DCS BVR STRATEGY GUIDE
(for Air-to-Air Missile Carrier Aircrafts)

INTRODUCTION

The following guide is meant to share some of the basic BVR (Beyond Visual Range) concepts I have learned. BVR tactics are highly subjective and depend on acquired combat experience. Therefore, they will vary from one person to another. What I am sharing is my approach to BVR tactics and what works for me. This document is work in progress, therefore, constructive criticism is welcome and will be considered.

By BVR I mean any fight that starts from further away than you can see the enemy and includes WVR (Within Visual Range) combat when the opponent has evaded preliminary BVR attempts. I am mainly a DCS F-15C pilot, so this guide will be more useful for combat aircrafts carrying active air to air missiles. The objective of this document is NOT to give you an extensive list of procedures/recipes to follow, but mainly to share some of the elements I consider and do when I enter the combat arena. This is what works for me and I hope that you may find this helpful in the development of your combat tactics. Please ensure you have read the ED (Eagle Dynamics) manual and know how to operate and read the aircraft’s instruments. This is a strategy guide and it should be more easily comprehensive to those that have had a few aerial combat interactions and know how to operate the aircraft to some extent.

This document was written by Ktulu2, with the help of HUMMER_NSDTD and Toolbandit.
**Glossary:**

Cold : Aircraft is running away from you.

Flanking : Aircraft is near notching/ going at nearly 90° with your flight path.

Hot : Aircraft is going towards you.

WVR : Within Visual Range

IFF : Identify if Friendly or Foe

NOTCH (Direction) - All-aspect missile defensive maneuver to place threat radar/missile near the beam while being lower than it. Today’s radars have Doppler filtering capabilities. To defeat the radar, one can use the ground reflexion and the notch technique to confuse and prevent detection of your aircraft. The ground provides a 'clutter' that confuses the radar, but by measuring the 'doppler shift' or how fast an object is moving towards you or away can make it stand out from the ground clutter. Therefore, an object that is moving at a relative speed of 0 towards your aircraft (i.e., perpendicular, or in the 'notch') is lost as part of the ground.

Cranking : It is good practice to always maintain the enemy on your radar’s gimbal limit. Cranking is a manoeuver used to extend the bandit’s missile path while maintaining radar contact with the enemy. Thus, allowing more time to guide your missile until pitbull and/or to delay defensive manoeuvers.

Gimbal limit : Putting the enemy as much to the right or left without losing him on the radar. This minimises the closure rate.

Jinking : To perform an unpredictable manoeuvre designed to change the flight path of the aircraft in all planes at random intervals, usually to deny a gun solution, although it is used for missiles in this manual.

Situationnal Awareness (SA) : To have a mental image of the situation in which you are, what is happening around you.

Furball : Turning fight in which multiple aircrafts are involved.
RADAR USAGE:

Please refer to the ED manual for radar symbology explanation. I will be explaining my usage, not basics. Keep in mind that, as soon as your radar energy waves point at an enemy, he will warned of your presence on his RWR (Radar Warning Receiver), even if you have not yet seen him!

Searching for potential bandits

Search Pattern: There’s a misbelief amongst new pilots that one must point their aircraft nose towards a target in order to detect it. The radar emits waves in a cone pattern and therefore, the further away from your aircraft you are looking the wider/higher your scanning coverage will be. THUS, it is important to regularly vary the radar’s scanning height so not to get approached by an undetected enemy. In the case of the F-15, the radar display shows at which altitude the radar is scanning at the distance you have placed the TDC. However, I recommend not changing the radar’s scanning altitude too fast otherwise the radar will not have time to effectively scan the entire area. A few seconds (3 to 4s, less in TWS) should be sufficient. Try to anticipate at what altitude your enemies might be at. Enemies above contrail height (40 000’(feet)+) are fairly rare and not too menacing if you are low, especially if they are not using their radar properly. They should be far easier to shoot down than others if it is the case. I generally scan from 0 to 40K’ at 40NM (Nautical Miles). This normally allows for an effective detection of enemy in most cases. Please note that radar enemy detection from a high altitude is harder and less effective than from a lower altitude. This is because the height of your radar scanning energy cone will require you to move it more often and more extensively in order to cover the area of concern. Alternatively, when flying low and scanning from 0 to 40K’ at 40NM you will be able to detect any bogey flying from low altitude (0’) to 40K’ at 40NM ( or up to 30K’ at 30NM, ;20K’at 20NM; 10K’ at 10NM and so on [these numbers are examples, they do not reflect the radar’s coverage]). For someone flying high, the useful scanning area will be much smaller (green area), as you will have to choose between scanning high OR low at a given range as demonstrated below.

