

SUKHOI-27
OPERATER'S MANUAL
FOR SYSTEMS OPERATION & TACTICS IN
AIR TO AIR COMBAT

By Verticle Charlie



ITGC AIR CORPS

**TACTICS & AIR COMBAT
DEVELOPMENT ESTABLISHMENT
(T.A.C.D.E)**



LEARN TO LEAD LEAD TO FIGHT FIGHT TO WIN

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INTRODUCTION



Su-27 in context of DCS is a very potent and lethal Air superiority weapon platform. There is an array of primary and secondary sensors and various weapons at your disposal which combined with manoeuvrability of this platform enable you to dominate your adversary in the sky.

However, as lethal this platform may be, make it a habit to fly in pair. Air to air combat in Su-27 (or any other aircraft) is not just about aggression. It is also about the presence of a sound tactical mind, ability to take quick decisions and using your enemy's disadvantages against them. Working in pair enables greater coordination, improves Situational Awareness and improves the chances of you surviving & achieving your operational goals.

This operator's manual however aims at making you a better pilot in terms of employing your weapons and sensors in combat to achieve dominance over any platform in 1 v 1 scenario with proper utilisation of Sensors, Missiles, Tactics and Manoeuvres.

SENSORS

Su-27 has wide variety of active and passive sensors that can be used in combat. These sensors when properly used increase Situational Awareness, decrease your work load and increase the probability of you making the kill.

Let's take a detailed look at these sensors which are as follows:

- 1. Radar**
- 2. Infrared Search & Track / Electro Optical System**
- 3. SPO-15 Radar Warning Receiver**
- 4. Datalink**

RADAR

The Phazotron N001 Myech Pulse-Doppler radar in the Su-27 has a scan range of 200 Km and has 60 degree F.O.V w.r.t azimuth.

The Track range is 70-80 Kms for a reliable track. Though the radar is powerful, it is **fairly susceptible to Jammers and the Doppler notch**. The radar has 3 types of scans/modes:

1. **Scan mode**: This mode is used for scanning for bandits & friendlies,
2. **Track While Scan (TWS)**: This mode can be used to scan for tracking a particular target while still being able to monitor other bandits & friendlies. However this mode turns off automatically when there are jammers around. Further, **it switches to STT at 85 % of the calculated maximum range of the weapon automatically**.
3. **Single Target Track**: Locking on to a particular bandit. After going into STT the information regarding other bandits & friendlies on the HDD will disappear if you are not linked with the AWACS via Data-Link

Unlike F-15C the Su-27 can **guide its missile only in the Single Target Track mode**. It cannot fire on the bandit and remain in the TWS mode. As **soon as you launch any Radar Guided Missile, the radar switches to STT** mode to guide the missile.

Pulse Repetition Frequency (PRF): To search for the targets there are different pulse repetition frequency or PRF modes

1. **HI-PRF : For Hot targets.**
2. **MED-PRF : For cold & Notching target within 45 Km.**
3. **ILV-PRF : For unknown targets within 50 Km.**

The radar locks are most stable in MED & ILV PRF modes.

HDD & HUD Symbology

Whenever the Radar is on, ILL at the bottom of the HUD comes on as well. It is an indicator that the radar is operational. **The friendlies are demarcated with “=” and enemies with “-” in the BVR mode.**



On the HDD the bandit will be **demarcated by a “T” or a “>-- “symbol and a friendly by “0— “symbol**. A jamming Bandit will appear as a continuous line of dashes on your HUD. You can judge the contact speed and altitude by looking at how long and short the Horizontal & the Vertical lines of the contact on the HDD are. The Vertical offset of the “T” represents the Flight Vector of the Bandit and the Horizontal base of the “T” represents the altitude of the bandit. The bigger the lines, the faster and higher they are and vice versa.



OPERATING THE RADAR

SCANNING FOR THE BANDIT

The antenna on the Sukhoi- 27 can be slewed up, down & sideways. Each notch on the radar can scan thousands of meters up down & sideways. In combat when you are flying high (above 10000m) you will mostly need to scan the horizon and downwards and if you are flying low in the weeds you need to scan the horizon and upwards. However flying at medium altitude you need to scan in all directions. + & - 3 notch setting will take care scanning both up and down from the ground to 15000m.

IMP- However, what you need to remember is the radar on the Sukhoi is stabilized and therefore when you are pitching up or down aggressively you need to slew the radar up or down as well to find the Target. (E.g. If you are flying straight with your nose pointing at bandit who is colatitude, you can track the bandit with your radar pointed at the horizon i.e. at 0 elevation. However, if you pitch up or down you need to slew the radar up or down +- 1/2/3 etc. due to stabilisation and change in altitude.

SOP FOR SORTING THE BANDIT

The **priority** in terms of **sorting** out the bandit shall be as follows:

- 1. Nearest**
- 2. High Speed- High Altitude.**
- 3. High Speed- Low Altitude.**
- 4. Low Speed- High Altitude.**
- 5. Low Speed – Low Altitude.**

TRACKING

A Bogey can be tracked either in the Track while scan mode or the Single Target Track (STT) mode.

TRACK WHILE SCAN

As the name suggests in this mode you can scan for additional bandits while tracking the priority bandit as warranted by the situation. Remember this mode is only effective in a non-jamming environment. The TWS in Su-27 turns to the Scan mode or the SCN (on HUD) automatically if it is getting jammed. Further, **it switches to STT at 85 % of the calculated maximum range of the weapon automatically. This mode does not display the altitude and speed of the bandit.** However it will slew the radar according to the movement of the bandit.

