

# Barak 8

**Barak 8** (the Hebrew word for Lightning) also known as LR-SAM or as MR-SAM<sup>[11][12][13]</sup> is an Indian-Israelisurface-to-air missile(SAM), designed to defend against any type of airborne threat including aircraft, helicopters, anti-ship missiles and UAVs as well as ballistic missiles,<sup>[14]</sup> cruise missiles and combat jets.<sup>[5][15]</sup> Both maritime and land-based versions of the system exist.<sup>[16]</sup>

Barak 8 was jointly developed by Israel Aerospace Industries (IAI), India's Defence Research & Development Organisation (DRDO), Israel's Administration for the Development of Weapons and Technological Infrastructure, Elta Systems, Rafael and other companies. Bharat Dynamics Limited (BDL) produce the missiles.

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## Background

Barak 8 is based on the original Barak 1 missile and is expected to feature a more advanced seeker, alongside range extensions that will move it closer to medium range naval systems like the RIM-162 ESSM or even the SM-2 Standard. Israel successfully tested its improved Barak II missile on July 30, 2009. The radar system provides 360 degree coverage and the missiles can take down an incoming missile as close as 500 meters away from the ship. Each Barak system (missile container, radar, computers and installation) costs about \$24 million.<sup>[17]</sup> In November 2009 Israel signed a \$1.1 billion contract to supply an upgraded tactical Barak 8 air defence system to India.<sup>[18]</sup> In May 2017, India placed an order of \$630 million for four ships of the Indian Navy.<sup>[19]</sup>

## Design

Barak 8/ LR-SAM/ MR-SAM	
<div><span></span></div>	
Type	Long-range surface-to-air missile
Place of origin	India, Israel
Service history	
In service	Induction Phase <sup>[1]</sup>
Used by	Indian Navy <div></div> Indian Air Force <div></div> Israeli Navy
Production history	
Designer	Israel Aerospace Industries <div></div> Defence Research and Development Organisation
Manufacturer	Rafael Advanced Defense Systems <sup>[2]</sup> <div></div> Bharat Dynamics Limited <sup>[3]</sup>
Specifications	
Weight	275 <span> </span> kg (606 <span> </span> lb) <sup>[4]</sup>
Length	4.5 <span> </span> m (180 <span> </span> in) <sup>[4][5]</sup>

The Barak 8 has a length of about 4.5 meters, a diameter of 0.225 meters<sup>[6]</sup> at missile body, and 0.54 meters at the booster stage, a wingspan of 0.94 meters and weighs 275 kg including a 60 kg warhead which detonates at proximity.<sup>[5]</sup> The missile has maximum speed of Mach 2 with a maximum operational range of 70 km,<sup>[5][15][20][21]</sup> which was later increased to 100 km.<sup>[8][9]</sup> Barak 8 features a dual pulse rocket motor as well as Thrust vector control,<sup>[22]</sup> and possesses high degrees of maneuverability at target interception range. A second motor is fired during the terminal phase, at which stage the active radar seeker is activated to home in on to the enemy track.<sup>[5]</sup> Barak 8 has been designed to counter a wide variety of air-borne threats, such as; anti-ship missiles, aircraft, UAVs drones and supersonic missiles<sup>[23]</sup> When coupled with a modern air-defence system and multi-function surveillance track and guidance radars, (such as the EL/M-2248 MF-STAR AESA on board the Kolkata-class destroyers) Barak 8 enables the capability to simultaneously engage multiple targets during saturation attacks.<sup>[5][10]</sup>

Israel Aerospace Industries describe Barak 8 as "an advanced, long-range missile defense and air defense system" with its main features being:<sup>[10][24]</sup>

- Long Range
- Two way data link (GPS S band)
- Active Radar Seeker Missile
- 360 degree coverage
- Vertical Launch
- Multiple Simultaneous Engagements
- Point defence anti-ballistic missile<sup>[14]</sup>