Be aware that in mountains, there is a possibility that an enemy successfully approaches undetected into firing range despite you doing a good job with the radar. Please keep this in mind, when flying against Russian pilots who like to kiss the ground.
Radar power settings: Unfortunately, few players use radar PRF (Pulse Repeat Frequency), which enhances the range and detection of bogeys. The default (alternative Hi/Med) is ok, but manual control of this option is much better. The HIGH setting allows you to detect HEAD-ON targets, at greater ranges (80NM, or even 100NM in the case of bigger targets under ideal situations). This is the mode you will want to use in most CAP (Combat Air Patrol) scenarios. The MED setting is useful to see TAIL/Cold/Flanking aircrafts. The MED maximum range compared to HIGH is very reduced (approximately 20 NM). This mode will be used in specific cases such as when you have detailed Intel on a target location.

TARGET APPROACH:

This is very much a case-by-case situational decision process. In general, I keep an eye on the bandit’s heading so as not to be notched and I make sure he will be LOWER in order to have missile range advantage. In any case, keep an eye on your radar display; this will help in case you lose the target.

RWS : The Range While Scan mode is the default mode of every radar. In this mode, the radar covers a very large angle (120°) and slowly scans the area. This mode gives limited information: IFF response, azimuth and range (although altitude can be roughly guessed as long as the target is in the scan cone). As soon as you lock a target, the radar will enter STT mode. When looking at a bogey, he will get a normal painting sound on his RWR.

STT : The Single Target Tracking mode allows you to guide ordonnance onto a target. In this mode, the radar only focusses on one target and is constantly looking at it. This is the mode you must use to guide SARH (Semi-Active Radar Homing) missiles. This mode will give a hard lock sound on the RWR. This is the most arcuate way to guide a missile. In STT, the radar will display the altitude, the speed, the heading, the time to intercept, the range and the missile steering dot.

TWS : The Track While Scan mode allows you to quickly scan a small area (60°). In this mode, the radar can “remember” a target and keep track of it without a hard lock while still scanning for other targets. Although the quicker data acquisition is better than in RWS, it is still not enough for terminal guidance of missiles. For missiles that are autonomous in the final guidance stage (ARH) this mode allows to shoot at multiple targets (up to 4 in the F15c) at the same time. In TWS, you get all the information STT gives you for the primary target. If you press the target selection key twice on a single target, you will go into STT. As TWS does not consist in a hard lock, the enemy will not get any waring on the RWR when you launch a missile (until the missile reaches Pitbull) and he will only get a normal painting when selected.

Flood mode : This mode, only used with SARH missiles, will guide the missile on the target in the showed cone (on the HUD) that reflects the most radar waves.

Every visual acquisition mode (VACQ [vertical scan], GACQ [Gun sight mode] and BACQ/BST [Boresight mode]) consist of RWS in a reduced zone and will lock onto anything inside 10NM with STT.

I strongly advise to use TWS when you find an enemy to keep a good SA (Situational Awareness). Also, to determine the height of a potential target, it is a good idea to scan in TWS and not lock the target so as not to “scare” or make him aware that he is now a potential target. However, if you want someone that is running away to turn towards you, it could be a good idea to hard lock them so that they adopt offensive counter maneuvers. Finally, as the enemy gets no warning sound, players that have low SA and improper defensive technique will get surprised, react most probably too late and in a non-effective manner leading to easier kills. The same thing can be said about bogeys that are unaware of your presence.
**ECM WARFARE:**

The functions of ECM (Electronic Counter Measures e.g., jamming) are fairly limited in game at the moment. Its current purpose is to deny the enemy of your range and, to some extent, your altitude. There is a MAJOR downfall to ECM usage: your presence will become highly visible on the radar. It’s like a flashlight in the dark pointing at you: you don’t know how far, how high, but you do know the general direction and you see it from much further away than you would normally as you are broadcasting a high energy noise signal in order to deprive the enemy of some targeting information.

