

फरवरी

February  
2023

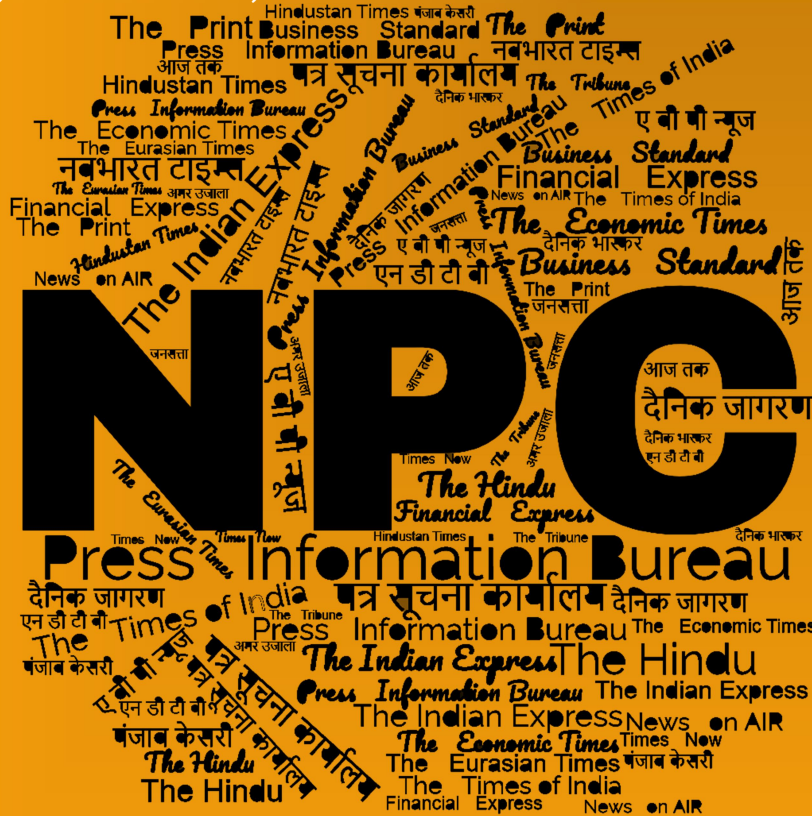
खंड/Vol. : 48 अंक/Issue : 40

25-27/02/2023

# समाचार पत्रों से चयित अंश Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology



रक्षा विज्ञान पुस्तकालय

Defence Science Library

रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र

Defence Scientific Information & Documentation Centre

मेटकॉफ हाउस, दिल्ली - 110 054

Metcalfe House, Delhi - 110 054

# CONTENTS

S. No.	TITLE		Page No.
	<b>DRDO News</b>		<b>1-2</b>
	<b>DRDO Technology News</b>		<b>1-2</b>
1.	India has become Self-sufficient, Self-reliant in Missile Technology: Scientific Advisor to Defence Minister	<i>ANI</i>	1
	<b>Defence News</b>		<b>2-22</b>
	<b>Defence Strategic: National/International</b>		<b>2-22</b>
2.	Annual Refit Conference 23 (ARC-23) and Annual Infrastructure & Indigenisation Conference 23 (AIIC-23)	<i>Press Information Bureau</i>	2
3.	Indian Air Force to Participate in Exercise Cobra Warrior at Waddington in UK	<i>Press Information Bureau</i>	3
4.	Indian Air Force to Participate in Exercise Desert Flag VIII: First International Exercise outside India for LCA Tejas	<i>Press Information Bureau</i>	4
5.	India's Indigenous LCA Tejas Lands in UAE to Take Part in its First-ever Foreign Air Exercise – Details	<i>Times Now</i>	4
6.	Amid Ukraine War, Panel Reviews India's Readiness	<i>The Tribune</i>	5
7.	LCA Tejas Mk2's Engine will be Made in India by GE Aviation	<i>Times Now</i>	5
8.	Indian Navy's Aircraft Carrier INS Vikramaditya to Carry out Sea Trials Post Major Refit	<i>RepublicWorld.com</i>	6
9.	India-Germany Submarine Deal under Discussion: Foreign Secretary	<i>Times Now</i>	7
10.	Modi, Scholz Discuss Defence Cooperation; Germany keen to Build Submarines for India	<i>Deccan Herald</i>	8
11.	Decoding the \$5 billion Defence Exports Target, which PM Modi Spoke of at Aero India 2023	<i>The Indian Express</i>	9
12.	नौसेना के पास पनडुब्बी की कमी, प्रोजेक्ट-75i भी पीछे	<i>नवभारत टाइम्स</i>	12
13.	Defence Budget & Trends in Security Environment	<i>The Times of India</i>	13
14.	4 Years since Balakot Strikes, Rafale Jets Boost IAF Capability, Ceasefire Holds	<i>The Tribune</i>	15
15.	India & Sri Lanka Review Defence & Security Cooperation at Annual Defence Dialogue	<i>The Economic Times</i>	16
16.	Looking Forward to Continue to Develop, Foster Relationship with Indian Military: Pentagon	<i>The Economic Times</i>	16
17.	How Air-To-Air Missiles have Completely Changed the Dynamics of Aerial Battles as Dogfighting Takes a Back Seat	<i>The EurAsian Times</i>	17
18.	Russia's Medvedev says Defence Factories Meeting Demand, Denies Missile Shortage	<i>The Times of India</i>	21
19.	Vladimir Putin: Wary of NATO's Nuclear Potential, Battling for Survival	<i>The Tribune</i>	22
	<b>Science &amp; Technology News</b>		<b>23-24</b>
20.	Russia Launches Rescue Ship to Space Station after Leaks	<i>The Hindu</i>	23