IMP: This mode does not give any LOCK warning to the bandit therefore it can be used to track the bogey discretely.

SINGLE TARGET TRACK

Scan mode is the mode that you will most probably use in combat. Once the bandits are prioritized for the engagement, put your TDC over the bandit you want to target and lock him. As soon as you lock the bandit it will display his speed and altitude above your speed and altitude. However, once in STT you will not be able to see other bandits if the AWACS is not available. Once in the suitable range according to the R.O.E you can fire for the kill. **Always, while tracking the enemy Switch on yourIRST so that mode on the top says EORL. It means both you radar & IRST are operational. If radar cant track due to notch IRST will keep on tracking the bandit.**

****NOTE: If a bandit is jamming you can only lock him up. Until your radar achieves a burn on the Jammer, none of his critical information like his altitude, Range and Speed will be available to you for utilisation.**



A JAMMING BANDIT

INFRARED SEARCH AND TRACK

The Infrared Search & Track (IRST) provides the Su-27, the capability to track a target passively. The IRST is the most feared sensor of the 27 as it does not provide any lock warning to the bandit. The IRST basically tracks the heat which is the engines and the heat exhaust from the engine. The maximum range of EO is 200 Km for a cold burning bandit. The effective range however is around 25 clicks for head on non-afterburning bandit. When Switched on it will show EO on the left hand side of the HUD.



The IRST can be used the same way as radar with a couple of major differences.

1. **IRST has a limited look down capability.** Since the sensor is located on the nose of the aircraft, the nose of the aircraft blocks the look down capability of the aircraft it has only +50 & -15 degree FOV. It can scan 30 degree in azimuth.
2. **It cannot tell friendly from a foe.** The aircraft on HDD & HUD will always show as an enemy when locked. Therefore, in case of using the IRST it becomes imperative to IFF before engaging.

IMP: To IFF a target keep him locked in EO and switch on and off your Radar quickly. If the A on the left hand side turns to AFR that means you have locked a friendly. If it remains 'A' that means the aircraft locked is a bandit and can be engaged.

There are a couple of very powerful close combat modes in the Su-27 arsenal which are used in conjunction with IRST/EO.

1. The Vertical Scan mode.
2. The Helmet Mounted Sight (H.M.S)

Verticle Scan

This Vertical Scanning mode is the most frequently used mode in close manoeuvring air combat. In this mode, the radar or IRST scan pattern is a vertical bar that is **-10 & +50** degrees wide in elevation. The HUD displays two vertical lines denoting the boundaries of the scan zone. Lock-on is possible when a target is inside the scan zone, which starts at the lower edge of the HUD and extends above it by about two more HUD lengths. To lock-on a manoeuvring fighter, fly to place the target in the scan zone and press the lock Button. The Lock-on occurs within 1 – 3 seconds of the target entering the scan zone with Lock button pressed. After the target is locked, the display on the HUD changes to the Attack (STT) mode.



Head Mounted Sight (H.M.S)

The pilot can aim weapons at the target simply by turning his head to look at it, with the help of the Schel-3UM helmet-mounted sight (HMS). The sighting ring on the screen emulates the HMS sighting system viewfinder located in front of the pilot right eye. The pilot can superpose the viewfinder over the target by panning the view. This mode is used in close combat to get an advantage in guided missile launch as HMS permits lock-on and missile launch from high off-bore sight angles, without turning the whole fighter to point at the target. After locking the target by superposing the sighting ring and pushing the Lock Button, if all the launch criteria are satisfied, the ring starts flashing at a frequency of 2 Hz, signalling "LA" (launch authorized). If the target moves out of the missile seeker's angular gimbal limits, an "X" symbol will appear above the ring.



IMP: Remember these modes can be used passively, however if your radar is on they will give a lock warning to the bandit. Also, remember to IFF as these modes by default utilise the IRST/EO and will always show the aircraft as an enemy.

RADAR WARNING RECIEVER

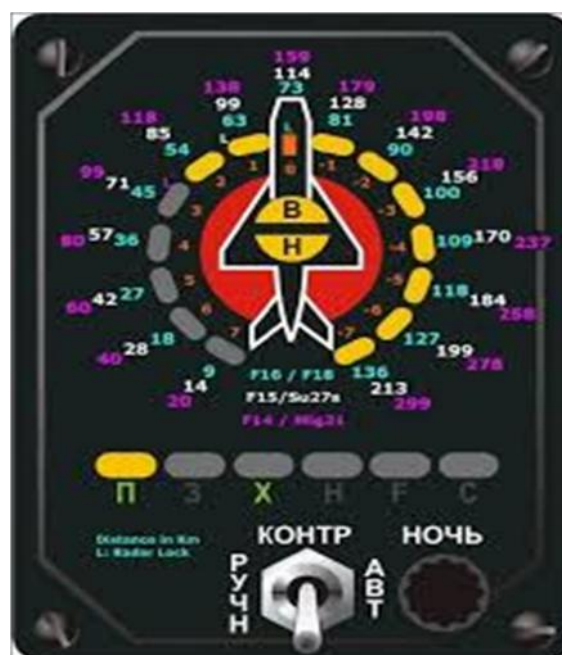
The Su-27 has the "Beryoza" SPO-15LM Radar Warning Receiver (RWR). Unlike the other RWRs of say a mirage or an F-15, The SPO-15 gives the Strength signal of the radar painting you. The system provides detection of radar signals at the following angles: Azimuth = +/- 180 and Elevation Range = +/- 30. The threat history display duration time is 8 seconds.



