

# AKASH

## **ROLE**

The AKASH is a medium range, surface-to-air missile system which provides area air defense against multifarious air threats to mobile, semi-mobile and static vulnerable forces and areas. The AKASH air defense group sanitizes a large volume of air space over the combat zone.

## **COMPOSITION**

- ❑ The Group Control Center —a C<sup>4</sup>I Center
- ❑ The Central Acquisition Radar —a 3-Dimensional sensor
- ❑ The Battery Control Center —a C<sup>4</sup>I Center
- ❑ The Battery Level Radar —a Phased Array tracking - cum-guidance 3-D sensor
- ❑ The Battery Surveillance Radar —a 2-Dimensional sensor
- ❑ The Launchers - 4 in each battery
- ❑ The AKASH Missile — 30km range 3 missiles on each launcher.
- ❑ Support Vehicles —power supply, missile transport and engineering support

## **CAPABILITIES**

- ❑ Real time multi-sensor data processing and threat evaluation
- ❑ Fully automated operations
- ❑ Simultaneous engagement of multiple targets from any direction
- ❑ Plug-and-fight architecture
- ❑ In-built ECCM
- ❑ Cross-country mobility and multi-terrain deployability

- ❑ Transportable by road, rail and air
- ❑ Quality assured and cost competitive
- ❑ State-of-the-art technologies
- ❑ Mobile and semi-mobile vehicle configurations
- ❑ Customized software and hardware design
- ❑ Life cycle support
- ❑ Simulation and training support
- ❑ NBC hardening

## **OPERATIONAL MODES**

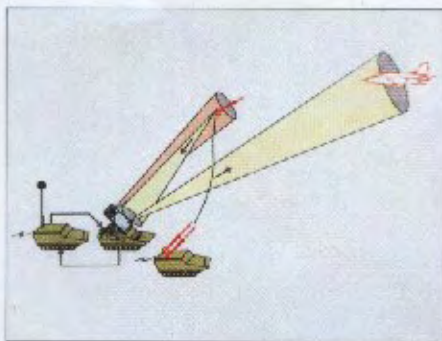
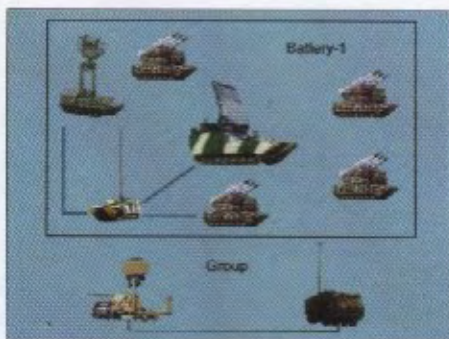
The AKASH weapon system deploys in the Group and the Autonomous (Battery) modes to protect critical national assets in the Combat Zone.

In the Group mode, the GCC controls air defense operations of the Batteries, through secure point-to-multi-point communication links up to 30 kms in range, in all directions

In the Battery mode, the BCC conducts air defense combat independently

Real time software integrates the sensors and processes target data and other information. Decision support software carries out threat analysis and generates options for commanders. Automated target assignment and launch commands are generated for optimal engagement in kill zones.

## AKASH Weapon System



### FEATURES

- Number of targets processed greater than 200
- Hands-free operations from target detection to engagement
- Four targets engaged simultaneously with eight missiles
- Digital radio proximity detonation
- Slewable multi-function phased array radar
- Automated decision making of launch commands enable rapid response
- Secure communications with redundancy
- Advanced navigation system enables quick deployment
- Flexible deployment geometries
- Operable from sub-zero to desert temperatures
- Basic chassis is T-72 / Tatra / Trailer