When you are in a SMALL server, it is best not to use ECM as there are not enough alternative targets to distract enemies, and you risk having them all pay attention to you.

When you are in a BIG server, ECM is ok to use, but hiding your altitude and distance is only useful to catch enemies lower than you. ECM could also be used to hide that you are with a wingmen, as the enemy will see only one strobe if you are close to each other. Even if you are in combat spread, the enemy cannot know the two strobes are at the same distance from him. So use it only when flying high or in formation. If you are in an ECM-fest, put it on or you will appear as a potential easier target to defeat and are likely to end up in a 1 vs 4 furball (turning fight in which multiple aircrafts are involved). Remember to turn it off once you are engaged for reasons I will discuss later.

ECM exploits the fact that a radar wave loses power with range (i.e., radar energy expands during both the signal transmission and also on the reflected return, so the inverse square for both paths means that the radar will receive energy according to $1/r^4$ power). A jammer only has to cross half the distance the radar wave from the ship needs to, so radars can be jammed by an ECM much weaker. This is true at longer ranges, but at some point, called the burn-through (point at which a target is close enough that it can pinpoint the emitting aircraft through all the electronic noise), the radar wave will return strong enough for the enemy to detect your location and allow him a shot. At burn through, the ECM is basically useless. In many cases you are better off without it. Burn through in the F-15 happens at ±30NM if the target is head-on and against a fighter-sized target.

**LOOSING A TARGET:**

There are three main reasons why you can lose a target:

1) Bandit has significantly changed altitude / Incorrect radar scanning height. This should not happen if in TWS and if it’s your main target. Simply correct your radar scanning height. If unknown, try a best guess.

2) Terrain. Those who fly low will try to hide into the terrain. If this is the case, gain altitude if you can to be able to see them. If you are still blind, use TWS to have a faster tracking of the zone he may be in. He should pop out at some point. Expect this when engaging a Sukhoi and keep an eye on the HUD to see if he’s going to disappear in the mountains and try to anticipate his next move.

3) Being notched. There’s no way to see a notching target, but switch to MED PRF for a greater tracking for when he comes out of the notch. It is a defensive maneuver and he will have to re-commit at some point. Notching is only possible on Pulse-Doppler/Doppler effect based radars (i.e., the velocity of the target coming towards you becomes null and the radar thinks it is a ground reflection especially if he is flying lower than you).
ENGAGING A TARGET:

Once you have identified a target, if possible try to gain an altitude and speed advantage over the enemy. In the following sections I will try to explain what to do when inside a firing range solution.

EOS (Electro Optical Systems):

Contrary to NATO aircrafts, Russian aircrafts have a sensor (EOS) that detects IR waves. Though radar is an effective sensor, particularly in its advanced forms, it has a fundamental weakness as it requires that the transmitter illuminates the target with energy. In doing so it identifies itself and betrays its location. Electro-optical sensors, on the other hand, do not have these deficiencies, as they are entirely passive, sensing energy emitted by or reflected off the target itself.

Since EOS is IR based, you will not get any notifications on the RWR when tracked by an electro-optical system. This is one of the biggest advantages of Russian aircrafts. Because Su-27s are seriously at a disadvantage in conventional BVR, they will always try to sneak up on you using EOS detection and fire IR weapons whenever possible. The EOS has a range of less than 10NM when AB (afterburner) is not used, but it is much more when using AB. For this reason, one should always check his six regularly to ensure no one is there; ESPECIALLY in mountainous combat terrain where there is a strong possibility for EOS equipped bandits to approach unnoticed and have a first shot advantage.

CONTRAIRLS:

Contrails are a major problem when flying high and are a great way to get shot down without any warning as you are constantly giving away your location. KEEP OUT OF CON LAYERS unless engaged. If you know your enemy sees you, it does not matter anymore. In a 1vs 2 or worse, I strongly advise “conning” to have a solid height advantage to counter your numerical inferiority. At approximately 30K’ altitudes you should be at a very good height should you rapidly need both quick speed and longer missile range. At the same time, keep in mind that, for reasons that will be briefly discussed later, flying at such heights will require you to anticipate enemy launches, as your maneuverability is seriously limited at conning heights. This combined with the fact that you are more easily spotted and the RWR’s limited coverage makes you a more susceptible and vulnerable target.
MISSILE EVASION:

Missile evasion is the most case-by-case and complex action the pilot has to master in a combat sim. In this section, I will simply explain the different ways you can evade a missile. Hopefully, these tips will help you, but nothing beats practicing with an opponent friend or going against AIs to improve your skills.