The different threat types present in the RWR's Directory is as below.

1. **Π – airborne radar (Fighters)**
2. **3 - long-range radar (Long Range SAM)**
3. **X - medium-range radar (Medium Range SAM)**
4. **H - short-range radar (Short Range SAM)**
5. **F - early warning radar (EWRS)**
6. **C – AWACS.**

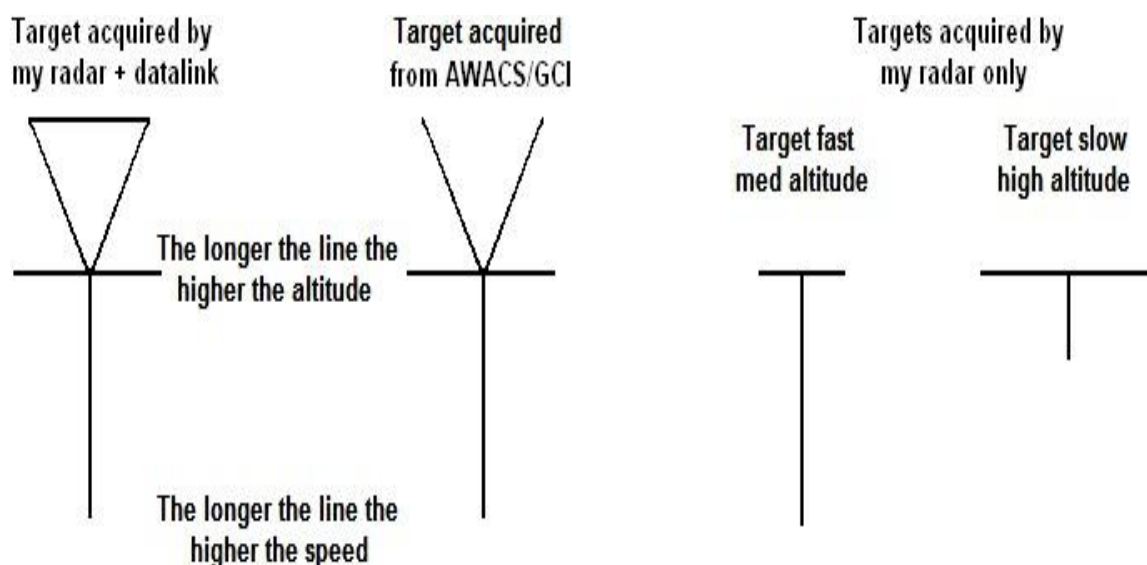
The approximate ranges of the different types of aircraft are given below.



In conjunction with HUD, Speed of the bandit and the Strength signal you can also ascertain the type of aircraft you are engaging for E.g.

1. If you lock a target and you see that the signal on RWR is at half strength however on the HUD & HDD he is showing at 50 KM that means he is either a Mirage 2000 or a Mig-29.
2. If you engage a target and you see his speed is above 1300 Km/Hr. you can most of the time safely assume that it and F-15 or Mirage 2000.
3. If a bandit is jamming you can still know the range of the bandit using the signal strength marker on the RWR. You can also know his approximate relative altitude to your position by using the B & H Symbols on your RWR.
4. You can also know the approximate range of the bandit with radar off just by the signal strength and above chart for reference.

DATA LINK



Different Symbology received on Data-Link

The Su-27 carries radio equipment to receive digital target information directly from off-board sensors (A-50 AWACS aircraft and ground-based EW radars) without using voice communications. The command post transmits air combat tactical situation to the fighter, and this data is then displayed in a top-down view on the HDD to improve the pilot's situational awareness. This tactical display shows the positions of all aircraft detected by off-board sensors, using the fighter's own position as a reference. The data link is automatically active when the radar is first turned on so long as a friendly AWACS aircraft or Early Warning (EW) ground radar station is available in the mission. The data link will remain active, and targets will continue to be displayed on the HDD, even if the radar is thereafter switched off.

It should be noted that some AWACS-detected targets appearing in the radar azimuth coverage zone may not be visible to the radar if they are outside the radar elevation scan limits in altitude therefore to find these targets you need to manually steer the radar to see them on the HUD. The fighter's radar should be controlled with the help of the HUD display.

IMP: At present the Datalink in Su-27 does not function to its full potential in DCS and therefore only AWACS can show you the picture. Ideally, You should be able to see what your buddy in the same Datalink sees on his radar as well. This is not implemented in the multiplayer. However it works properly in the Single player.

MISSILES

Su-27 in DCS has the ability to carry a wide array of Air to Air missiles based on mission requirement and restrictions. The missiles like R-27 ER & ET of the Su-27 outrange any other missile at present on any other platform like Aim-120 etc. by a good margin of 15- 20 Km at altitude. However, just the launch of missile will not guarantee you a kill. Lot of parameters have to be taken into account for a good kill probability but the holy trinity for the best performance of the missile are as follows.

1. **Range to bandit** - The **lower the range**, the **less time** your adversary will have to **react** to the launch and the lesser time the missile will take to reach its designated target.
2. **Altitude of launch platform**- The **higher you** are, the **greater** your missile **range**.
3. **The speed of the launch platform**- The **faster you are**, more will be the momentum provided to the missile off the rails and therefore it gives **less time for the bandit to react** and **more range** to the missile.