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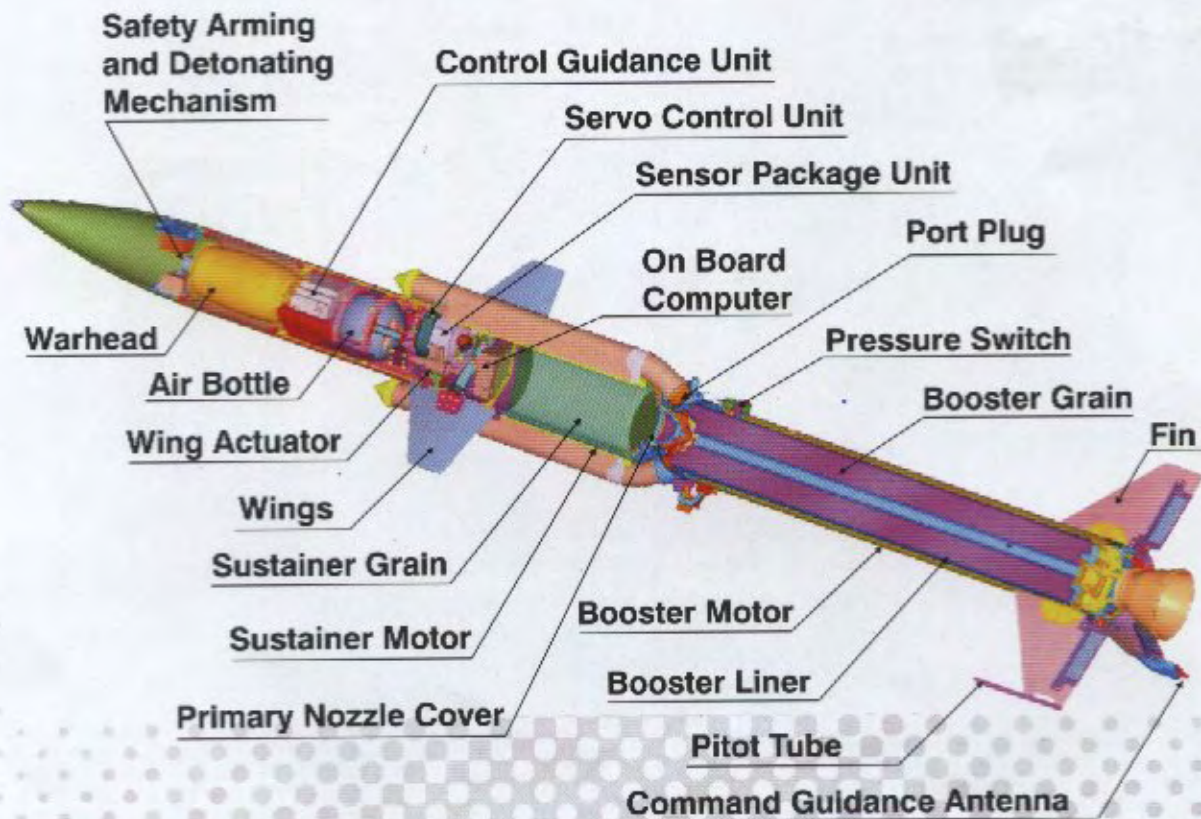
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Area defence surface-to-air  
guided weapon system

## AKASH Missile

AKASH surface-to-air missile has a launch weight of 720 kg, diameter 350 mm and a length of 5.8 m. Its integral Ram Rocket propulsion provides all the way thrusting to a range of 25 km. The digital autopilot and guidance system are microprocessor based. The missile has all the way command guidance for full range of operation. Electro-

pneumatic servo actuation system controls cruciform wings for quick response, and thermal batteries provide onboard power supply. The Radio Proximity Fuze has advanced signal processing features. Together with the prefragmented warhead and safety arming mechanism, a high kill probability of maneuvering targets flying upto 600 m/s is achieved.