**DRDO News**

**DRDO Technology News**



*Mon, 27 Feb 2023*

## **India has become Self-sufficient, Self-reliant in Missile Technology: Scientific Advisor to Defence Minister**

Scientific Advisor to Defence Minister and former DRDO chief Dr G Satheesh Reddy said India has become self-sufficient in missile technology with wide range of missiles in its arsenal and that global restriction regimes "helped" it achieve this self-reliance.

Dr Reddy said that the country has today developed a range of missiles that any country would like to have.

In a podcast with ANI, the former DRDO chief said, "Indian missile programme has gone a long way and a number of missile systems have been developed. Varieties of missiles have been developed. Surface-to-surface missiles, surface-to-air missiles and air-to-air missiles, anti-tank missiles, and many other varieties of missiles which have been developed in the country. The country has gained a lot of knowledge and has become, I say that, self-sufficient and self-reliant in missile technology today by developing all these varieties of missiles. Range of missiles that any nation would like to have based on their necessities, the country has developed all these."

When asked about the hurdles faced by the R&D organisation after the restrictions were imposed on India in the 1980s to restrict India's missile programme, Dr Reddy detailed the manner in which the DRDO had countered the sanctions and said that it undertook as a mission, the development of components for missiles technologies.

"When the country started the missile programme, when we tested Prithvi, and Agni and conducted tests in Pokhran and other tests, there were restrictions put on this country. Various components and critical systems, sub-systems which we have been dependent on foreign nations, that had become very restricted. But I think that has helped the country. You had to develop yourself and so that was taken as a mission to develop all these critical systems and components that are required in these missile technologies. They all have been developed in a period of time indigenously," he said.

Expressing confidence in the indigenization of the country's missile programme, Dr Reddy said that India is not dependent for any critical components on any other country today.

"Today I can say that the indigenous content in our missile programme is very, very high. I can definitely say that we are not dependent for any critical sub-systems and things like that on anyone. All these things are developed in the country and the industry is able to produce them

and that's how the missiles are getting developed very fast, as you have the how and know why in the country," he said.

The former DRDO chief explained the kind of setbacks it received due to the restrictions, and said that they had begun the parallel development of the sub-systems for missiles in spite of facing troubles of not getting the required components.

"We were also in the phase of development of missiles, so you are not looking for a large number of sub-systems or components what you get from outside. The day we started the missile programmes, the leadership at that time definitely, thought that let us develop parallelly. Then parallel development work also started of sub-systems and critical technologies. When there were restrictions, that had definitely put us into some troubles that you are not able to get anything that you look for," he said.

"And some we already got, which was there in stock, you use it for immediate use. So the indigenous programme has been accelerated. Serious importance is given to that. Lots of teams have been put in, and industries have been brought in parallelly. There has been a serious thrust on that," Dr Reddy added.

Notably, India had conducted the first nuclear test on May 18, 1974, following which sanctions were imposed on the country.

<https://www.aninews.in/news/national/general-news/india-has-become-self-sufficient-self-reliant-in-missile-technology-scientific-advisor-to-defence-minister20230227114916/>

## Defence News

## Defence Strategic : National/International



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Sat, 25 Feb 2023*

### **Annual Refit Conference 23 (ARC-23) and Annual Infrastructure & Indigenisation Conference 23 (AIIC-23)**

Indian Navy's Annual Refit Conference 23 (ARC-23) and Annual Infrastructure & Indigenisation Conference 23 (AIIC-23) conducted on 23 and 24 Feb 23 at Headquarters, Eastern Naval Command, Visakhapatnam. The conference was held under the Chairmanship of VAdm Sandeep Naithani, Chief of Materiel (COM). Refit plans, operational availability of ships/ submarines of

the Indian Navy and the plans for augmentation of infrastructure to meet the growing requirements of the Indian Navy were discussed during the conference.