In general the best probability of kill will be generated by the above three factors. At any given situation keep those factors in mind for a launch. Thus, for the best Kill Parameter **you would always want to be closest to the bandit, higher than him and if the situation allows, ALWAYS KEEP YOUR SPEED ABOVE MACH 1 at the time of the launch.**

Su-27 in DCS is a 1980's version and was only capable of carrying Semi-active missiles radar guided missiles like R-27 ER & R-27 R and Fire & Forget IR guided missiles like R-27 ET/T & R-73.

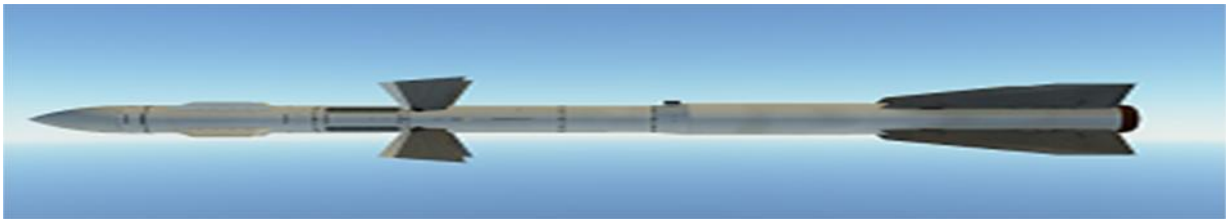


Let's have an in-depth look at these missiles.

RADAR GUIDED MISSILES.

The targets for the radar guided missiles have to be locked before launching the missile. As mentioned before the Su-27 is only capable of employing the Semi Active Radar guided missiles. The Semi actives unlike the active missiles have to be guided all the way through to the target till the impact and if the platform loses the lock on the target the missile is dead as it is unable to guide itself. These are immune to flare & susceptible to chaff. The effective ranges of the 2 radar guided missiles are as follows.

1. R-27 ER:



Max Range: 70 KM for a launch at 12000/13000 M above Mach 1.0+

Effective range

-) Effective range against manoeuvring Target (head on) : 15-18 Km
-) Effective range against manoeuvring Target (Tail chase) : 05 -10 Km

2. R-27 R:



Max Range: 45 KM for a launch at 12000/13000 M above Mach 1.0+

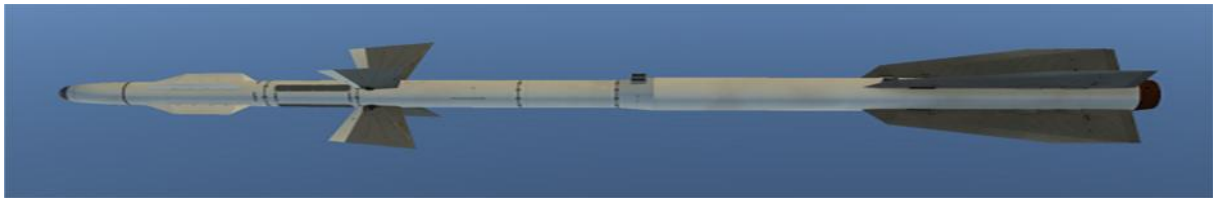
Effective range

-) Effective range against manoeuvring Target (head on) : 10-15 Km
-) Effective range against manoeuvring Target (Tail chase) : 05-08 Km

INFRARED GUIDED MISSILES

Su-27 also has the capability to employ medium range infrared guided missiles like R-27 ET/T & R-73. Unlike the radar guided missiles these are Fire & Forget missiles and don't have to be guided all the way through to the impact. They however need a tone or a lock on the heat signature of the target. These are immune to chaff & susceptible to Flares. Further these missiles don't give launch warning to the bandit (Except Mirage 2000 due to DDM)

1. R-27 ET:

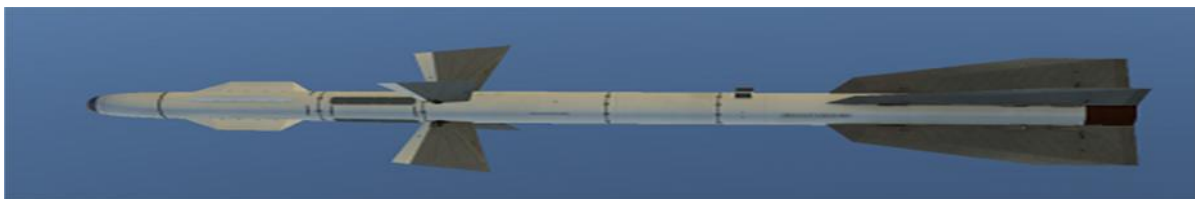


Max Range: 50-60 KM for a launch at 12000/13000 M above Mach 1.0 +

Effective range

-) Effective range against manoeuvring Target (head on) : 15-18 Km
-) Effective range against manoeuvring Target (Tail chase) : 05 -10 Km