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## AKASH Missile System

- Solid Integral Ram.Rocket Propulsion System
  - High Thrust/ Weight Ratio
  - All the way powered range of 25 km
- Coded Command Guidance System for multiple targets
- Digitally Settable Frequencies for Anti-jamming
- Digital On Board Processor System
  - On Board Mission Events
  - Prelaunch Health Checks
  - Ground Checks with System
  - Safety Abort System
- Long Shelf Life Thermal Power Source
- High Performance Prefragmented Warhead
- Digital Radio Proximity Fuze
- Switchable Guidance Antennae System
- Safety Arming and Detonation Mechanism
- Automatic Checkout and Launch System

Physical Parameters	
• Diameter	: 350 mm
• Length	: 5820 mm
• Weight of missile with warhead	: 720 kgs
• Weight of warhead	: 55 kgs



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## Operational Configuration of the System

The AKASH Weapon System architecture is based on a group headquarters and a number of batteries. The army configuration is based on tracked vehicles while the airforce configuration is based on wheeled vehicles. The system can be operated either in the Autonomous Mode or in the Group Mode.

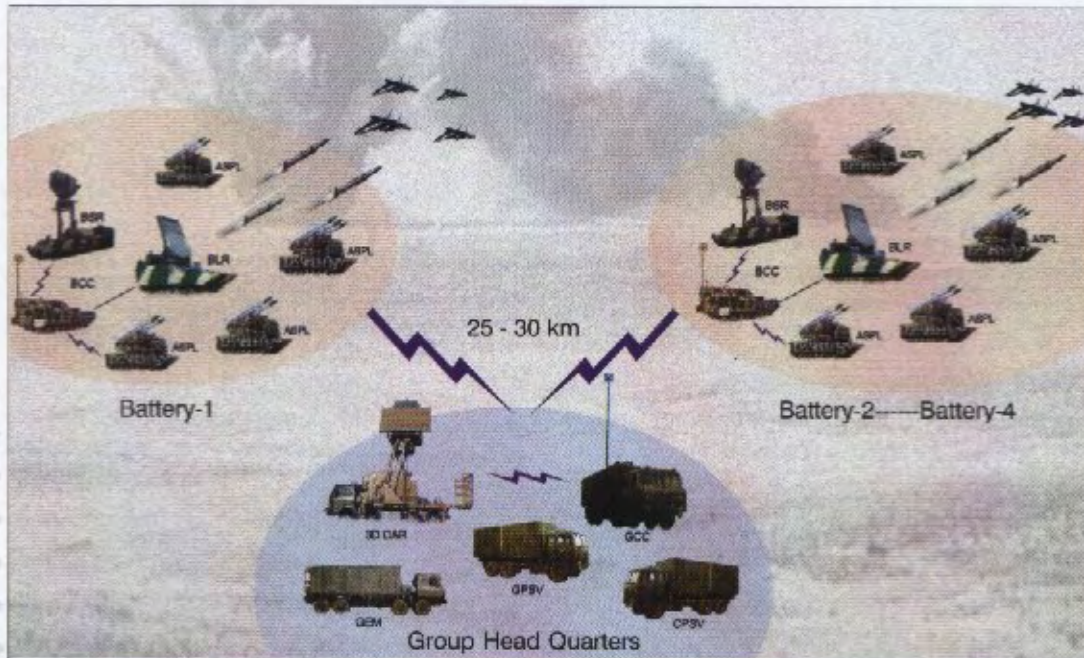
### Autonomous Mode

The system can be deployed in Autonomous Mode with a single battery functioning independently. In this mode, an additional 2D radar will be added in the battery configuration for surveillance function. This mode provides point defence to moving columns

of a land force or vulnerable area / point defence of air force installations.

### Group Mode

In the Group Mode, a number of batteries function together seamlessly for integrated operations against air threats. These multiple batteries are deployed over a wide area and are linked to the Group Control Centre (GCC) through secure communication links. Group Mode deployment provides facility to defend vulnerable areas at short notice. In this mode a 3D Surveillance Radar provides a single integrated air picture to GCC.



