

BALLISTIC MISSILE DEFENCE SYSTEM

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Abstract -This study examined types of Ballistic missile defense systems that are developed by different countries in order to tackle threats of ICBM attacks during wartime. Now a days Missiles are one of the most deadliest weapons available. They have capability of carrying multiple warheads(explosives and nuclear) within them , which can cause mass destruction.

1. INTRODUCTION

Ballistic Missile- Ballistic missile is a rocket propelled weapon which delivers one or multiple warheads to a predetermined site. Ballistic missiles can be categorized to-

- Short Range- 300 to 1000 KM
- Medium Range - 1000 to 3500 KM
- Intermediate Range - 3500 to 5500
- Long Range or ICBM - Above 5500

Note- Here ICBM stands for inter-continental Ballistic missile. These are long range missiles having capacity to hit over other continent.

In order to deal with threats of ballistic missiles different countries developed a defence system which have capability to destroy these missiles in air only.

Missile Defense System - It is a system which detects , track and intercept Ballistic missiles.

Defense System consists of -

- Satellite Sensors and Ground based or Sea based Radars - Monitors and detect threat missile.
- Interceptors- These are missiles which carry kill vehicles and it destroy threat missiles once detected by sensors and radars.

Today many countries have developed missile defense system. These countries are U.S., Russia, India, Israel, and UK.

2. DEFENCE SYSTEM OPERATION

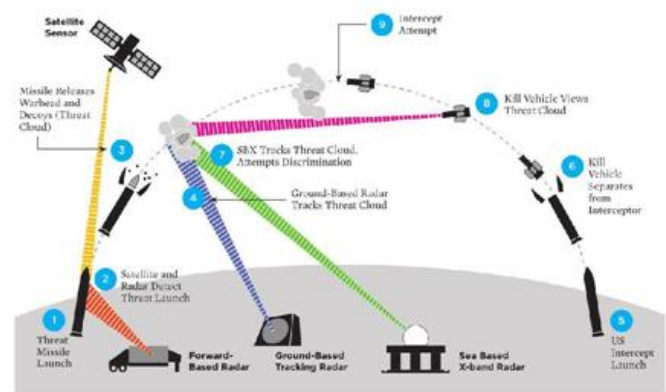


FIG- Defense System Operation Working[1].

3. SYSTEM OPERATION STEPS

STEP 1 - Threat Missile Launch

STEP 2 - Forward base radars detect Launch of threat missile and is also detected by Satellite Sensor.

STEP 3 - Threat missile decoys and release its warheads. and form a "THREAT CLOUD".

STEP 4 - Ground Base Radar tracks Threat Cloud

STEP 5 - As information is received from radars defense system launch one or more interceptors.

STEP 6 - These interceptors release kill vehicle.

STEP 7 - Sea based X- Band Radars observe threat cloud and try to determine the warhead and pass this information to kill vehicle.

STEP 8 - Kill Vehicle observe threat cloud and determine warhead in it.

STEP 9 - Kill Vehicle then goes into path of warhead to destroy it.

4. INDIA'S MISSILE DEFENCE SYSTEM

India targeted to deploy a Multi Layered Ballistic Defense System in order tackle with Ballistic Missile threats.

Indian Ballistic Missile system consists of two land and sea based interceptor missiles.

These are Prithvi Air Defense and Advanced Air Defense.

Prithvi Air Defense - For high altitude interception.

Advanced Air Defense - For lower interception.

Note - this two tiered shield can intercept an incoming missile from 5000 KM away.

5. PRITHVI AIR DEFENCE (PAD)

- Prithvi Air Defense is exoatmospheric i.e. it intercepts ballistic missile outside the atmosphere.
- PAD two stage missile. {maximum interception altitude of 80km}.
- FIRST STAGE - Solid fuelled motor
- SECOND STAGE - Liquid fuelled
- operational range of Prithvi missile is about 2000 km
- Prithvi Missile travels with speed of MACH 5+
- Inertial Navigation System , Active Radar Homing , ground based Mid - Course correction . These are used in guidance system in terminal phase.[2]
- Also a LRTR radar used in PAD. It is fire control and target acquisition radar which has capability to track about 200 target coming at a range of 600 KM.
- PAD was successfully tested on November 2006.
- During test, PAD missile intercepted a modified Prithvi II missile.(at an altitude of 50km).
- PAD Missile has been called as Pradyumna.
- In 2009 , second test was conducted by DRDO, and PAD missile destroyed a missile named as Dhanush (has a trajectory range of 1500km) at altitude of 75 km.



Prithvi Missile [3][2].

6. ADVANCED AIR DEFENCE (AAD)

- AAD is anti-ballistic missile which intercepts incoming ballistic missiles in endo-atmosphere.
- Maximum interception altitude - 30 km
- AAD is Single Stage Missile (Solid Fuelled).
- It travels with speed of Mach 4.5
- Guidance System - Inertial Navigation System , Active Radar Homing, ground based Mid - Course correction (used in terminal phase).
- On 6 December 2006 AAD intercepted Prithvi II missile (as enemy missile) at 15 km altitude.
- Latest TEST of AAD was done 15th may 2016 in which upgraded version of AAD was used and AAD missile destroyed Prithvi Missile fired from a ship.
- AAD also Known as Ashwin Ballistic Missile Interceptor.



AAD System [2].

7. CONCLUSION

Hence we have studied about Ballistic Missile Defense System and how they are used to intercept threat missiles. We have also studied about India's Ballistic Missile Programme and different technologies India use in their system.

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REFERENCES

- [1] Union of Concerned Scientists.
- [2] Defence Research And Development Organisation - DRDO.

[3] Bharat Dynamics Limited.