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BASIC SEAD/DEAD GUIDE

=X51= WAZZERBOSH - 05.05.2019

SEAD – Suppression of Enemy Air Defences

DEAD – Destruction of Enemy Air Defences

This guide focuses on SEAD/DEAD tactics against radar guided missile threats.

RWR USAGE

Understanding the RWR is key to fighting radar SAMS.

- Any contacts you see on the RWR are emitting radiation that is being detected by your RWR sensors.
- The contact's "o'clock" position is relative to your aircraft.
- The contact's distance from the centre is related to the threat level (further out – lower threat, closer to the centre – higher threat) and not the distance (see **Fig. 1**)
- The symbology and audio tones can inform the pilot of new contacts, locks (spikes) and missile launches.
- It provides invaluable situational awareness for understanding when to go defensive or offensive, for executing notching attempts, etc.

It **cannot:**

- Warn you of passive threats (e.g manpads)
- See contacts in the sensor blind spots (see **Fig. 2**)
- Distinguish between locks from similar radars in the same line of sight, or conversely, if you or someone else within the radar beam of the enemy radar is being locked. (see **Fig. 3**)

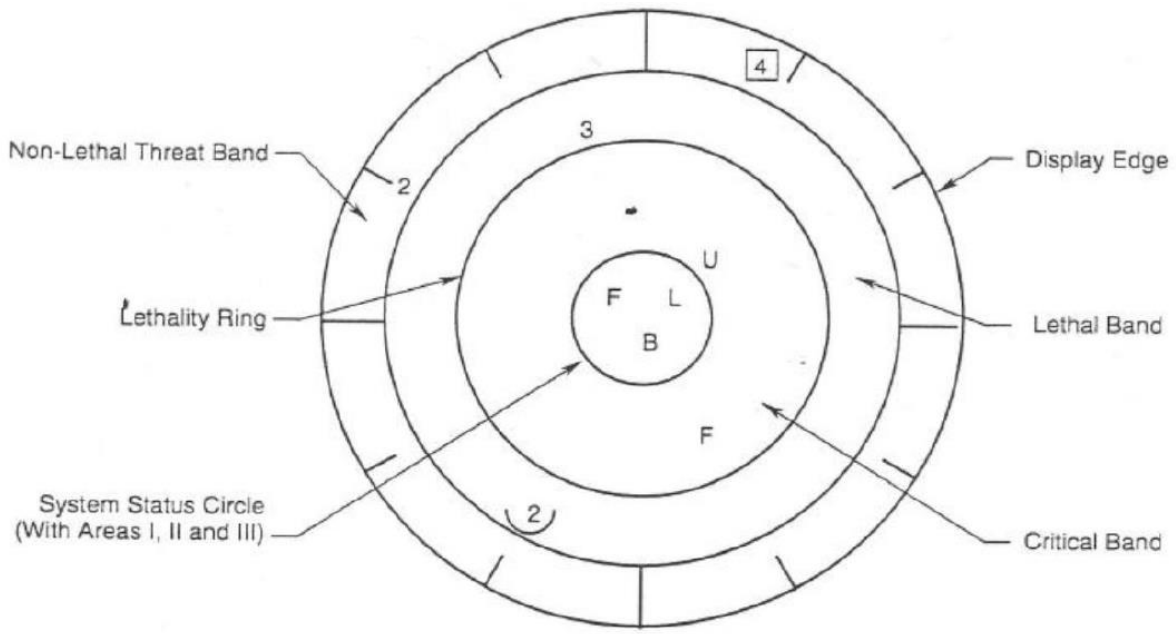

Fig.1: RWR lethality rings for the F-18 (Chucks guide F-18)

