (in denser air). This low corner velocity for a minimum radius turn, along with good energy re-

generation and sustained high-alpha manoeuvrability combined to create a dogfighting aircraft that was able to defeat the best of Western jets.

To fly the *Flanker* well, the pilot must think ahead and consider the mass of the aircraft. Its closest match in terms of Western jets is the F-15C Eagle, which also has a huge lifting-body airframe, huge engines and good low-speed, high-alpha manoeuvrability.

Even when fully fuelled and laden, the SU-27 remains combat capable, meaning that it can engage other fighters at close range and stay in the fight even when smaller-mass jets such as the F-16 would have to bug-out to regain energy.

The Flanker, in common with many Soviet jets, has an all-weather capability and can operate from rough or damaged air-strips. The Foreign Object Damage doors can be closed to prevent stray debris from damaging the engines on take-off and landing, as see in the image above.

The take-off and landing techniques in the aircraft are relatively benign, with V2 being around just 150 knots and landing generally around 170 knots approach depending on weight.

The aircraft has a very large ventral airbrake (spoiler) and can also deploy a pair of braking parachutes for landings on short or damaged airstrips, should extra braking be required.

SPECIAL MANOEUVRES

The Flanker is famous for its ability to perform both tail-slides and the famous “Cobra” manoeuvres. To perform either of these, both in real life and in the DC Designs Flanker, the pilot ***must disengage the AoA limiter and also the G-limiter***.

To perform a tail-slide, the pilot should pull up into an 80-degree climb, then reduce the throttles to idle and let the airspeed bleed off. The SU-27 will eventually lose all airspeed and begin to fall backwards while developing a tendency to want to nose down and “mush into” the stall. Maintaining maximum “up” elevator trim while holding the stick fully back will maintain the nose at a steep angle for several seconds before aerodynamic forces overpower the control

settings and the Flanker will nose down into a recovery. The pilot should then apply power, gradually trimming out and levelling off.

The "*Cobra*" manoeuvre is really just a fancy name for a "dynamic deceleration". This is something that was discovered in the 1950s by pilots in both the USA and other countries. In the 1986 Paramount Pictures movie *"TOP GUN",* the famous *"I'll hit the brakes and he'll fly right by"* scene is actually the F-14A Tomcat performing a "pitch-pulse" manoeuvre, which is almost the same thing.

What makes the "Cobra" somewhat special is the higher angle of attack and the lack of altitude gain when compared to a pitch-pulse.

To perform the manoeuvre, the *Flanker* should be at around 200-270 knots and with a low power setting. The pilot should then pull the stick back hard all the way, and immediately "check" it forward to prevent an over-rotation. With practice, the Flanker will pitch to 90-degrees + before "pushing" through and back to level flight, with barely any change in altitude.

The pilot should engage maximum afterburner as the *Flanker* reaches the vertical and use "down" elevator trim to help push the aircraft back to horizontal flight.

CREDITS

DC Designs SU-27 *Flanker*

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Textures	Dean Crawford
Sounds	Big Radials (WWise)

Just Flight

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