Chief of Materiel lauded the progress made on maintenance and sustenance aspects of Machinery, Hull, Weapons and Sensors of the Naval platforms. He urged the Technical fraternity to remain focused on challenges faced and use latest technologies like Artificial Intelligence, blockchain, quantum computation, 5G for IOT, robotics, etc, to ensure enhanced operational availability of ships and submarines through reduction in maintenance periods. He further highlighted the growing role of the Indian Navy and the extended deployment of ships away from the base port, which calls for greater reliance on repair authorities to deliver quality output.

During the AIIC meeting held on 24 Feb 23, progress of various Technical and Marine infrastructure projects was reviewed by the Chief of Materiel. The COM expressed satisfaction with the pace of the ongoing technical infrastructure projects aimed at the augmentation of repair and refitting facilities in the Indian Navy. Further, various Marine infrastructure projects including the creation of additional berthing space for future platforms planned to be inducted over the next 15 years were reviewed during the meeting.

An exclusive session on indigenisation was also conducted during the conference, in line with the Government of India's initiative of Aatmanirbhar Bharat. The conference was attended by delegates from the Naval Headquarters, the three Naval Commands, the Tri-Services Andaman and Nicobar Command, Director General Naval Projects, Naval Dockyards, Repair Yards and Material Organisations of the Indian Navy.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1902227>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Sun, 26 Feb 2023*

## **Indian Air Force to Participate in Exercise Cobra Warrior at Waddington in UK**

An Indian Air Force contingent comprising 145 Air Warriors departed Air Force Station Jamnagar today for participating in Exercise Cobra Warrior at the Waddington Air Force Base of the Royal Air Force in United Kingdom. The exercise is scheduled from 06 Mar 23 to 24 Mar 23. The Exercise Cobra Warrior is a multilateral Air exercise in which Air Forces from Finland, Sweden, South Africa, United States of America and Singapore would also be participating alongside Royal Air Force and IAF.

The IAF is participating in the exercise this year with five Mirage 2000 fighters, two C-17 Globemaster III and an IL-78 mid air refueller aircraft. The aim of the exercise is to participate in diverse fighter aircraft engagements and learn from the best practices of various Air Forces.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1902576>



**Press Information Bureau  
Government of India**

**Ministry of Defence**

*Sat, 25 Feb 2023*

## **Indian Air Force to Participate in Exercise Desert Flag VIII: First International Exercise outside India for LCA Tejas**

An Indian Air Force contingent comprising of 110 Air Warriors has arrived at Al Dhafra airbase of United Arab Emirates for participating in Exercise Desert Flag VIII. The IAF would be participating with five LCA Tejas and two C-17 Globemaster III aircraft. This is the first occasion when the LCA Tejas shall participate in an international flying exercise outside India.

Exercise Desert Flag is a multilateral air exercise in which Air Forces from UAE, France, Kuwait, Australia, UK, Bahrain, Morocco, Spain, Republic of Korea, and USA would also be participating. The exercise is scheduled from 27 Feb 23 to 17 Mar 23.

The aim of the exercise is to participate in diverse fighter engagements and learn from the best practices of various Air Forces.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=1902383>



*Sat, 25 Feb 2023*

## **India's Indigenous LCA Tejas Lands in UAE to Take Part in its First-ever Foreign Air Exercise – Details**

India's indigenous LCA Tejas fighter jets have landed in the United Arab Emirates (UAE) to take part in their first-ever air exercise outside India. An Indian Air Force (IAF) contingent comprising of 110 Air Warriors has arrived at Al Dahfra airbase of UAE for participating in 'Exercise Desert Flag VIII'.

India would be participating in the exercise with five LCA Tejas fighter jets along with two C-17 Globemaster III aircraft.

"This is the first time ever that the Indian Air Force has deployed the made-in-India LCA Tejas fighter aircraft for an exercise outside the country," said the IAF.

It should be noted that 'Exercise Desert Flag' is a multilateral air exercise in which Air Forces from UAE, France, Kuwait, Australia, the UK, Bahrain, Morocco, Spain, Korea, and the USA would also be participating.

The IAF confirmed that the exercise is scheduled to start from February 27, and conclude on March 17.

The aim of the exercise is to participate in diverse fighter engagements and learn from the best practices of various Air Forces, said the air force.

<https://www.timesnownews.com/india/indias-indigenous-lca-tejas-lands-in-uae-to-take-part-in-its-first-ever-foreign-air-exercise-details-article-98232078>

# The Tribune

*Sat, 25 Feb 2023*

## **Amid Ukraine War, Panel Reviews India's Readiness**

The parliamentary standing committee on defence met over three days to discuss and review India's defence preparedness in the wake of the ongoing Ukraine-Russia war, which entered the second year today, and India's hostile neighbourhood.

The committee met on February 20, 22 and today with the Chief of Defence Staff, Vice Chiefs of all three services and all secretaries in the Defence Ministry briefing members on critical aspects related to India's defence needs and preparedness.

