

## **Scenario Description**

Welcome to the Realistic Detection and Intercept tutorial.

This is the fourth in a series of tutorials designed to teach players the fundamentals of air operations in Command. In this tutorial, the following topics will be covered:

- Detecting an airborne target.
- Shooting down an evading target.

Pop-ups will appear with important messages during this scenario. You can find a PDF of them in the documents folder that comes with these tutorials. The default location is: C:\Program Files (x86)\Command Modern Operations\Scenarios\Tutorials\Air Warfare Tutorials\Flight Tutorial\Documents.

For Steam users, they will be located at: C:\Program Files (x86)\Steam\steamapps\common\Command - Modern Operations\Scenarios\Tutorials\Air Warfare Tutorials\Flight Tutorial.

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## **Scenario Briefing**

Welcome to the Realistic Detection and Intercept tutorial.

In this scenario you will be guided through the following topics:

- Detecting an airborne target.
- Shooting down an evading target.

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## **Message 1**

Good morning!

Today you will impersonate the commander of the Ramat David Air Base in Northern Israel and you will learn how to detect and engage an airborne target that is trying to evade.

You have two F-15A Baz (1985 variant), two F-15A Baz (1995 variant), six F-16I Sufa, two Gulfstream G550 AEW Nahshon, two 707 Saknaye tankers and two Hermes 900 Star UAV under your command.

Your fighters are armed as follows:

- 2x F-15A Eagle [Baz]: 2x AIM-7F Sparrow III and 2x AIM-9J Sidewinder.
- 2x F-15A Eagle [Baz]: 4x AIM-7F Sparrow III, 2x AIM-9L Sidewinder, and 2x Python 3.
- 2x F-16I Falcon [Sufa]: 2x AIM-120C-7 AMRAAM and 2x Python 5.
- 3x F-16I Falcon [Sufa]: 4x Python 5.

### **Missile Types:**

- AIM-7F Sparrow III: Semi-Active Radar Homing (SARH). Range: 2-38nm.
- AIM-9J Sidewinder: Rear-Aspect mid-course plus Passive Infrared terminal guidance. Range: 0.2-8nm.
- AIM-9L Sidewinder: All-Aspect mid-course plus Passive Infrared terminal guidance. Range: 0.2-10nm.
- AIM-120C-7 AMRAAM: All-Aspect Long-Range (Datalink (DL/INS) mid-course plus Active Radar Homing (ARH) terminal guidance. Range: 2-56.7nm.
- Python 3: All-Aspect mid-course plus Passive Infrared terminal guidance. Range: 0.2-8nm.
- Python 5: Inertial (INS) mid-course plus Passive Infrared (IR) terminal guidance. Range: 0.2-15nm.

Before we start, a quick recap of Missiles 101.

## **Missiles 101**

**Rear-Aspect and Stern-Chase:** Is a missile that can engage a target aircraft only when it is flying away from the attacker. This makes engagement with cannons or infrared

homing missiles easier because of the minimal lateral target movement relative to the attacker and the fact that the hot engine exhaust are pointing directly at the attacker, making the infrared seeker's task of tracking the target much easier. These are usually old short-range missiles.

**All-Aspect:** A missile able to track a target no matter which way the target faces relative to the missile. An All-Aspect missile can be launched against a target in a tail-chase engagement, in a head-on engagement, in a side-on engagement, from above, from below, etc. These are usually newer medium or long-range missiles.

**Off-Boresight:** Helmet Mounted Display Systems allow the pilot to aim weapons at targets that are off-boresight from the line of sight of the aircraft. The missile can be launched to a point beyond its seeker limits to then start an autonomous target search. Using cues from the aircraft radar, a helmet-mounted sight, or off-board targeting data, the missile can thus undertake engagements in a 360-degree radius around the launch aircraft.

**Active Homing:** Active homing missiles use a radar system on the missile to provide a guidance signal. Typically, electronics in the missile keep the radar pointed directly at the target, and the missile then looks at this "angle" of its own centerline to guide itself.

**Passive Homing:** Infrared homing is a passive system that homes in on the heat generated by the target. Typically used in the anti-aircraft role to track the heat of jet engines, this means of guidance is sometimes also referred to as "heat seeking".

**Semi-Active Radar Homing:** Semi-active homing systems combine a passive radar receiver on the missile with a separate targeting radar that "illuminates" the target. Since the missile is typically being launched after the target was detected using a powerful radar system, it makes sense to use that same radar system to track the target, thereby avoiding problems with resolution or power, and reducing the weight of the missile. Semi-active radar homing (SARH) is by far the most common "all weather" guidance solution for anti-aircraft systems, both ground- and air-launched.