## MRSAM

*MRSAM* is the land based configuration of the missile. It consists of a command and control system, tracking radar, missile and mobile launcher systems. Each launcher will have eight such missiles in two stacks and are launched in a canister configuration. The system is also fitted with an advanced radio frequency (RF) seeker.<sup>[25][13]</sup>

The Indian Army ordered five regiments of this version, which consists of about 40 launchers and 200 missiles for ₹17,000 crore (US\$2.7 billion). It is expected to be deployed by 2023 with first deliveries commencing in 2020.<sup>[13][26][27][28][29]</sup>

## LRSAM (Barak-8ER)

It has been reported that an ER (extended range) variant of the Barak 8 is under development, which will see the missiles maximum range increased to 150 km.<sup>[22]</sup> Designed to engage multiple beyond visual range threats, the low launch signature Barak-8ER is understood to retain the same autopilot/inertial navigation system and active radar seeker guidance as the Barak-8, although some modifications to the software and to the missile control surfaces are likely. The booster increases the length of the missile at launch from its current 4.5 m to nearly 6 m, although the length in flight after the booster has been jettisoned may be slightly less than the base Barak-8 missile, if a TVC is not present. The missile diameter and fin spans are thought to be the same as the base Barak-8. The booster weight is currently unknown, although the missile's weight after the booster has been jettisoned is the same as that for the current Barak-8 configuration.

Diameter	0.225/0.54 m <sup>[4][5][6]</sup>
Detonation mechanism	Proximity (60 kg warhead) <sup>[4]</sup>
Engine	Two stage, smokeless pulsed rocket motor
Wingspan	0.94 m <sup>[4][5]</sup>
Operational range	0.5–90km, <sup>[7]</sup> some media reports indicate a capability of 100km <sup>[8][9]</sup>
Flight ceiling	0–16 km <sup>[4][5]</sup>
Speed	Mach 2 (680 m/s) <sup>[4]</sup>
Guidance system	<ul style="list-style-type: none"><li>▪ Two way data link<sup>[10]</sup></li><li>▪ Active RF/IIR seeker<sup>[10]</sup></li></ul>
Launch platform	<ul style="list-style-type: none"><li>▪ 8 cell VLS module<sup>[5]</sup></li><li>▪ 8 cell, double stacked land launcher</li></ul>



Barak 8 launcher module

Levy said that initial operational capability (IOC) for Barak-8ER will first be declared for the naval variant, followed by IOC for the land variant. He declined to comment on a launch customer for Barak-8ER, but noted "existing Barak-8 customers will be interested in this configuration because it offers additional capability to their current system".<sup>[22]</sup> The missile is expected to equip the Indian Navy's future Visakhapatnam-class destroyers<sup>[30][31]</sup>

## Flight tests

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- In May 2010, the Barak-II missile was successfully test fired at an electronic target and met its initial objectives. The second test of the missile was to be held in India later in 2010<sup>[32]</sup> "More than 70 per cent of the content in the missile being developed with Israel would be indigenous." DRDO chief V K. Saraswat told The Economic Times.<sup>[33]</sup>
- On 10 November 2014 the Barak 8 was successfully test fired in Israel with all integrated operational components for both the marine & land system.<sup>[34][35]</sup>
- On 26 November 2015, a successful test was conducted on a drone target.<sup>[36]</sup>
- On 29 December 2015 and 30 December 2015 the Indian Navy successfully test-fired the Barak 8 missile from INS Kolkata.<sup>[37][38]</sup> Two missiles were fired at high speed targets, during naval exercises being undertaken in the Arabian Sea.<sup>[39][40]</sup>
- On 30 June 2016, India test-fired a land based version of the Barak 8 surface-to-air missile for the first time from the Integrated Test Range (ITR) in Chandipur, Odisha, successfully hitting the target pilotless target aircraft (PTA) at 8:15 AM IST.<sup>[41]</sup> the missile was again test fired for second time around noon where it again successfully hit a pilotless target aircraft over the Bay of Bengal. The test-firing of the missile was jointly carried out by Indian defence personnel, DRDO and IAI.<sup>[42][43][44][45]</sup>
- On 1 July 2016 the MR SAM (land based version) was tested for the third time from the ITR at Chandipur at 10:26 AM IST and the missile successfully hit a pilotless target aircraft, proving its reliability.<sup>[46]</sup>
- On 20 September 2016, India successfully test fired the Barak-8. The long range missile was launched from a mobile launcher at the ITR in Chandipur at around 10:13 AM IST.<sup>[47]</sup>
- On 25 December 2016, Azerbaijan successfully tested the missile.<sup>[48]</sup>
- On 10 February 2017, Israel Aerospace Industries test fired the missile at sea to verify its capabilities.<sup>[49][50]</sup>
- On 16 May 2017, the Indian Navy successfully test fired the missile from INS Kochi.<sup>[51][52]</sup>
- On 29 November 2017, the Indian Navy test fired the missile from INS Kochi.<sup>[53]</sup>