2. R-27 T:

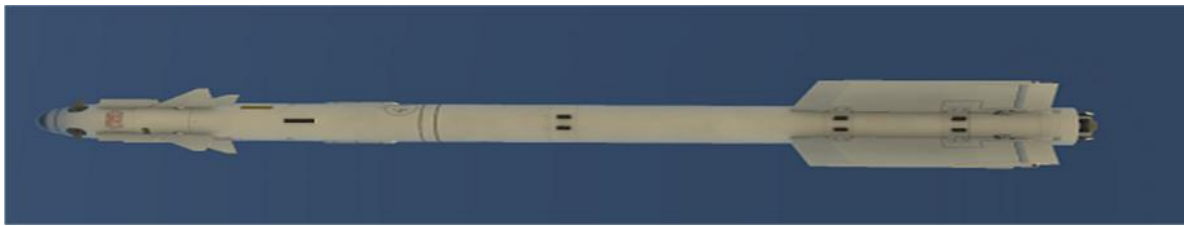


Max Range: 40 KM for a launch at 12000/13000 M above Mach 1.0 +

Effective range

-) Effective range against manoeuvring Target (head on) : 10-15 Km
-) Effective range against manoeuvring Target (Tail chase) : 05-08 Km

3. R-73:



Max Range: 15 KM for a launch at 12000/13000 M above Mach 1.0

Effective range

-) Effective range against manoeuvring Target (head on) : 05-07 Km
-) Effective range against manoeuvring Target (Tail chase) : 02-03 Km

**** NOTE:** The R-73 has a high off bore-sight capability by virtue of which your nose doesn't need to point at the bandit for the launch. You can Lock & Launch at the target more than 30 Degree of your nose with the help of Helmet Mounted Sight or the HMS.

IMP: The **Semi Active** radar guided missiles **cannot be notched** unlike 120C & R-77. To **evade a semi active missile** you have to **notch the platform** firing the missile.

2. Further an IR guided missile cannot be notched at all. You need to either defeat it with flares or kinetically or with missile evasion manoeuvres.

3. After you have launched a Radar guided Missile also monitor your HUD. By doing so you will also be aware of if the missile is still tracking or not. If the EORL or RL changes to just EO after you have fired your missile on the Top left of the HUD that means your Radar has lost Lock and the missile isn't tracking anymore (Except a jamming bandit on which the Missile Homes on Jam) and you may need to launch another.

LOCK AND LAUNCH WARNINGS

When a target is locked with Radar it gets a lock warning and if he locked with the IRST (EOS) there is no lock warning. Depending upon the situation and your missile load-out you may want to go for a completely stealthy kill etc. Down below we will see the various combination of missile & sensors and if it leads to Lock & Launch warnings for the bandits when you Fox.

MISSILE	RADAR	IRST	LOCK WARNING	LAUNCH WARNING
R-27 ER/R	ON	ON	YES	YES
R-27 ER/R	OFF	ON	NO	YES
R-27 ET/T/73	ON	ON	YES	NO
R-27 ET/T/73	OFF	ON	NO	NO

As you can see from the above table, **Radar Guided Semi-active missile always gives a launch warning**. Even if the target has been locked with IRST/EO System the launch of the Radar Guided missiles automatically switches on the Radar and thus gives a launch warning. Further, the **IR missiles will never give a launch warning** (Except Mirage 2000 C because of the D2S (French Missile Approach Warning System))

Therefore, based on your situation you can employ the weapons accordingly.

TACTICS & MANOEUVRES

Tactics are specific actions taken by person/organisation to achieve a goal. The Tactics in DCS keep evolving with improvements of adversary's skill and also with the changes in the DCS coding, flight dynamics & mission requirements. Tactics in DCS are mostly Fighter/Striker centric.

To achieve the goal you should be aware of couple of manoeuvres which maximize your survivability. Some of them are as below.

1. Cranking
2. Notching
3. Extending
4. Square Loop
5. Snaking manoeuvre

CRANKING

To use this manoeuvre you need to understand that longer the missile has to fly, the lesser is its chance to hit the target as usually it loses all its energy before it reaches the bandit at long range. As you know, the shortest distance between two points is the straight line. To maximize the distance between you and the enemy we use what is called as a cranking manoeuvre.

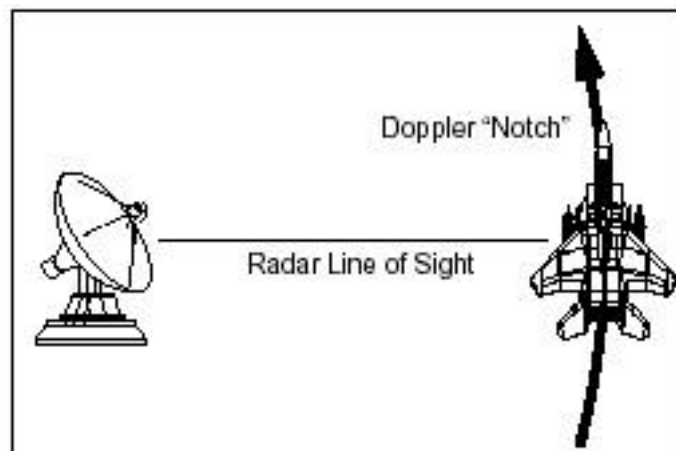
Now, with that in mind Cranking involves keeping your bandit at the edge of your radar gimbal. So in short you are basically flying at an angle to a bandit with your directional vector is pointing away from the bandit where you can still track him. As the missiles in DCS currently follow the Lead trajectory therefore by cranking you are increasing the missile range and therefore reducing your bandit's probability of kill. This is how a right crank will look like. You put him on the left end of your radar gimbal.



Notching

At present most of the Aircrafts in DCS employ Pulse Doppler Radars. Pulse-Doppler radar is a radar system that determines the range to a target using pulse-timing techniques, and uses the Doppler effect of the returned signal to determine the target object's velocity.