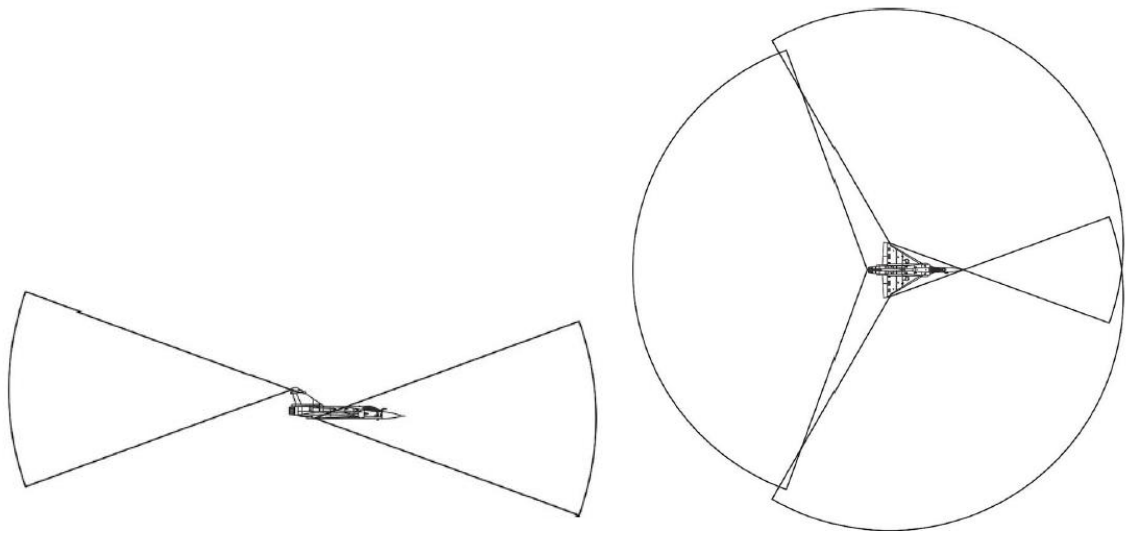

Fig. 2: RWR sensor coverage for the MC2000C (RAZBAM MC2000C Flight Manual)

When approaching an enemy SAM site, always keep an eye on the RWR. If the SAM launches on you, go defensive. The defensive manoeuvres one can do depend on the surrounding terrain, your altitude and distance from the target, but can include:

- Outmanoeuvring/energy bleeding
- Notching
- Chaff dispensing
- Breaking Line of Site (LOS) or forcing an impossible intercept

These are each explained briefly below.

OUTMANOEUVRING

Missiles will not chase you, but will instead fly towards a computed intercept point based on your current flight path. Making the maximum variations possible in this flight path after the missile has launched will force it to pull high-g manoeuvres towards the new intercept point. This will bleed a large amount of energy, especially when the missile is off burner and gliding.

NOTCHING

Radars often distinguish between background contacts and the target by measuring the Doppler shift of the returning radar signal. A SAM radar pulse being reflected off of the side of a mountain will return at the same frequency it was emitted. However, if it is also reflected off of a fast approaching aircraft, the frequency of the reflection will be slightly higher (blue-shifted) while the frequency of the reflection from a fast retreating aircraft will be slightly lower (red-shifted), in the same way the pitch of an ambulance's siren increases when coming towards you and decreases when going away.

If an aircraft is flying perpendicular to the SAM and close to the terrain, there will be minimal Doppler shift and the aircraft will "disappear" into the terrain from the POV of the SAM's radar. This is called notching – or hiding in the notch. See **Fig. 3.**

The relative velocity range in which the RADAR cannot distinguish a contact from the background is known as "the notch". Older radar systems will have larger notches than newer ones.

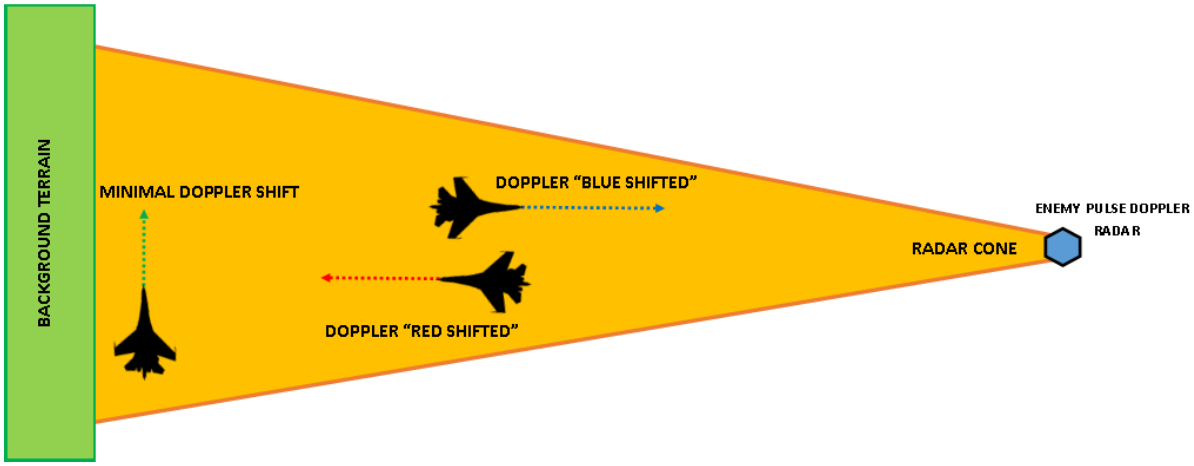

Fig. 3: Notching pulse Doppler radars

It is important to remember, you are hiding in the notch against the terrain. If you are attempting to notch against the sky you will still be seen by the radar as you are the only object reflecting the beam.