Countermeasures:

While evading, regularly release chaffs if engaged by a radar missile. If you were not warned by the RWR and you see a missile trail coming at you, it is likely to be an IR missile. If at long range, fire a few flares and turn or crank the other way and you’ll be fine. If at short range, get out of after-burner if possible, release multiple flares and do sharp turns. A short range IR shot is often deadly, especially for the F-15 since even if you survive, you will have lost momentum and become too slow to regain air superiority position and fight back. Stay in BVR if possible to have the upper hand.

Keep in mind that chaffs will not have much effect on their own. Chaffs are like decoys. They reflect more RDR waves than your aircraft in the hope to distract the radar-guided missile from its primary objective. If you want your chaffs to be most effective, release them while beaming the incoming missile on your 3 o’clock or 9 o’clock so that the missile is attracted elsewhere. This countermeasure is useless when facing an incoming missile. SARH are far more vulnerable to chaffs than ARH. It is often a good idea to dispense chaffs in groups instead of at a continuous rate.

CONCEPTS:

Things to keep in mind when fired upon.

-Air density: Air density decreases proportionally with altitude. The drag of an object is influenced by the speed, the area, the aspect of the object and finally air density. This means that a missile launched from 20K’ will travel further than from 10K’, as the drag should be lower. For exact calculations, refer to an air density chart.

-Burn time: A missile uses a rocket propulsion system which will rapidly deplete itself while attaining extreme speeds (about 10s). Once the missile has burned all of its fuel, it will start to lose speed, manoeuverability and overall capacity to pursue its target.

-Distance: If you are able to increase the distance the missile has to cover in order to reach you, the missile will obviously loose much more momentum \[Ki-W(=F*s)=Kf\], and ultimately be enough to make it stall and plunge towards the ground.

-Jinking: In a much less important way than increasing the travel length, if you are able to make the missile change direction through jinking, it will lose a lot of its momentum (speed) as it will have less and less combustible to regain momentum.

-Tip: If you are able to “disappear” from the missile’s tracking view, or from the launching aircraft and the missile is not yet active it is EXTREMELY unlikely that that missile will reach you.

-ECM: IRL, missiles are able to engage a target with what’s called HOJ mode (Home On Jam). For obvious reasons, this mode is less effective than against a non-jamming target. But, at the moment, missile range is so short that you will never get a kill before entering the burn-through zone. Once inside the burn-through zone, the jammer serves you no purpose and will not trick or misguide the enemy’s incoming missile, unless the missile is a SARH. If the missile is a SARH, it would enter HOJ mode. As
the jammer of the target aircraft is constantly emitting, it can be used to guide the missile. This provides the missile with some ability to act as an ARH (Active Radar Homing seeker), as it homes in on the target without the main ship's radar guidance and for this reason, I recommend turning ECM off when engaged.

-Outmaneuvering: Missiles have a higher G-limit and speed than your aircraft does. For these reasons, outmaneuvering a missile is a very last resort technique and is often ineffective. It will only work when the missile is slow and if you are lucky. Still, beaming, jinking, increasing distance as well as proper usage of chaffs and flares are all to be considered when under fire.

- Remember missiles DO NOT know where the ground is: This makes it easy to make them crash.

**Evasive Techniques:**

For long range shots:

**- Go Low:** This is directly in relation with air density, and will make most “long shots” fail. As soon as you are fully engaged in missile evasion, go low. This will increase your aircraft’s maneuverability and provide an acceleration boost.

**- Maintain Speed:** Hitting a relatively stationary target by maintaining speed is MUCH easier than hitting a fast target. A faster moving away target will require the missile to fly a longer time and further distance before reaching its target.