It has the disadvantage for air-launched systems that the launch aircraft must keep moving towards the target in order to maintain radar and guidance lock.

**Mid-course Guidance:** These missiles can be guided during the flight before the terminal guidance. This means that during the flight the missile will get updates on the target position and will react accordingly.

**Terminal Guidance:** Refers to any guidance system that is primarily or solely active during the "terminal phase", just before the weapon impacts its target.

**Energy-based Flight Model for Boost-Coast Missiles:** Boost-coast anti-air missiles (i.e., most tactical missiles that are not powered continuously) use a realistic flight model that distinctly models the initial boost-sustain and post-burnout regimes and takes into account the effects of gravity (shedding speed while climbing and regaining it when diving) and aerodynamic drag. The drag changes with altitude, built-in drag coefficient and whether the weapon is maneuvering (pitching/turning) or not. This change makes it possible to apply real-life exhaust the threat tactics and constrains edge-of-envelope shots.

**Default Aircraft Defensive Maneuvers:** When evading incoming missiles aircraft will first try to outrun the missile while matching its relative pitch (i.e., climb if the missile is below them, or dive if it's above them), and if the missile closes the distance, they will then attempt to beam it (or its parent guidance) while also reversing their climb/dive.

## **Message 2**

We have good intelligence that a Syrian Cessna AC-208B Combat Caravan is flying from Syria to Israel. Even though the aircraft shouldn't be armed, we don't want the Syrians to collect intelligence over our territory, so the intruder must be destroyed.

We can't see it yet, so you need to activate a radar to find the intruder. You have four possible choices to accomplish this:

1. Press "CTRL + SHIFT + F9" and in the EMCON page select "Active" in the Radar menu.

This will activate every radar on every platform on your side. However, usually this is not the recommended solution as any hostile side will rapidly identify every unit under your command.

2. Select one of the three radars north of Ramat David, press "F9", uncheck the "Unit obeys EMCON" box and then check the "Radar" box.

This will activate the radar of the selected unit and is a good way to find enemy aircraft.

This is one of the preferred solutions, but you will not always be in command of a fixed radar unit, and they are a good target for enemy aircraft with Anti-Radiation Missiles (ARM). If you choose this during a scenario, just make sure to have a CAP (Combat Air Patrol) nearby to protect your radar.

3. Assign a Gulfstream G550 AEW Nahshon to a Support Mission, checking that the radar EMCON setting for the mission is set to "Active".

This is the preferred solution in real life, as AEW and AWACS aircraft have long-range radars best suited for this task and, being mobile, the risk of losing it to an enemy attack is reduced. Again, just make sure to have a CAP nearby.

4. Use the radar on your fighters.

This solution has a few drawbacks, as the fighters radar are ill-suited for the task due to their limited coverage area and range. If the enemy has an ELINT platform using them can also alert the enemy and give away their position and type.

Whatever solution you pick, it's time to get some aircraft airborne and try to intercept the intruder!

Note that the Hermes 900 UAV can be used as a powerful jamming platform. You shouldn't need them against a Cessna Caravan, but they are useful when you engage armed hostiles.

### **Message 3**

You have just detected an airplane. As there shouldn't be other aircraft in the area, you can safely assume it's the enemy aircraft.

Note that usually there are civilian aircraft in the area of operations, so you should clearly identify contacts before firing.

Now it's time to shoot down the intruder before he can collect any intelligence over our territory.

Remember that if you have selected the F-15 and you want to shoot the AIM-7 Sparrow, you will need to keep them pointed at the target with the radar switched on during the entire engagement, otherwise the missile will lose guidance and will self-destruct. If they

are ordered to do an automatic attack, they will do this without any additional orders needed from you.

#### **Message 4**

Well done! The enemy aircraft has been destroyed!

But we have just received intelligence about another attempt by Syria to gather intelligence.

An Il-38 May and a Tu-22 Backfire are headed towards us and you must destroy them. With the aircraft damage scenario setting activated these aircraft are tough targets, especially if engaged with short-range missiles that have a smaller warhead or cannon fire. This is also true for many multi-engine aircraft, that can fly with one or more engines destroyed.

As these aircraft are unarmed, I suggest you engage them with AIM-120 AMRAAM or AIM-7 Sparrow missiles.

#### **Message 5**

Well done! You have successfully destroyed all the enemy aircraft.

I suggest you try this scenario again using different aircraft and weapons to learn the differences between them. This will be useful when you face more difficult engagements.

When you think you're ready, move onto the next tutorial, where you will learn to engage armed enemy aircraft.