Use your RWR to gauge the notch. You should aim to put the contact at your 3 or 9 o'clock.

Be aware that during the turn into the notch, you may be putting the contact in the directional RWR sensors' blind spots, in which case the contact may disappear (if it is also not visible to the omnidirectional sensors) or its position on the RWR will not update until you go back to wings level.

CHAFF DISPENSING

Chaff are metallic debris ejected from the countermeasure dispensers which will reflect radar. The hope is that the enemy missile/radar will choose the chaff over you. To increase the likelihood of this, the chaff must be dispensed in a way to make it “more desirable”. This usually means:

- Deploy it in bursts, such as 3-4 very quick ejections. This creates a localised, large and expanding cloud of chaff which will have a large radar cross-section.
- Deploy it before a high-g manoeuvre/crank to separate yourself from the chaff signature.
- Deploy it when on a high Doppler-shifting flight path, immediately before moving into the radar’s notch. This will give your chaff a larger Doppler shift than you and also employs the advantages of the previous two points.
- Deploy while in the notch to further confuse the radar.

BREAKING LOS

Simply putting terrain or buildings between yourself and the SAM radar/missile will break the radar lock and trash any incoming missiles (See **Fig. 4**). This is easiest in mountainous terrain. When the terrain is flat, one can still defeat many types of incoming missiles by driving the intercept underground, See **Fig. 5.**