Now if you start flying perpendicular to the Bandit (beaming) at a lower altitude than him (preferably hugging the ground) wherein his radar pointing at you also sees the ground clutter behind your Aircraft, you enter what is known as a Doppler notch wherein the bandits radar loses you in the ground clutter behind. Further, your speed at notch would be somewhere around 450-550 Km/hr.



IMP-You can only notch the radar. You CANNOT notch the IRST/EO

EXTENDING

Extending usually refers to turning cold or turning away from the bandit. If in a fight you feel that your situational awareness is low. Extend out of the fight. Always choose your fights wisely.

While extending if you have a mountain nearby extend towards the mountain & close you radar and use vertical scan for finding the target.

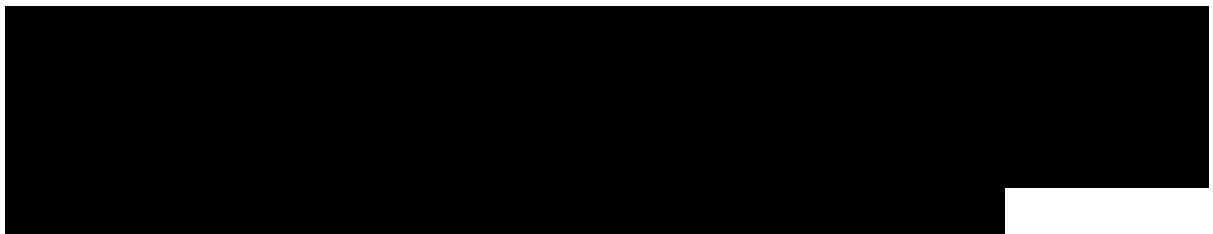
SLAKING MANOEUVRE

After locking the bandit if you get fired upon, manoeuvre from fag end of the missile range arc (LEFT OR RIGHT) to the other end of the arc (LEFT OR RIGHT) while pulling 6 G. Further keep diving to retain some speed and keep your nose below the enemy to keep the Radar & EO Lock. Once the end of the missile arc is reached on both the sides, CHAFF IN QUANTITY. Keep foxing on

the enemy when you reach the middle of the ARC to keep the pressure up. Here is what it will look like while you are carrying it out.



SQUARE LOOP



1V1 BVR TACTICS

BVR refers to Beyond Visual Range. But in DCS you will be hard pressed to get a BVR KILL. Only a pilot who is not competent enough yet will get shot at those ranges. With the present missile models & ranges it is very easy to defeat those long shots. As it has been mentioned above, the higher the range to the bandit, the lower the kill probability will be. At low altitude the missile range is somewhere in the range of mid to high 20 Kms which winds down to WVR or Within Visual range Combat. A BVR engagement usually takes place at High Altitude. Further there are some important benefits of engaging the bandits from a high altitude. If you can fight at high altitude you can fight anywhere and survive. Further, if you can fight out of any situation presented the sneaking and the stealthy kills can come in later. At ITGC we imbibe in our cadets & operational pilots that they need to learn to fight and fight to win. Only if you are confident that you can fight in any sort of situation will your wingman or flight commanders feel confident in taking you into the battle. To achieve this you need to become proficient in engaging and destroying your designated enemy at all altitude. Therefore, at ITGC Air Corps we put special emphasis on teaching our pilots to fight at high Altitude. Let's have a look at Pros & Cons of fighting at high and low altitude.

	High Altitude		Low Altitude	
	Pros	Cons	Pros	Cons
Missile Range	Greater Range	Easy to notch	Harder to notch	Lower range
Fuel	Greater economy	Less manoeuvrable on low speed	Decently Manoeuvrable	Lower economy
Situational Awareness	High (scans more area)			Low
Ability to hide		Poor	Excellent	
Radar Picture	Excellent (Can look through the valleys)			Line of Sight is limited in mountainous terrain
IRST		Poor (limited look down capability beneath the nose)	Excellent	
Speed	High			Low (hindered by mountains and valleys)

As per our assessment the merits of fighting at high altitude outweighs the demerits. A good pilot however will thrive at all altitude. Let us have a look at high altitude level engagements themselves.

HIGH ALTITUDE ENGAGEMENTS

HEAD ON JAM LAUNCHES

Explanation: Head on Jam shots are used against a jamming bandit before your radar has a burn through on it. Essentially, you lock on to the bandit jammers and launch the missile. Your bandit in this situation will get a lock tone however he will not get a launch tone until your radar achieves a Burn-through on his jammers.

How: Your altitude needs to be 12000 + meters with speed above 1.5 Mach. This will give you missile a huge momentum as well great range. The launch is to be carried out at ■■■ Kms from the bandit with R-27 ER. The range to bandit will be gauged through the RWR signal strength. If the target does not pull more than 2-3 G ideally this shot should hit. Downside is that these shots are unreliable and can be defeated with a single high G manoeuvre as at that range the missile loses its momentum.

BVR LAUNCHES AFTER BURNTHROUGH

The range for burn-through is approximately 40-45 Kms. Though the recommended range for R-27 ER is about 25 Km at an altitude of ■■■ M. However you can Launch at 40 Km from that altitude to make him go defensive. **For the best Kill Probability, your speed should be above one Mach and altitude above your enemy. If your speed and altitude are low, get to the requisite parameters (That is gain altitude and speed) by cranking and going into maximum reheat.** After Launching, Crank Left or Right according to the situation, to increase the distance between yourself and the enemy. If launched upon, carry out the SQUARE LOOP (Refer Squadron Combat Manual). But always remember to launch on him even while going defensive. Keep him on defensive as well while you carry out the manoeuvres. Being higher than the bandit entails you not losing the lock on him while you carry out the square loop. If by chance you do get below him carry out the Snake manoeuvre.

