

Medium Range Surface to Air Missile (MRSAM) - UPSC Notes

Surface-to-Air Missiles (SAM) are designed to be launched from the ground to destroy aircraft or other missiles. They are also known as ground-to-air missiles. The topic finds relevance in GS-3 of the [UPSC exam](#), as “defence” is a very dynamic segment of the exam.

Surface-to-Air Missiles

The SAM is a type of anti-aircraft system, as in the modern armed forces, missiles have replaced the conventional anti-aircraft systems. Although no functional prototypes were introduced, serious efforts for the development of SAM were initiated during World War II itself.

- Further developments in the 1940s and 1950s led to the first operational systems being introduced by most major forces during the second half of the 1950s.
- The **American Nike Ajax** was the first functional guided SAM system.
- These missiles are classified on the basis of their mobility, guidance, range and altitude.
- The SAMs are categorized into three classes subsequently:
 - Fixed heavy long-range systems
 - Vehicle-mounted medium-range systems, and
 - MANPADS (short-range man-portable air-defence systems)

Medium range SAMs

The heavier the missiles, the longer they can fly. Thus, the missiles which can fly for longer durations are less mobile. The medium-range missiles are specifically designed to be highly mobile with very fast setup time.

- The **Medium-Range Surface-to-Air Missile (MRSAM)** was developed by India's [Defence Research and Development Organisation \(DRDO\)](#) in collaboration with Israel Aerospace Industries (IAI).
- The MRSAM is based on the configuration of the **Barak-8 naval air defence system** which is a **Long-Range Surface-to-Air Missile**.

Specifications of MRSAM

The MRSAMs are usually 4.5m long and weigh around 276kgs. The missiles have canards and fins for manoeuvrability and control.

- The MRSAM consists of four common features, that are:
 - A command and control system
 - A tracking radar
 - Radiofrequency seeker
 - Missiles
 - And a mobile launcher system
- The tracking radar is utilized to track and identify the threat. It is a part of the combat management system.

- The system is capable of calculating the distance between the target and the launcher while simultaneously determining whether the target is a friend or an enemy.
- The MRSAM utilizes a mobile launcher to transport the missiles.
- The MRSAM also consists of an active **Radio-frequency seeker**, which is located at the front section of the missile. It is used to detect the moving targets in all weather conditions.
- These missiles also consist of a **bi-directional data link**. This passes on the information regarding the target to the missile.
- The MRSAMs are equipped with an explosive warhead. This warhead has a self-destructing fuse which increases the probability of killing the target with little to no collateral damage.

Akash Missile

In this section, you can read about the SAM Akash and its capabilities.

- **Type:** This is a Medium-range Surface-to-Air Missile.
- It was developed by the Defence Research and Development Organisation (DRDO).
- The missile has an intercept range of 30kms, at altitudes up to 18 km.
- It has a launch weight of 720 kg, a diameter of 35 cm and a length of 5.78 metres.
- It can reach a supersonic speed of around **Mach 2.5**.
- It has a multi-target engagement capability which means it can engage with multiple targets at a time. It has the capability to neutralize several types of targets also, such as aerial targets, cruise missiles and even ballistic missiles.
- The Akash battery consists of a passive electronically scanned array radar otherwise known as PESA radar.
- The missile is also equipped with a highly explosive warhead with a proximity fuse weighing 60kgs.
- The Akash system is proficient to protect a convoy of vehicles which are in constant motion.
- The design of this missile is similar to that of the SA-6, otherwise known as **2K12 "Kub" mobile surface-to-air missile system**.