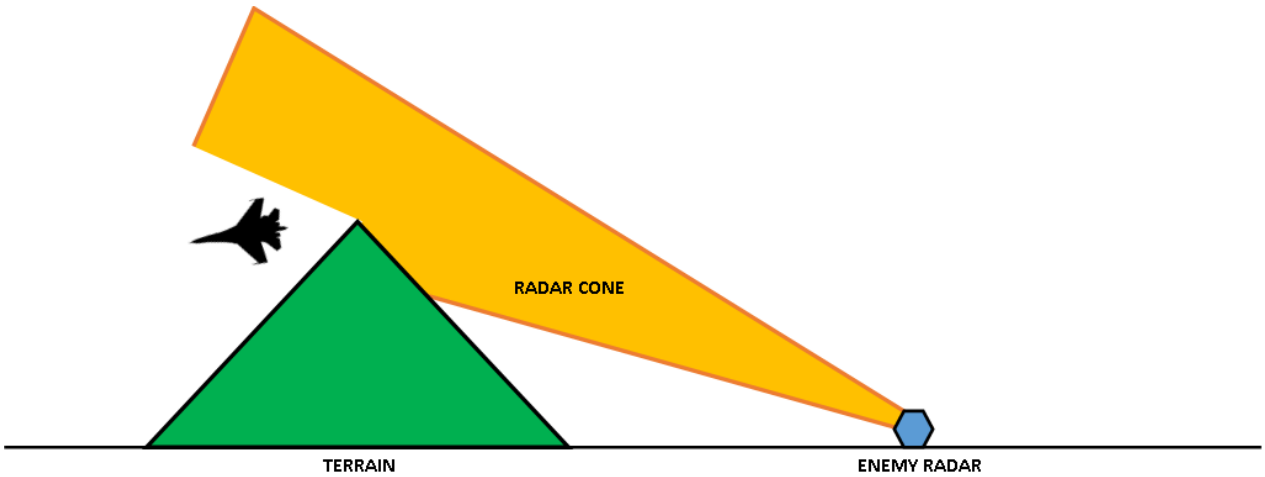

Fig. 4: Breaking LOS behind high terrain

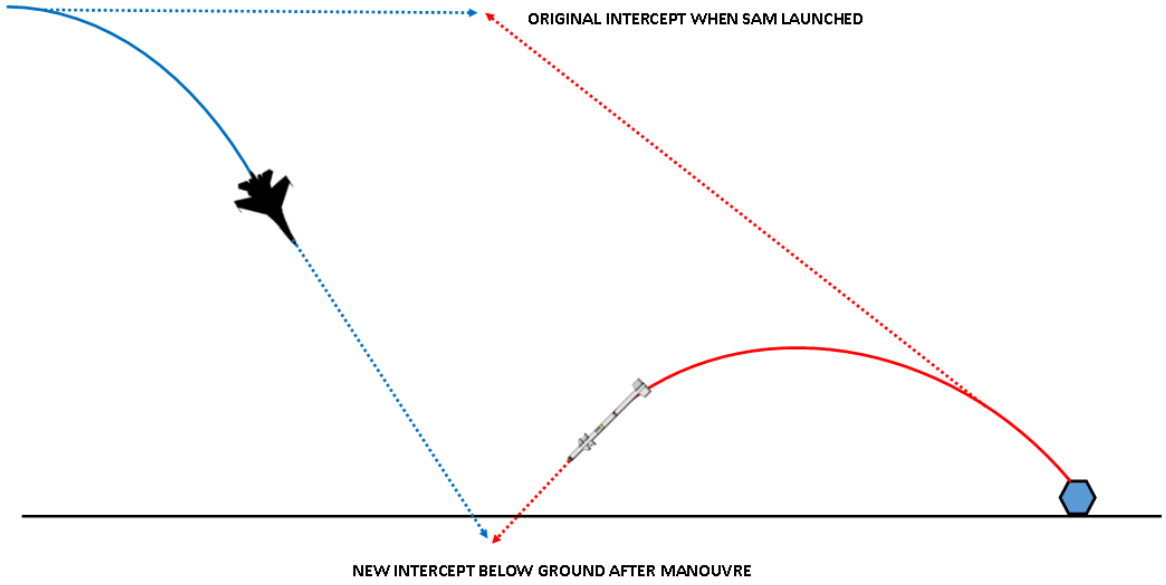

Fig. 5: Forcing subterranean intercept by diving after launch and recovering after SAM missile trashed

Most of these tactics are combined during defensive manoeuvres.

E.g. Attacking aircraft is in hot, at altitude towards SAM site. When the SAM launches, the attacker goes defensive by dispensing chaff, rolling over and cranking into a perpendicular dive towards terrain which will bleed missile energy as it manoeuvres after the attacker, may force the intercept under ground level, will put the attacker in the radar notch, and bring the attacker closer to the terrain making the notch more effective and increasing the opportunities to break LOS.

OFFENSIVE TACTICS

When conducting SEAD or DEAD, defensive and offensive tactics are often used together, and rapidly switched between as threat circumstances change. Tactics include:

- Exhausting the SAM's missile supplies by repeatedly baiting launches and then going defensive.
- The above tactic but with another SEAD aircraft attacking the SAM while it is distracted by the defender.
- Overwhelming the SAM with enough aircraft that it cannot defend against them all (combined with defensive tactics if you like living…).
- Switching between defensive and offensive manoeuvres while closing the distance with the SAM until within weapons range.
- Guided bombing from an altitude above the SAM's range
- Launching stand-off munitions (mavericks or anti-radiation missiles) from altitude and at a range greater than the SAM's.

- Supress the SAMs by launching anti-radiation missiles, forcing the SAMs to power down their radars to avoid being killed. (Many MP servers or missions in DCS use a script which allows SAMs to do this)

ANTI-RADIATION MISSILES

These missiles, such as the HARM and Sidearm lock onto the radar beam of enemy SAMs. They are often most effective when launched from altitude as this increases their range and velocity when they reach the target. Otherwise, they may fall short or be slow enough to be shot down when they arrive.

The sidearm is much shorter range than the HARM (essentially an AIM-9 with an ant-radiation seeker) and for long range SAMs, pop up attacks are more suitable.

Using all the tactics discussed in this document, one can engage and destroy a SAM that has a much larger engagement range than oneself, e.g with Sidearms or mavericks, and in relatively flat terrain, such as in the example in **Fig. 6.**