**- Drag > Gravity:** Many try to instinctively do a vertical climb in order to escape an incoming missile. The problem is that missiles have greater speed and lower mass than your aircraft and therefore, they can afford climbing much more than you. It is in fact often better to go downwards because it will increase drag on the missile from the denser air while providing you with an instant speed help, more maneuverability and often extend the range the missile has to travel.

**- Notching:** If you are below your enemy and get fired upon, you can place him at your 3/9 o’clock and you will be safe, in the case of a SARH missile. This will not work well against an ARH missile, as the missile is autonomous, so you will have to notch the missile, leaving the aircraft with a lock on you. Notch the missile and not the plane’s radar. This is a pure defensive move and should not be used when you have the upper hand. For SARH, this method is very efficient as long as you notch the aircraft’s radar (same thing for ARH before Pitbull).

**- Cranking:** Cranking means to put your target at the gimbal limit of your radar. Cranking will extend the distance the enemy’s missile has to travel should he shoot, compared to flying directly towards you. Although this will not defeat missiles in NEZ, it will defeat missiles shot with a low Pk (Probability of Kill). Cranking will also give you more time before the engagement starts in case you want to gain more altitude or speed. Exemple: [https://youtu.be/H9WJzljb30?t=214](https://youtu.be/H9WJzljb30?t=214)

**- Split S (ARH specific):** The Split S is an air combat maneuver mostly used to disengage from combat. Diving and, once you are low, flying away from the enemy. Very few missiles will hit you if done properly and with a proper timing. This is best used when you have identified the direction of an incoming missile and have a good timing estimate of it. It’s by far the most annoying thing for a SARH carrier, as you have a 10-15s advantage to go defensive. This is usually the method used to evade medium shots fired in the first wave of a fight when high. Exemples: Done low: [https://youtu.be/nhrqBAJ2CM?t=375](https://youtu.be/nhrqBAJ2CM?t=375) 
Done high: [https://youtu.be/lpujWdEaXk?t=159](https://youtu.be/lpujWdEaXk?t=159)
- **Mountains**: For the low flyers. If you are low, there’s no better way to escape a missile than putting a mountain between you and it. To succeed, obviously, one needs to identify and keep in mind the incoming missile’s direction.

- **Doing “the Sin wave”**: This is a manoeuver that has no proper name to my knowledge. It consists in going up and down near the ground to exploit the fact that the missile does not see the ground. This should force the missile to go into the ground, as its delayed time of reaction to correct course and intercept you may drive it into the ground. This combined with notching and jinking makes the missile bleed a LOT of energy, as it will have to continuously change its course and if you are notching/running away it will make it travel longer distances. This is especially successful against missiles that were launched low (i.e. SAM or low aircrafts). It is a great last resort technique if flying low. Sure you will also lose a lot of speed, but being fast and dead is useless.

WHEN TO SHOOT:

-Missile Range: I see a lot of people relying on a fixed range to shoot. This is a very bad tactic in my opinion as a static range cannot take into account factors such as the drag variation that comes with altitude. Ten NM might be a good range when flying fairly low, but you may enter a potential payoff death zone as far as 30NM if you are very fast and very high. Missile launch range varies, as previously explained, with height, your aircraft’s speed, target’s altitude relative to yours and so on. For these reasons, aeronautical engineers created a launch cue symbology called the Dynamic Launch Zone that is both on the HUD and on the radar display. Please refer to the manual for further detail on the meaning of these cues in your aircraft. Essentially there are 3 elongated bars on the scale which display the missile’s Rpi (range probability of intercept). The minimal launch range (Rmin), the Non-Escape-Zone (NEZ) and the maximum range against a non-maneuvering target (Rmax). Do NOT shoot at Rmax. A good range would be about at half the distance between Rmax and the beginning of the NEZ. A shot taken at this range has little chance of actually hitting a good pilot, but it will force him to go defensive sooner, leaving you some time to defeat his missiles before he re-commits. A real GOOD shot is one taken when very near or within the NEZ which is where the target is theoretically incapable of outrunning/escaping kinetically the missile. Such a shot has the highest probability of hit, but it doesn’t always succeed (especially against well trained pilots). After having taken a GOOD SHOT wait until the missile is autonomous (Pitbull) and prepare to engage into defensive maneuvers. In the F-15, you will get a ‘‘T X’’ blinking in the lower left corner of the HUD while the missile needs guidance. When the missile becomes autonomous, the T X will change to ‘‘M X’’. This being said, Eagle Dynamic’s modeling of the NEZ is not great. This is why many players suggest shooting at 10 miles at low altitudes and 15 high.