The meeting, primarily held to assess the quantum of the defence budget in relation to national defence requirements, concluded today.

The panel met for more than 15 hours over three days. A source said that the meeting of the standing committee on defence was held on three days, including today, where "India's defence preparedness was reviewed and discussed in the light of the present global geo-political and security scenario vis-a-vis the ongoing Ukraine-Russia war, instability in neighbouring Pakistan, which is on the verge of a loan default, and tensions in the South China Sea, specially in relation to Taiwan and India's hostile borders".

The review, sources said, discussed every minute detail of the proposed defence budget allocations for 2023-23 along with budget heads.

Detailed discussions also took place on defence procurement, pensions, welfare of ex-servicemen and war widows, and health scheme for ex-servicemen.

<https://www.tribuneindia.com/news/nation/amid-ukraine-war-panel-reviews-indias-readiness-482851>



*Mon, 27 Feb 2023*

## **LCA Tejas Mk2's Engine will be Made in India by GE Aviation**

American aerospace company GE Aviation's Vice President, Youngje Kim has said that they will design, develop, and manufacture LCA Tejas Mk2's engine in India itself. "Going forward,

our plan is to support Make in India by forging meaningful partnerships. You must have seen the recent media coverage of how we submitted proposals to the U.S. government to support the LCA Mk 2. Though we are yet to procure the license for the global market, we plan to manufacture a very significant portion of that engine here in India. Moreover, maintenance, repair and overhaul will also be done in the country,” Kim was reported saying by Financial Express in an interview.

GE has more than a century of experience in the aircraft industry. It has been collaborating with Indian defence services for more than 30 to 40 years and manufactures some of its items in India already.

GE will be supplying F414 INS 6 engines for Tejas Mk2. As per reports, 99 engines were ordered by India in October 2010. In addition to having a Full Authority Digital Electronics Control (FADEC) system, it delivers more thrust than prior iterations.

As per GE, the development of these engines is complete and they intend to manufacture it in India itself. The engine can also equip the ambitious AMCA aircraft.

Kim was also reported saying by Financial Express that they were doing a lot of engineering work in India and have established an engineering centre in Bengaluru.

Earlier this month at the curtain raiser event of Aero India, Defence Minister Rajnath Singh said India was working on a made-in-India engine for LCA Tejas.

It is anticipated that it will power the Tejas Mark 2 jet, which the DRDO’s Aeronautical Development Agency (ADA) plans to introduce in the first half of 2024.

<https://www.timesnownews.com/india/lca-tejas-mk2s-engine-will-be-made-in-india-by-ge-aviation-article-98261918>



*Mon, 27 Feb 2023*

## **Indian Navy’s Aircraft Carrier INS Vikramaditya to Carry out Sea Trials Post Major Refit**

After 15 months, the Indian Navy’s aircraft carrier INS Vikramaditya will move out of Karwar naval base for sea trials on March 23. The 45,000-ton carrier will be handed over to the Indian Navy by March 31. The MiG-29K fighter jets will start operations in April 2023.

The aircraft carrier was sent for a major overhaul in Karwar in December 2021. The test for air operations will begin in April, and various checks of armaments and surface-to-air missile systems on board will commence in March. The warship will carry a maximum of 36 aircraft.

### **Aircraft on INS Vikramaditya**

The warship will carry a maximum of 36 aircraft including 26 MiG-29K fighters and 10 Kamov Ka-31 advance electronic warning and Ka-28 anti-submarine warfare helicopters. India will now



have two operational advanced aircraft carriers with INS Vikrant. It will be joining INS Vikramaditya after the completion of its sea trials on the western seaboard.

The new aircraft carrier will be based in Visakhapatnam on the eastern seaboard. It will keep a check on the increasing expansion of China's People's Liberation Army Navy. It is India's most powerful carrier and along with India's QUAD partners United States, Japan and Australia will challenge the Chinese Navy in the Indian Ocean and the Pacific region.

It is a matter of time before the Indian government decides which aircraft will be on board Vikrant with the final contenders being the F-A/18 Super Hornet of Boeing and Rafal Marine of the French Navy. The decision will be made based on the recommendation from the Indian Navy to purchase a total of 26 fighter aircraft. Joining them will also be the Twin Engine Deck Based Fighters developed by DRDO and HAL for the futuristic fighter programme of the Indian Navy.

This induction will strengthen the Indian Navy to challenge the Chinese PLA Navy in the South China sea and Indian ocean region along with its QUAD partners - the US, Australia and Japan. The two aircraft carriers will keep an eye on India's two notorious neighbours. Given the Chinese Navy's expanding footprint from MALLACA STRAITS to the south Indian Ocean, the Indian navy will be adding teeth to its maritime defence with a second nuclear submarine expected to be commissioned by 2024.