INS Kolkata firing a Barak 8 missile

## Deployment




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The Israeli Navy has commenced equipping its Sa'ar 5 corvettes with the system, the first re-fitted vessel being the INS Lahav. The Sa'ar 4.5 flotilla will be next for the upgrade.<sup>[54]</sup> Indian Navy has already deployed the missiles on Kolkata class stealth guided-missile destroyer.<sup>[55]</sup>



## Operators

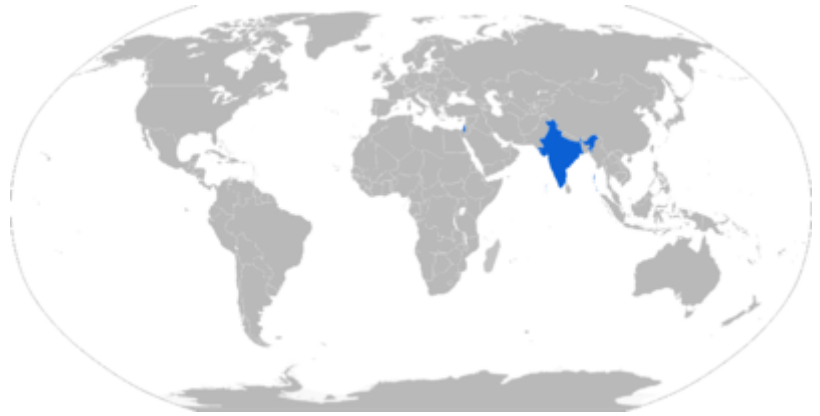
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### Current operators

-  Azerbaijan<sup>[56][57]</sup>
-  Israel – By February 2017, Israel's Sa'ar 5-class corvettes to carry the newer Barak 8 missile system, instead of Barak 1. To that end, INS Lahav, a Sa'ar 5-class corvette live-fired the Barak 8 missile system, during a trial in late 2015. Subsequently the navy will convert lighter Sa'ar 4.5-class corvettes in two to three years.<sup>[54]</sup>
-  India – Indian Army, Kolkata-class destroyers, Visakhapatnam-class destroyers, Kamorta-class corvettes<sup>[38]</sup> INS Vikramaditya, INS Vikrant and Project 17A frigates<sup>[58]</sup>

## Potential operators

-  Germany<sup>[59]</sup>
-  Poland – In 2014, Polish Navy evaluated the Barak 8 missile system for potential use in their ships.<sup>[15]</sup>



Map with Barak 8 operators in blue (doesn't include Azerbaijan)

## See also

- Barak 1
- Tor missile system
- MIM-104 Patriot
- RIM-66 Standard
- RIM-67 Standard
- Aster (missile family)
- RIM-174 Standard ERAM

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## External links

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- [Barak 8 on the IAI website](#)
  - [Jane's Naval Weapons: Barak 1/2/8](#)
  - [Defense Industry Daily - India & Israel Introducing MR-SAM](#)
  - [Defense Update - Barak-8 MR-SAM program](#)
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  - [IAI Barak 8 Video](#)
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