Group Configuration of AKASH Weapon System



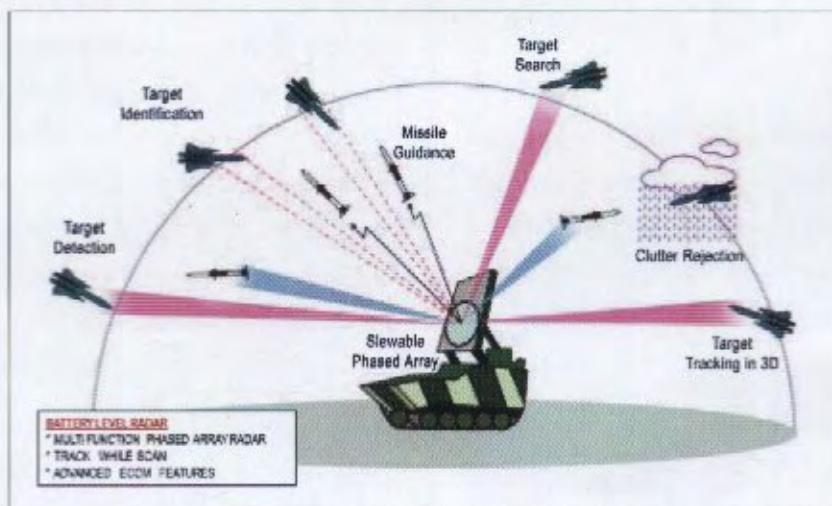
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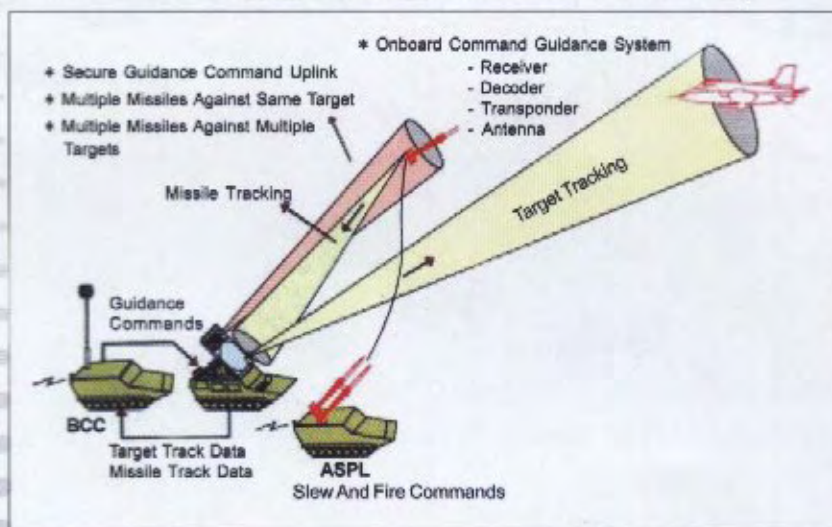
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## Command Guidance using Battery Level Radar

The BLR configuration consists of a phased array antenna of more than 4000 elements, spectrally pure TWT transmitter, two stage superheterodyne correlation receiver for three channels, high speed digital signal processor, real time management computer and a powerful Radar Data Processor. The antenna coverage is optimised for the effective operational ceiling of the AKASH missile. The system analyses the radar environment and adapts its mode of operation from task to task to suit the prevailing conditions.



The system has multiple target handling capability. A single battery can simultaneously engage four targets. Against each target a maximum of three missiles can be launched in ripple mode.



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## Group Head Quarters

### Group Control Centre (GCC)

- Controls eight missile batteries located at 30 km (max.) distance
- Data communication between batteries and GCC through radio or line links
- ECCM features for communication equipment
  - Frequency Hopping System
  - FEC & RS Coding and Code Inter Leaving
  - Highly Directional Antennas
- Displays for commander and operator showing coherent integrated air picture
- Real Time Data Processing in RISC based work stations
- Command Control Software for air defence
  - Target Classification
  - Threat Evaluation
  - Threat Prioritisation
  - Assignment to BCCs
- Built in Simulator



Group Control Centre (GCC)



3D-Central Acquisition Radar (3D-CAR)