<https://www.republicworld.com/india-news/general-news/indian-navys-aircraft-carrier-ins-vikramaditya-to-carry-out-sea-trials-post-major-refit-articleshow.html>



*Sat, 25 Feb 2023*

## **India-Germany Submarine Deal under Discussion: Foreign Secretary**

Germany wants to partner India to design and develop submarines. After the meeting between German Chancellor Olaf Scholz and Prime Minister Narendra Modi, Foreign Secretary Vinay Kwatra said the issue "remains under discussion."

"The submarines remain under discussion. It is yet to be finally determined," Kwatra said, adding that any deal would involve co-design and co-development and possibly, manufacturing in India.

The Navy wants submarines and it will be under the P-75 scheme. It involves the building of six submarines in India, but with the tender process still to happen, the project still has some distance to go. South Korea and Spain are among the contenders. Earlier, the German Ambassador to New Delhi, Philip Ackermann had said the project was in the early stages but could come up for discussions when the Chancellor and the Prime Minister meet.

During the meeting, Prime Minister Modi said India was ready to help to end the war between Russia and the Ukraine and bring peace. Foreign Secretary Kwatra, speaking on the issue, mentioned that this was in context of the PM telling Russian President Vladimir Putin some months ago that the 21st century was not the time for war. The war has put considerable pressure

on Third World countries, particularly in terms of food and energy security. There are also shortages of fertilisers.

The Indo-Pacific, usually a euphemism for China, came up during the discussions. The foreign secretary said that both India and Germany have agreed to jointly face any challenges that come up in the area.

<https://www.timesnownews.com/india/india-germany-submarine-deal-under-discussion-foreign-secretary-article-98237529>



*Sun, 26 Feb 2023*

## **Modi, Scholz Discuss Defence Cooperation; Germany keen to Build Submarines for India**

With Germany keen to clinch a deal worth about \$5.2 billion (Rs 43,000 crore) to build six conventional submarines for India, Prime Minister Narendra Modi on Saturday agreed with the West European country's Chancellor Olaf Scholz that the two nations would henceforth focus more on security and defence cooperation.

As Modi played host to Scholz in New Delhi, the two sides continued discussion on the proposed deal for Germany to build jointly with India six conventional submarines for the Indian Navy. "Security and defence cooperation can become an important pillar of our strategic partnership. Together we will continue to make efforts to fully realize our untapped potential in this area," Modi told journalists after a meeting with Scholz at Hyderabad House in New Delhi.

Foreign Secretary Vinay Mohan Kwatra later told journalists that the discussion on Germany building six submarines in India under the Project 75I of the Indian Navy was under discussions between the two governments. "Naturally, when you talk of that project, which is, you know, yet to be finally decided upon in terms of direction it takes, co-design, co-development, manufacturing in India, transfer of technology – I'm sure would be important constituents of it as we go forward."

The ThyssenKrupp Marine Systems of Germany was among the contenders for the nearly Rs 43,000 crore contract for the Project 75I to build six diesel electric submarines for the Indian Navy jointly with Mazagon Dock Limited (MDL) of India. The TKMS had withdrawn a few months back, citing difficulty in meeting the technical and financial conditions being imposed by India. It, however, has apparently once again expressed interest in the project.

The Rubin Design Bureau of Russia and the Naval Group of France had also withdrawn from the race to win the contract as they had failed to meet the Indian Navy's requirement of fitting the submarines with sea-proven Air Independent Propulsion systems. The Daewoo Shipbuilding and Marine Engineering of South Korea is still in the race though. The Prime Minister and the German Chancellor on Saturday also discussed the scope of bilateral cooperation in the Indo-Pacific region, particularly to counter the belligerence and hegemonic aspirations of China.

Scholz arrived in New Delhi early on Saturday for his maiden visit to India after taking over as the Chancellor of Germany in December 2021.

The Modi-Scholz meeting resulted in two intergovernmental documents – India-Germany Vision to Enhance Cooperation in Innovation and Technology and a Letter of Intent between Department of Science and Technology of the Government of India and Fraunhofer Institute for Solar Energy Systems of Germany for Cooperation in Green Hydrogen and Clean Energy Technologies.

The German Chancellor will visit Bengaluru before concluding his visit to India on Sunday.

Modi and Scholz had “a multi-pronged, multi-layered discussion” on defence cooperation, focussing largely on transfer of technology, co-designing and co-development military hardware and what the industries and businesses of the two nations could do, the Foreign Secretary said.

<https://www.deccanherald.com/national/modi-scholz-discuss-defence-cooperation-germany-keen-to-build-submarines-for-india-1195144.html>



*Mon, 27 Feb 2023*

## **Decoding the \$5 billion Defence Exports Target, which PM Modi Spoke of at Aero India 2023**

*By Amrita Nayak Dutta*

The defence ministry’s target to raise India’s annual defence exports to \$5 billion by 2024-25, from the \$1.5 billion currently, was reiterated by Prime Minister Narendra Modi at the recently concluded Aero India 2023 in Bengaluru earlier this month.