-Warning shots: I call this any shot meant to scare the enemy and force him into a defensive mode more trying to get a kill. I use this tactic in special circumstances, such as when an engaged friendly requires assistance and you are too far to help him properly, but still want to mess with the enemy’s SA (Situational Awareness).

-Launch Conditions:
The point of this section is to provide a simple checklist before shooting a missile that ultimately has no chances of hit, therefore wasting a precious missile.
-Is the enemy about to enter the notch?
-Is the enemy about to hide in terrain/mountain (HUD CHECK)?
-Has my missile a clear path to the target (HUD CHECK)?
-Is the enemy spamming CM (CounterMeasures) flares?
-Is the range adequate?
-Is there a friendly near the target?
It all sums up to “Is the Pk (probability of hit/kill) acceptable?”
WHEN TO GO DEFENSIVE:

Not knowing when to go defensive is often what gets new players killed. Anticipation is key when it comes to determine when it is time to implement defensive maneuvers especially when flying high. It is not always necessary to go defensive. So when is it the right time?

By defensive, I mean that your only objective is now to evade incoming missiles and survive an attack wave. When flying high, I suggest doing a split S, followed by a notch, a bit of mountain hiding or doing the wave if in flat terrain if you went defensive too late. If you are low, hide in mountains and turn cold/notch. Unless you are sure you have not been detected, it is a good idea to start cranking to evade any long shots as soon as you enter the DLZ. Excepted in rare and special circumstances, it is very useful to have a height advantage on your enemy. The main advantage is that when your “Good Shot” missile will be launched it will become autonomous before the enemy has had time to shoot a NEZ shot. This means you will still be able to go defensive without having a “High treat” missile on you, while he does. If you are lower than the bandit, take your shot slightly before the NEZ to stay out of his NEZ shooting zone. Still, you will have to engage into smart defensive work, as missiles from above are harder to evade and keep in mind that he is likely to survive your shot. Going defensive too early is as bad as too late: you’ll get an enemy on your 6.

-Against a SARH Missile Carrier: Semi-active radar homing (SARH) seeker requires constant target illumination by the radar (STT). Therefore, you will get both a hard lock and a launch warning tone as clues. The locks will usually just means you are seen, but keep an eye out for launched IR (R-27ET) missiles (they leave a big white trail of smoke while burning). If in doubt, it’s generally a good idea to drop some flares against an enemy aircraft known to carry such weapons. These IR MRM (Medium Range Missiles) are very easy to evade. You can be assured that no SARH have been launched as long as you get no RWR launch warning. When you do, start cranking if you were not already until your launched missile becomes autonomous and then turn 100% defensive. If not fired upon, well lucky you, you may have an opportunity to shoot first. Nonetheless, maintain defensive attitude in mind at all time during the attack in case you get fired upon. Wait too long before de-committing and you will have an R-73 to evade, a task which is very challenging even for good pilots.

-Against an ARH Missile Carrier: Most ARH carriers are able of TWS launches. This makes fights much more anticipation based. Unless you are low; by the time you get an ARH MSL inbound warning, you will be hopelessly vulnerable and will not be able to defeat it. If you see on the RWR that the enemy has you on radar you must anticipate/guess the range and time at which the enemy will start launching on you, and keep in mind his probable position at all times during defensive maneuvers so you can reengage promptly when able to. Start cranking the moment you are closer than his Rmax missile limit. Launch a “real missile” (and a first shot prior to that if deemed necessary), wait for it to go Pitbull and quickly go defensive. This might seem ineffective, but it saved my life so many times that I truly believe it’s worth wasting a few missiles. Please note that at higher altitudes, one should not wait to go inside the NEZ, as evading capabilities decrease significantly when above 35K’. This is because, as air density decreases, stall speed increases, which greatly limits maneuverability.
MISSILES TYPES:

Knowing what type of missile is trying to get you is crucial. Evasive techniques and countermeasures will be most effective knowing what you are up against.