### 3D-Central Acquisition Radar

- 3D-Radar
- Multi Beam Planar Array Antenna
- Integrated IFF Antenna
- Two rates of antenna rotation
- 150 km Detection Range
- Height Coverage 30 m to 19 km
- Range Resolution 200 m
- Air Conditioned Data Processing Vehicle



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# AKASH Combat Battery



Battery Control Centre (BCC)

- Tracked Vehicle Mounted
- Command and Control Centre for AKASH Battery
- Ruggedised Computers for
  - Radar Data Processing
  - Weapon Control Functions
  - Air Defence Functions
- Ruggedised Radar and Missile Control Stations
- Ruggedised Raster Scan Display. Can control upto four Missile launchers
- Interfaced with BLR and BSR
- Interfaced with GCC in Group Mode
- Air Conditioned

- Fire Control Radar for AKASH
- Fully Computer Controlled
- Mounted on Tracks for High Mobility
- Three Dimensional Electronic Scanning
- Multi Function, Multi Tasking
- Integrated IFF
- Designed to work in intense ECM Environment
- Max. Range = 60 km

- Range Resolution =  $\pm 30$  m
- Elevation Resolution = 2.0 Deg
- Azimuth Limits :  $\pm 45$  Deg
- Tracking : 20 Targets
- Engagement : Four Targets simultaneously
- Guidance : 12 Missiles against four targets
- Air Conditioned



Phased Array Radar System



AKASH Self Propelled Launcher (ASPL)

- High Performance Missile Launch System mounted on Tracked Vehicle
- Microprocessor Controlled Electro Mechanical Servo System
- Three Ready-to-Fire AKASH missiles can be carried and launched
- Checkout and Autolaunch of Missiles
- Interfaced with Battery Control Centre (BCC) via Line or Radio
- Maximum distance from BCC is 500 m
- Fully Automatic and Remotely Controllable
- Azimuth Slew : 360 Deg
- Elevation Limits : 8-60 Deg
- Slewing Rate : 9 Deg/Sec
- Captive GT Power Source
- Air Conditioned



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## Ground Support Systems



Integrated Power Supply Vehicle

### Group Headquarters

- Group Equipment Maintenance Vehicle
- Integrated Power Supply Vehicle

### Technical Battery

- Air Compressor & Storage Vehicle
- Transport cum Loader Vehicle
- Missile Transportation Vehicle



Air Compressor & Storage Vehicle



Transport cum Loader Vehicle

### Combat Battery

- Transport cum Loader Vehicle
- Battery Equipment Maintenance Vehicle
- Battery Cable Layer Vehicle

### Workshop

- Mobile Station for Missile Checkout
- Mobile Station for Repairs
- Launcher Repair & Diagnostics Vehicle
- Radar Repair & Diagnostics Vehicle



Mobile Station for Missile Checkout (MSMC)



Mobile Station for Repairs (MSR)

### Features of Ground Support Systems

- Designed for high reliability and maintainability
- Built-in diagnostics and checkout systems for the sub-systems
- Built-in simulators for operator training
- Card level fault diagnostics and field replacement



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## Timely Deliveries, Consistent Performance



### Facilities Established

- High & Low Pressure Pneumatic Facilities
- Actuator Assembly and Test Facilities
- Check-out systems
- Vibration, Bump, Damp Heat, High Temp, Low Temp
- Missile Assembly Facilities
- Storage and Handling Facilities.

### Production Readiness

The various subsystems have been sourced from private and public industry sources within India. The vendors have been chosen specifically for their mass production capabilities, manpower and quality management systems. This will ensure timely production deliveries. Cost competitiveness of the system with respect to other systems in the field with similar capabilities has been a primary consideration throughout the course of the program.

### Comprehensive Testing

The program has followed the route by testing incremental capability. The sensors have also been field tested in realistic environment resulting in hardware and software fine tuning to meet operational requirements. The flight tests of the weapon system have established consistent performance by flight and ground systems against realistic target scenarios. Comprehensive modeling and simulation tools have been developed and validated through these tests.



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