In the past few years, there has been a strong government push towards achieving self-reliance in defence, which is subsequently expected to increase India’s defence exports as well.

Towards this, the defence ministry has brought in several new policies, such as earmarking 75 per cent of its defence capital budget for 2023-24 towards procurements from domestic sources and three positive indigenisation lists of 3,738 items, for which there would an embargo on import beyond timelines specified against them. Also, two defence industrial corridors are being set up in Uttar Pradesh and Tamil Nadu, and there is an ongoing simplification of processes for ease of doing business aimed at boosting defence exports.

India is in talks with several countries to export several of its indigenous big-ticket platforms, such as the Light Combat Aircraft Tejas and the BrahMos supersonic cruise missile made by BrahMos Aerospace Pvt Ltd, a joint venture between India and Russia.

Multiple officials that The Indian Express spoke to said the key to reaching the \$5 billion defence export goal lies in expanding indigenous offerings, ramping up production for faster and timely deliveries, particularly for PSUs, and developing niche and critical technologies for export for fighting modern warfare but also to eliminate competition.

“Steps to encourage defence research are also being undertaken, such as earmarking 25 per cent of the defence research budget for the private sector in 2022-23, for newer innovation and developing niche technology,” an official said.

### **Current export figures**

As per government data, India’s defence export value till December 2022 had reached Rs 6,058 crore.

India’s defence exports have grown by 334 per cent in the past five years. They touched nearly Rs 13,000 crore in 2021-22.

This includes munition list items under category 6 of Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET), for which the Department of Defence Production (DDP) under the Ministry of Defence issues an authorisation.

### **Which defence equipment does India export?**

The major defence items being exported are Personal Protective items, Offshore Patrol Vessels, ALH Helicopter, SU Avionics, Bharati Radio, Coastal Surveillance Systems, Kavach MoD II Launcher and FCS, Spares for Radar, Electronic System and Light Engineering Mechanical Parts, among others.

In December last year, the government told Parliament that major items exported by India in the last three years include lightweight torpedoes, weapon locating radar, fast patrol vessels, 120 mm mortar armoured protection vehicle, 0.338 Lapua magnum sniper rifle, and simulators.

### **What are the major defence platforms India is looking to export?**

India is in talks with Argentina and Egypt, among other countries, to export its indigenous LCA Tejas. The aircraft had in the past few years participated in several air shows, including at Singapore last year, as well as in Malaysia, Bahrain and Dubai, so it could be showcased to other countries.

India was hopeful of selling the platform to Malaysia, but the country signed a deal with Korean Aerospace Industries for the supply of 18 FA-50 light combat aircraft.

LCA Mk2 Project Director at Aeronautical Development Agency (ADA) Dr V Madhusudana Rao recently told The Indian Express that the LCA Mk 2 has seen interest from nearly 16 countries and efforts are on to identify private production agencies to ramp up manufacturing of the jet.

India is looking to export the indigenous Advanced Light Helicopter to several countries—and has signed a contract with Mauritius for the export of one Advanced Light Helicopter (ALH Mk III) for Mauritius Police Force. The country already operates the ALH and Do-228 aircraft, which is a multi-purpose light transport aircraft.

India is in talks with Guyana to export the Dornier 228 and fast patrol vessels and will aim at exporting the latest HTT-40, Light Utility Helicopters (LUH) and Light Combat Helicopter (LCH).

Last year, India signed a \$375 million contract with the Philippines to export the BrahMos supersonic cruise missile. Defence officials had recently told The Indian Express that India is

looking to export the weapon system and its lighter next generation version (BrahMos NG) to over 10 countries, including South Africa, Egypt, UAE, and Saudi Arabia.

Last year, it was showcased at the Africa Aerospace and the Defence Expo in Cape Town.

Last year, Armenia inked a government-to-government deal to buy the DRDO-developed Pinaka multi-barrel rocket launchers, rockets and ammunition. In 2020, the country is also learnt to have bought Swathi weapon locating radars from India.

Private defence manufacturer Kalyani Strategic Systems last year bagged an export order worth \$155 million from an unspecified country for artillery guns.

### **Africa, Myanmar among major export destinations**

India's private companies and Defence PSUs currently export defence equipment to over 75 countries.

As per the DDP, Italy, Maldives, Sri Lanka, Russia, France, Nepal, Mauritius, Sri Lanka, Israel, Egypt, UAE, Bhutan, Ethiopia, Saudi Arabia, Philippines, Poland, Spain and Chile have been some of the major export destinations for defence equipment and platforms.