Ideally, any aircraft within the 25 km even if it goes into a notch will be tracked by your IRST/EO if your nose is pointed at him.

To achieve a radar lock on a Notching bandit

1. Jink left or right so that he may not be in the beaming position anymore.
2. Switch to Medium PRF for reacquiring him.

In our experience, **against an F-15 we like to always fight him in Maximum Reheat** to keep the speed up while carrying out the manoeuvres as they take a lot of energy.

However **against a Su-27 fight in 95 % power** from 35 Kms onwards to deny him that ET Shot. **With 95 % power** he will only be able to **launch at you** within **10 Kms**.

Also remember to **turn off your jammers once you have a burn through** on the bandit otherwise the ER or the Aim-120 might lock onto your jammers for H.O.J shot.

In the end if the bandit has been splashed. Close your burners barrel roll and flare to avoid being complacent and getting killed by Aim-9, Matra Magic or R-73.

WITHIN VISUAL RANGE

The fighting techniques shall be the same however in a restricted scenario (Aim-7, R-27 R etc.) the missile are easier to trash. Utilise that EO to get a few ET/T shots out. And once in a merge use the Helmet mounted sight to get the high off bore-sight shots off.

IMP- Verticle scan and HMS will give a radar lock of your radar is on.

To defeat an IR missile close your throttle to idle flare or carry out repeated barrel roll. The missile should be defeated.

IMP: if you fly with low speed at high altitude the aircraft becomes sluggish and the missiles have higher opportunity to hit you because of the low speed. Use the Maximum reheat to keep your speed above Mach one and do not worry about the fuel. At higher altitude the fuel economy of the Su-27 is much more efficient than at low altitudes.

2. Barrel rolls can an effective method if you can track the missile visually.

3. You can also mask your short range IR launches with Flares. If you keep flaring in a spiral sort of flight vector or just rolling, the smoke trail from you missile will get masked by the flare illumination & smoke.

LOW ALTITUDE ENGAGEMENTS

First and foremost thing!! **DO NOT FLY LOW IN A PLAIN OR NON MOUNTAINEOUS TERRAIN!! YOU'LL DIE!!** The eagerness to get that stealthy kill in does us more harm than good we forget how to fight. The engagements at low altitude are usually within 25-30 Km range. If you are lower than your enemy and there is a considerable difference in altitude and he has spotted you chances are at the same skill level you will be the one to die. At low altitude your missile range is considerably lower than at high altitude. Further you can't drop your altitude and go into manoeuvres like split S which require some altitude to complete. Additionally, you cannot lose your altitude for speed as you don't have much room therefore it will take you longer to build that speed.

However if the enemy hasn't seen you and there are mountains around use the terrain masking to get closer to the bandit with the radar off and use the IRST/EO to kill him with ET/T/R-73 Missile. Remember to IFF though.

We believe higher Situational awareness is required to fight in the mountains which might sometimes be detrimental as against multiple bandits you'll be at loss if a couple of them have targeted you. Further a bandit at 12000 M + altitude can see through the valleys with his radar from such a high altitude. And at that altitude his engagement Zone will be considerably higher than yours.

Therefore always remember, if there are no mountains around always fly high **or** make him fight you fight and drag him to the mountains and use the IRST/EO & the data-link (if available) to splash him.

To avoid the missiles you can use the **snaking manoeuvre at low altitudes**. The Square loop won't work here as [REDACTED]

At both high & low altitude you can drag the missile down into the ground. When launched upon, initiate an aggressive dive towards the deck. The missile following lead pursuit will ram into the ground.