Infrared missiles: They give NO WARNINGS on the RWR. They are to be escaped with flares. They are mainly short range missiles, with the exception of the vicious R27T/ET. Once launched, they are autonomous. These missiles will NOT IFF, be worried of cross-fire as with any autonomous missile.

- Rear aspect: These missiles require a visual on the enemy’s exhaust to track. They include the R-60 and the AIM-9P.
- All aspect: Is one which is able to track a target no matter which way the target faces relative to the missile. They can be fired in any circumstance.

Radar Missiles: These are all Medium range missiles.

- Active Homing: The missile has its own radar seeker and it will be autonomous at near 10NM from the target. They might give an initial launch warning (TWS vs RWS) but will give a constant warning once the final guidance is achieved. These missiles will NOT IFF, be worried of cross-fire as with any autonomous missile. They include the R-77 and they AIM-120.

- Semi-Active Homing: The missile needs the launcher ship’s guidance through the whole flight. They only give a launch warning in at the moment of the launch, and they require a hard lock to guide. They will not end up in cross-fire. They include the R-27R/ER and the AIM-7.

- Long Range Air to Air missile: There’s only two LRM that are in game at the moment: the R-33 and the AIM-54. The METEOR and the R-37 LRM should get operational in the near future. The only aircraft that will be carrying these in the future in DCS is the F-14 that is currently being developed. Such missiles will require a hard lock to launch from ridiculous ranges, but they should be extremely easy to defeat, given proper attention as the time of intercept should be very long.

- AIM-120 C vs B: There’s a lot of misunderstanding about this. The C version was originally created to fit into the F-22’s small internal bay. This was made possible by reducing the size of the fins on the missile. Personally, I always take the C as they should be newer and thus have a better software on top of the longer range that comes with the smaller control surfaces. Others also take AIM-120Bs as the larger control surfaces should make sharper turns possible, which would make the missile better WVR. I have no idea if this is true or not, although the displayed range of the C is indeed longer.

Payload choice:

A good payload will vary on the engagement terrain. If you know your chances of getting into the visual range are high, take at least two of the best short range missiles (SRM) you can carry, the rest of the ordonnance being ARH missiles. If you are in flat terrain, I would suggest none, or one if there are small mountains. There are two reasons to carry SARH: 1) You can’t bring ARH 2) You are doing a formation flight. As said before, SARH are assured not to team kill unless you are using flood mode, although most of the time team kills are a concern you will be close enough to use SRM.
**GENERIC BVR ENGAGEMENT:**

In essence, if the first missile wave is ineffective, go to the heading where the enemy was and re-engage, you should be fairly close to a NEZ shot. So it is important not to take more time than needed to evade incoming missiles if you want to survive the second wave. If you fired a relatively good shot, it is assumed he is now lower in order to implement evasive maneuvers to avoid the missile, as in many cases, he wouldn’t have survived if remained high. Keep in mind that you do not want an enemy on your six at less than 5NM if flying low or 20NM if flying high, as this will result in a sure death in a flat terrain. The point of the first missile wave is to get the enemy defensive, as good pilots will often not get killed by it. The second wave is intended to strike and kill, and for this reason, a quick re-acquisition of the target after re-committing is essential. Of course, a deadly first missile wave is something sought for.

In flat terrain, it is crucial to have a significant altitude advantage, and also speed if possible. In an ideal world, you would have at least 10K’ more than the enemy. In mountainous terrain, missiles are much less effective as they will be much easier to evade by good pilots. For this reason, height advantage is only useful up to 5-8K’. Being higher than this will result in a handicap more than anything else, as you might not be able to reach the mountains soon enough.

-The F-15 is currently the best BVR aircraft until DCS releases the Eurofighter 2000. However, it is best to keep out of WVR, as other planes (such as, M2000C, Su, Migs) will have an advantage or at best a fair fight. One way to stay in BVR territory is to do split-S or to go cold after each “waves of missiles”. If done correctly, the fight should stay in BVR, as the enemy will also have to de-commit to evade your missiles

-Mountains are BVR’s enemy in that they make it easy with a little bit of SA to evade missiles even at a ridiculously short range. For this reason, merges, or at least WVR fights, are more frequent. As a matter of fact, there would rarely be gun kills in servers in flat terrain. If possible, any F-15 pilot should drag the fight away from mountains, as ARH have an advantage as long as the fight is in BVR.