Last year, a report released by India Exim Bank stated that Mauritius, Mozambique, and Seychelles have been among the top customers for India's defence exports between 2017 and 2021, of which Mauritius was at 6.6 per cent, Mozambique at five per cent and Seychelles 2.3 per cent.

According to a Stockholm International Peace Research Institute (SIPRI) report released last year, India is among the top 25 exporters of major arms. Myanmar has been the biggest importer of Indian arms at 50 per cent during the 2017-2021 period, followed by Sri Lanka at 25 per cent and Armenia at 11 per cent.

<https://indianexpress.com/article/explained/decoding-the-5-billion-defence-exports-target-8466734/>

## नौसेना के पास पनडुब्बी की कमी, प्रोजेक्ट-75i भी पीछे

Poonam.Pandey@timesgroup.com

■ नई दिल्ली: भारतीय नौसेना के पास इस वक्त 16 परंपरागत सबमरीन (पनडुब्बी) ही सेवा में हैं। इनमें भी 11 तो ऐसी हैं, जो दो दशक से भी ज्यादा पुरानी हैं। नौसेना को नई सबमरीन की जरूरत है, लेकिन नई छह सबमरीन के लिए इंडिया-75i प्रोजेक्ट में भी देरी हो रही है।

नौसेना के पास इस समय जो सबमरीन हैं, उनमें 7 रूस की किलो-क्लास सबमरीन हैं। वहीं, 4 जर्मनी की HDW सबमरीन हैं और 5 फ्रांस की स्कॉर्पीन क्लास सबमरीन हैं। इनमें जो किलो क्लास और HDW सबमरीन हैं, वह पुरानी हो गई हैं। उनकी लाइफ बढ़ाने के लिए मीडियम रीफिट-लाइफ सर्टिफिकेशन (MRLC) प्रोग्राम चल रहा है। इसमें सबमरीन को अपग्रेड किया जाता है और इससे उसकी लाइफ 10-15 साल बढ़ जाती है।

रूस से भारत ने किलो क्लास की 10 सबमरीन ली थीं। इनमें सिंधुरक्षक हादसे में नष्ट हो गईं। सिंधुवीर को म्यांमार को दे दिया गया। सिंधुध्वज

35 साल की सर्विस के बाद जुलाई 2020 में नौसेना से रिटायर हो गई। किलो क्लास की एक सबमरीन INS सिंधुकीर्ति को नॉर्मल रीफिट के लिए भेजा गया है। विशाखापट्टनम में हिंदुस्तान शिपयार्ड लिमिटेड में रूस की इस किलो क्लास सबमरीन को पहले 2015 में मिड लाइफ अपग्रेड किया गया था और अब यह नॉर्मल रीफिट के लिए आई है। इसमें 22 महीने का वक्त लगेगा। किलो क्लास की INS सिंधुरत्ना का MRLC रूस में पूरा हो गया है यानी यह अपग्रेड हो गई है। लेकिन यह अभी रूस से भारत आ नहीं पा रही है। रूस-यूक्रेन जंग की वजह से इसे लाने के लिए ट्रांसपोर्ट उपलब्ध नहीं हो पा रहा। नौसेना ने कोशिश की है कि इसे पहले नॉर्वे तक लाया जाए और फिर वहां से मुंबई, लेकिन यह भी हो नहीं पाया।

■ नौसेना के पास सेवा में इस समय 16 परंपरागत सबमरीन हैं।

■ इनमें 7 रूस से किलो क्लास, 4 जर्मन HDW और 5 फ्रांस की स्कॉर्पीन क्लास सबमरीन हैं।

■ 11 सबमरीन दो दशक से भी ज्यादा पुरानी हो चुकी हैं। इनमें किलो क्लास और HDW हैं।

### छह पनडुब्बी बनाई जानी हैं प्रोजेक्ट-75i के तहत

नेवी के पास जो 5 स्कॉर्पीन सबमरीन हैं, उनमें से पांचवीं सबमरीन दो महीने पहले नेवी में शामिल हुई है। इसका नाम INS वागीर है। इस क्लास की छठी और आखिरी सबमरीन भारत में ही बन रही है और यह नेवी को अगले साल के आखिर तक मिलेगी। छह स्कॉर्पीन सबमरीन को भारत में ही प्रोजेक्ट-75 के तहत बनाना था। फ्रांस से टेक्नॉलजी ट्रांसफर की डील अक्टूबर 2005 में साइन हुई थी। यह प्रोजेक्ट अपने तय शेड्यूल से करीब चार साल पीछे चल रहा है।