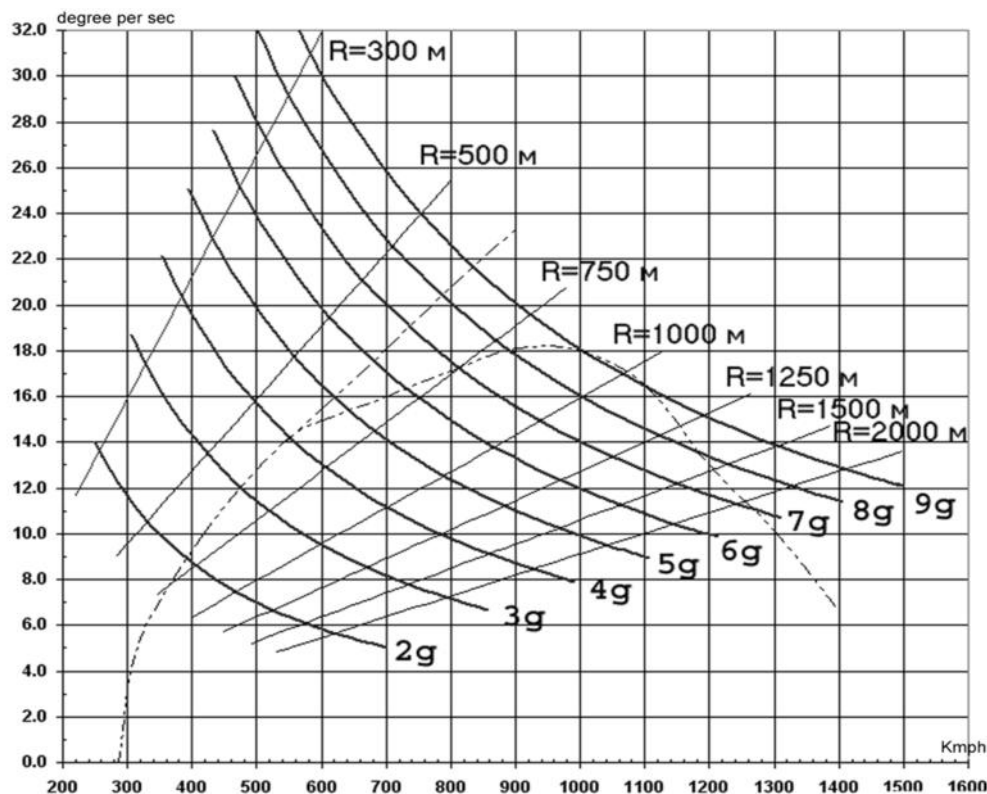
GUNS

A sound knowledge of BFM is necessary for guns engagement. Su-27 is more manoeuvrable than an F-15 but less than a mirage with comparable weight or fuel condition. Keep in mind that a Sukhoi with full tank will not out turn an F-15 without bags and less fuel on board. Here instead of just yanking on the stick to put your nose on the bandit utilise your BFM techniques to manoeuvre on his 6 o clock position. The pipper on the Sukhoi is very fidgety so sometimes you may need to fire anticipating the reach and trajectory of the shots. Su-27 is what is known as an Angeles fighter.

CORNER SPEED

The minimum speed at which highest allowable G can be generated is known as the corner speed. At corner speed the aircraft can achieve its maximum turn rate. The aircraft can execute the minimum radius sustained turn and keep the airspeed in control. In a fight always look out to maintain your energy while depleting the energy of the bandit.

Check out the chart for corner speed as mentioned below.



SUKHOI VS OTHER AIRCRAFTS

Su-27 Vs F-15.

An f-15 is an energy fighter it has more thrust and will out accelerate you in Maximum Reheat. Further the m-61 on the F-15 is a deadly weapon. In our experience we seldom go for those head-on shot. Try an engage him from the his 10 o clock or 2 o clock in the first pass and take him into the turn fight where you have an advantage. At comparable fuel loads the Su-27 should turn better. But remember don't try and yank on the stick too hard. Use corner speed to your advantage. For a Sukhoi it's somewhere around 540- 650 Km/ Hr. At corner speed you will turn the tightest. Maintain this speed. And make him bleed his while he yanks on his stick. If he bleeds too much airspeed and is turning on your Six take him into vertical but remember to go back to horizontal as soon as you can.

If you manage to pull on his six and you see cross from your 12 in a scissor like manoeuvre fire short bursts by putting him in the centre of your HUD as he is crossing you even if the pipper doesn't come on. Rest is all dependent on your knowledge of BFM (Refer Squadron BFM Manual).

Su-27 Vs Mirage 2000

Mirage is lighter and turns tighter than you. But he bleeds much more than you (Courtesy Delta Wing). Use the corner speed and make him bleed all his energy and airspeed. After 2-3 Tight turns Mirage is almost at the stall speed which renders him less manoeuvrable.

Rest the same applies as with an F-15.

General

If somebody is able to pull on your six try and keep changing your flight vector. Do not prolong those turn or try to turn harder than him. Turn every second or so. Further play with you flaps while turning or the speed breaks.

Against legacy fighters like an F-5 take him to a vertical fight. Against Mig-21 you should take them into a horizontal fight. Read about the adversary's weaknesses and exploit those against them.

Though it depends on the situation but as a general rule we follow our bandits in **lead pursuit in horizontal plane and lag pursuit in the vertical plane**. Before you pull up after the bandit wait for your energy to build up so that you have enough to follow him up and manoeuvre as well. If he comes down on you while you are pulling up, engage again from 2/10 o'clock position. Further if you don't have energy to go vertical with these aircrafts remain in your plain. He will have to come down at some point of time. So manoeuvre according to that.

CONCLUSION

The Su-27 is a very capable Air superiority fighter. While going up against an F-15C or a Mirage 2000, be as aggressive as you can by using your mind & knowledge. Don't go into fights which you can't win. Choose your fights wisely and you will always come out on top. If you feel even a bit unsure about the engagements just extend or run to the nearest friendly that can support you.

You already have the skill, now all you need is Speed & Altitude.

There is famous poem by James Elroy Flecker.

We are the pilgrims, master

We shall go always a little further

Beyond that last blue mountain barred with snow

Across that angry or that glimmering sea

Always strive to give better than what you gave before. Always go a little further than your adversaries would.

SOURCES

1. Testing done by the whole ITGC Air Corps Roster,

=ITGC=Pops
=ITGC=xbloodshed
=ITGC=Marvel
=ITGC=Skinner
=ITGC=Drona
=ITGC=Cougar
=ITGC=Icecube
=ITGC=Topgun
=ITGC= Gandalf
=ITGC=Honeybadger
=ITGC=Daroth

2. Ghost, Instructor Pilot, 65th VFS.

3. Training sessions with really amazing & skilled pilots from 104th Phoenix VFBS, 51st Bisons, NP Squadron, 59th Ravens, TAW & SF Squadron.

4. DCS: Su-27 Manual.

5. Eagle Dynamics Forums.