-WVR tips: The F-15 is an energy fighter requiring speed to be effective. The F-15 does not have exceptional turn rates or nose authority like most planes that are referenced in dogfights like the Mirage, Su-27, F-16, etc... This means that, as soon as you are below your cornering speed, you will be at a disadvantage and may be overtaken. If you happen to stall out and your opponent doesn’t, you are dead. Use the F-15’s superior acceleration and climb rate to stay away from a WW2-like aerial dogfight. The AIM-9M is a great missile, but it is outdated compared to the Russian R-73 (the AIM-9X fixes that though). This means that, once you get into visual range, you have a serious disadvantage missile-wise. This combined to being in-range of EOS and the Russians having R-27ETs also means that you will not, in most cases, get the enemy’s position on the RWR.
EXCEPTIONAL CIRCUMSTANCES:

The tips provided above are meant as a guide for usage under ideal circumstances. They are meant as a starting point and soon you will have to improvise and improve upon these tips.

-Fighting an enemy higher than you: It is possible that you become aware of an enemy’s presence so late that it is now impossible to go as high as him. Your situation is critical, but you are not yet defeated. Mistakes happen. You cannot always have the upper hand. If you find yourself lower than your target, you will have a hard time, but it’s possible to reverse the situation and win. In fact, many pilots, especially new comers, would rather fight low than high. Flying lower provides the bandit attack superiority, but you will be able to spot targets more easily. Flying low provides better Situational Awareness and gives you better handling and faster acceleration. On top of that, it is impossible to notch you when your target is higher, plus missiles are more reliable when going upwards (no ground reflections). Use the terrain (mountains if possible) to approach your enemy without giving him a missile solution (notch, break the lock with a mountain, etc.: MESS WITH HIS LIMITED SA). Keep in mind your enemy has range advantage, so shoot outside NEZ to be able to evade and use your superior maneuvering ability to bleed incoming missile’s energy before it reaches dangerous or lethal proximity to your aircraft. You MUST at least force your enemy into a defensive mode by launching a missile even if are not going to hit him. Having a high opponent on your 6 in firing range is one of the worst situations, as mountains might not be enough to break the lock. You might want to force the merge/WVR, as you could want to deny his BVR advantage. In this case, go towards him, no cranking as it will reduce the closing rate; just remember to go defensive earlier, without going cold, if you do this. This being said, I do not advise going low because if you have mastered the radar as your SA should not be that reduced at high altitudes. Also, if you go defensive at the right time, you will be low when the missile gets close anyway.

NOTES:

-Shots fired downwards (almost vertical) have a higher chance of failure, as the missile will need to isolate the target from the radar waves reflecting from the ground.

-The sea reflects radio waves much more than the ground as it is a conductor. For this reason, a shot fired downwards (even at as little at 20° downwards) over the sea has a high probability of failure. SARH fired in these conditions are almost guaranteed to fail, while ARH usually have better seekers, giving them more effective results.

-Numerical Inferiority: In an ARH carrier aircraft, this is not too much of a problem, just ensure to have a height advantage and to shoot at both. If the two enemies are separated by a significant distance, try to at least to force one into defensive maneuvers, so that the 2 cannot simultaneously engage you while you haven’t re-committed yet. If the second one is far enough from you so that your missiles can’t reach him, he is not your priority in the first missile wave.

-The RWR can detect emissions all around, form + to -45° horizontally, while Russian RWRs are from 30 to -30°. In the F-15, the RWR will show reversed left-right targets when the plane is upside down, even when only a few degrees past the vertical, so in tight turns you might see inversed positions. Keep this in mind. Do not lose precious seconds in a fight looking at the wrong place. This also means that if someone gets below you and hard locks you, you will NOT be aware of it.

-Sometimes, you will be tempted to just turn around looking at the radar to find a near target that has an unknown heading. Do not do this! The radar needs a few seconds to do a full horizontal and vertical scan. For this reason, you are extremely likely not to see your target even when pointing towards him. Often
you are better off de-committing if you have no idea of where he is. Use the Eagle’s superior speed to escape him at full burners until you are safe. Keep an eye on your RWR to spot him and look around the cockpit to find Russian IR missiles launches, as the bandit could have locked you on EOS.