



SEAD / DEAD

X51 Training

Table of Contents

- SEAD or DEAD?
- Types of air defense systems
- Weapons for SEAD / DEAD
- Defending against radar-guided surface-to-air mi
- SEAD / DEAD Techniques
- MAR, DR and R_{eff}
- Practice Scenarios



SEAD or DEAD?

SEAD: suppression of enemy air defenses

- Distracting the SAM long enough that other flights can achieve their objectives
- It covers an area, in most cases it is not against a specific SAM site

DEAD: destruction of enemy air defenses

- Destroying a specific SAM site

Types of air defense systems

Type	Short range (<10nm)	Medium range (10-30nm)	Long range (>30nm)
AAA	ZU-23		
IR SAM	MANPADS, SA-9, SA-13, M6		
Radar SAM	SA-8, SA-15, SA-19	SA-2, SA-3, SA-6, SA-11, Hawk	SA-5, SA-10, Patriot

*The list is not exhaustive

Weapons for SEAD / DEAD (1)

- Anti-radiation missiles (HARM, LD-10, Sidarm)
 - + The tool made for the job (in case of radar SAMs)
 - They go stupid if the radar switches off, can be shot down by self-defending SAMs, not working against IR SAMs
- Standoff weapons (JSOW, Maverick)
 - + Safe release distance
 - Can be shot down, need to know the exact location of the SAM
- Dumb bombs
 - + Can't be shot down
 - Inaccurate if dropped from high altitude, very risky if dropped from low altitude

Weapons for SEAD / DEAD (2)

- Laser guided bombs, JDAMs

- + Very accurate, can't be shot down
- Some SAMs have an extremely high max target altitude

- Cluster bombs

- + Large area-effect, can't be shot down
- They need to be released from a lower altitude to be precise enough

- Unguided rockets

- + Effective against unarmored and lightly-armored targets
- Very risky as they have to be released from an extremely close distance

Defending against radar-guided surface-to-air missiles

- Turning cold
 - Safest option to evade a missile
 - Turn 180° horizontally if you are at a decent distance from the SAM to maintain your altitude. Don't turn too hard or you will lose a lot of speed
 - Turn 180° vertically ("split s" maneuver) if you are close to the SAM (drags the missile into thicker air and gravity gives you a "speed-boost" during the turn). Be careful about possible AAA / IR threats below you
 - After turning cold do snake-like directional changes every couple seconds to make the missile bleed energy
- Jamming
 - Good for making it difficult for the SAM site to lock you
 - Be careful, by the time the radar burns through the jamming you might be too close to turn cold or notch
- Notching
 - More risky than turning cold, should be avoided if possible
 - Should be combined with releasing chaff right before getting into the notch position
- Breaking line-of-sight
 - Very effective for evading missiles (or for avoiding being targeted in the first place)
 - Dependent on terrain characteristics and has to happen at very low altitude (which is in general more dangerous)

SEAD / DEAD Techniques (1)

- Terrain masking and popup near the target to destroy it
 - + SAMs can't shoot you if they don't see you
 - Dependent on terrain, high risk, IR SAMs and AAA pose a larger threat than with other techniques
- Exhausting the SAM's missile supplies by repeatedly baiting launches and then going defensive
 - + Safe option with the right missile defense technique (turning cold)
 - Problematic against SAM sites with large missile stockpiles (like a full SA-10 site)
- One aircraft drawing fire and going defensive while other SEAD-capable aircraft attacks the distracted SAM (wild weasel)
 - + Sound tactic since WW2, especially if the exact location of the SAM is unknown
 - Requires additional aircraft and good timing

SEAD / DEAD Techniques (2)

- Overwhelming the SAM with enough aircraft that it cannot defend against them all
 - + Effective option even against fairly large SAM sites
 - Requires a large amount of resources (planes, missiles) in a tightly coordinated attack
- Launching standoff munitions (Maverick, JSOW and HARM missiles) from altitude and at a range greater than the SAM's
 - + Safe approach as it is outside of the threat range
 - Ineffective against self-defending SAMs (SA-10, SA-15) and if they switch off their radar
- Launching anti-radiation missiles, forcing the SAM to switch off its radars to avoid being killed
 - + Safe option for the SEAD flight
 - It only suppresses the SAM and requires perfect timing with the other flights

MAR, DR and R_{eff}

- Effective Range (R_{eff}):
 - The effective range of your missiles (shorter than max range)
- Minimum Abort Range (MAR)
 - Minimum range in which you can defeat the missile by turning cold
- Decision Range (DR)
 - Minimum range in which you can only defeat a missile by other means (notching, terrain masking, etc.)

General guidelines:

- Try to stay outside of MAR if R_{eff} allows. This way you can defend by just turning cold
- If R_{eff} is less than MAR, you need to be prepared to defend by other means
- Avoid going inside DR unless you are terrain masking to do a pop-up attack

MAR, DR and R_{eff} are dynamic ranges and they heavily depend on the type of SAM, your altitude, your speed, etc. With experience you will get a feel about these distances.





Practice Scenarios...

Scenario 1: Terrain masking with popup

OBJECTIVES:

- Follow your waypoints and stay under the radar coverage of the SA-10 site
- Pop up, kill the target and egress
- Release flares on the attack run

Scenario 2: Missile evasion by turning cold

OBJECTIVES:

- Fly towards the SA-6 at WP1
- Turn cold every time the SAM is firing at you (3)
- Practice turning cold both vertically and horizontally
- Do directional changes in your flight path while flying cold
- Once you exhausted its missiles go in for the kill

Scenario 3: Wild weasel

OBJECTIVES:

- Fly towards the SA-15 at WP1 in a combat spread formation with your wingman
- When the SAM is firing at one flight-member, he goes defensive
- The other flight-member waits a couple seconds then fires at the SAM and goes defensive
- The SAM will shoot down incoming missiles unless it is guiding its own missile



S1: SA-10

S2: SA-6

S3: SA-15

50 nm