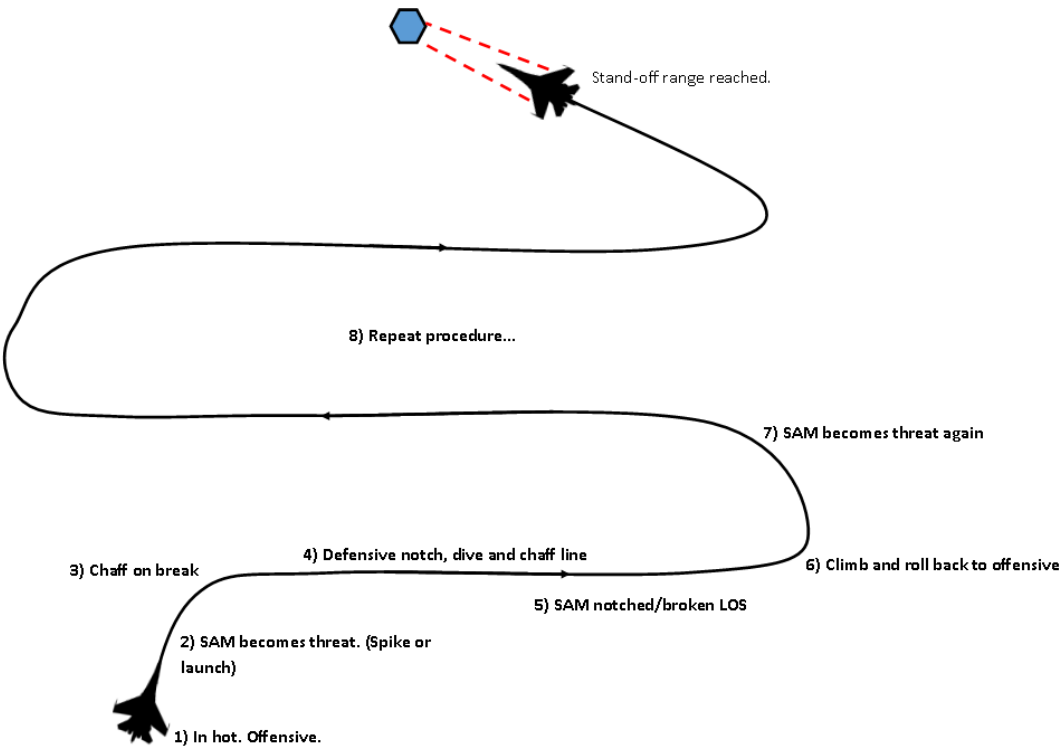

Fig. 6: Using offensive and defensive tactics, with good situational awareness to engage a SAM well with its engagement range.

This short guide is just an introduction and is not exhaustive manual on SEAD and DEAD tactics.

Red SAMs in DCS

SA-3
RWR: 3
Min range: 3.24 nm
Max range: 13.5 nm
Min altitude: 330 ft
Max altitude: 82 000 ft
Speed: Mach 3+
Armament: x4

SA-6 Kub
RWR: 6
Min range: 2.16 nm
Max range: 13 nm
Max altitude: 46 000 ft
Speed: Mach 2.8
Armament: x3

SA-8 Osa
RWR: 8
Min range: 0.8 nm
Max range: 5.4 nm
Min altitude: 80 ft
Max altitude: 19 700 ft
Speed: N/A
Armament: x6

SA-9
RWR: N/A
Min range: 0.43 nm
Max range: 2.27 nm
Min altitude: 100 ft
Max altitude: 11 500 ft
Speed: Mach 1.8
Armament: x4

SA-10
RWR: 10
Min range:
Max range: 25.4 nm (>6600 ft)
13.5 nm (<80 ft)
Max altitude: 98 500 ft
Speed: Mach 6
Armament: x4

SA-10 SR Big Bird
RWR: BB

SA-10 SR Clam Shell
RWR: CS

SA-11 Buk
RWR: 11
Min range: 2 nm
Max range: 13 nm
Max altitude: 39 400 ft
Speed: Mach 2.8
Armament: x4

SA-11 SR Snow Drift
RWR: SD

SA-13 Strela-10M3
RWR: 13
Min range: 0.1 nm
Max range: 2.7 nm
Min altitude: 30 ft
Max altitude: 11 500 ft
Speed: Mach 2
Armament: x4

SA-15 Tor
RWR: 15
Min range: 0.54 nm
Max range: 6.5 nm
Max altitude: 19 700 ft
Speed: Mach 2.8
Armament: x6

SA-18
RWR: N/A
Min range: N/A
Max range: 2.8 nm
Max altitude: 9 800 ft
Speed: N/A
Armament: x1

SA-19 (2S6) Tunguska
RWR: S6
Min range: 0.8 nm
Max range: 6.5 nm
Max altitude: 19 700 ft
Speed: N/A
Armament: x8
x2000

ZSU-23-4 Shilka
RWR: A
Min range: N/A
Max range: 1.35 nm
Max altitude: 4 900 ft
Speed: N/A
Armament: x2000

Source: https://forums.eagle.ru/showthread.php?t=84314