पहली सबमरीन INS कलवरी दिसंबर 2017 में, दूसरी सबमरीन INS खंडेरी सितंबर 2019 में, तीसरी INS करंज मार्च 2021 में और चौथी सबमरीन INS वेला नवंबर 2021 में नेवी में कमिशन हुई थी। नेवी के लिए 6 और अडवांस कंवेनशनल सबमरीन बनाने के लिए प्रोजेक्ट-75i शुरू किया गया। इसके तहत रिक्वेस्ट फॉर प्रोजेक्ट (आरएफपी) जारी किए गए हैं। इसमें भी देरी हो रही है। सवाल है कि यह कब शुरू होगा और कब नेवी को नई सबमरीन मिलेगी।

# THE TIMES OF INDIA

Sun, 26 Feb 2023

## Defence Budget & Trends in Security Environment

*By Lt General KJ Singh*

We are approaching another summer but neither its early onset nor global warming should worry security analysts. It is the opening of mountain passes, and unresolved stand-off on our northern borders, which should engage their attention.

The defence budget was presented, but there was no meaningful debate or analysis. To be better prepared to cope with the situation, it would be appropriate to analyse the defence budget along with inferences from emerging trends, likely to impact our operational environment.

### **Ukrainian imbroglio**

Putin's special operation has entered its second year. The focus from why Putin launched this misguided foray has shifted to what is likely to unfold in future? Weapons like tanks, whose death knell was sounded by experts, are likely to be back in action in campaigning season. Western nations are preparing to field refurbished Abrams, Leopards, Challengers and Leclercs. It will be relevant to critically assess their performance against the Russian anti-tank arsenal, especially drones, for designing our future platforms.

Our adversaries have similar Russian-derived equipment; hence, their relevance is likely to remain. We need to retrofit our protection suite to ward off top attack threats. The endeavour to field light tanks has hit an apparent roadblock due to the disruption of the power plants supply chain with Ukraine being the potential source. An alternative has to be worked out expeditiously. The analysis of an ongoing conflict has its own pitfalls, like pre-mature scripting of obituaries of weapon systems, yet we have to sift critical trends. The first and foremost is laying down a template for desired end-state and conflict termination.

This would entail interim objectives, and the possibility of conflict festering and acquiring the shape of an unresolved status quo. With China having a force asymmetry advantage, it will be appropriate to focus on quid-pro-quo options like the pre-emptive occupation of the Kailash range.

Calibrated hybrid war is another possibility, where we can leverage our demographic affinity in Tibet. It implies that instead of a short and swift war, we build up logistics for a prolonged one.

Unresolved stand-offs would suit China with its seamless civil-military fusion. The challenge for us is to build surge and dual-use capabilities in a shared militarycivil industrial ecosystem. The redeeming lesson of this conflict is that David can stand up to Goliath with resolve and resilience. Our forces have demonstrated both 'josh' and 'jugaad' in ample measure, even when matching Pattons and Sabres with Centurions and Gnats. However, the current state of obsolescence in equipment dictates modernisation.

### **Socio-economic chaos in Pak**

The economic meltdown and riot-like situation in nuclear-armed Pakistan, coupled with the resurgence of TTP, needs careful monitoring for spillover effects. It may be tempting to draw

comfort from their self-triggered implosion, yet it will be in our interest that Pakistan is put on the leash of an internationally monitored recovery path. The reluctance of the Ummah (Islamic brotherhood) to bail out the ‘awaam’ (populace) of Pakistan should be a reality check for those peddling the myths of Khorasan and the Caliphate. Notwithstanding the chaotic distress, the deep state will always remain invested in creating problems for us.

Ajnala fracas is an obvious pointer in this direction. We are witnessing the classic ‘Noora Kushti’ (shadow boxing) combined with an avoidable blame game. It is high time that embers of chaos in Punjab, being stoked in the garb of autonomy and panth, are squashed by a multiagency action plan, executed sincerely by both the Centre and state government.

Dealing with Pakistani terror bases requires enhanced surgical capabilities. It is recommended that scout forces like Rann, Thar and Seraiki Scouts should be raised, to boost our options.

### **Budget**

There were great expectations this year from the defence budget, but it has proved to be another damp squib. The budget can be analysed on five criteria — optics, statistical, economic, operational and performance-based evaluation. The government has claimed that there has been a significant increase in capital and revenue (non-salary) for war wastage, munitions and maintenance.

To boost optics, increased outlay for Border Roads, DRDO, IDEX (innovation) and simulators is promised. However, statistical analysis reveals that the increase in capital is only 6.7%, just enough to cater for inflation, exchange fluctuations and committed liabilities.

An increase of 9% in DRDO funding again is meagre. IDEX funding remains an exercise in optics, as offtake was minimal, last year. The only significant increase is Rs 1,500 crore for Border Roads. Economically, both in the percentage of GDP and total allocation of expenditure, the declining trend continues. In GDP terms, it is down from 2.07% in FY 2022-23 to 1.97%, and in government expenditure from 13.31% to 13.18%.

The government remains agile and committed to modernisation and capability building.

Unfortunately, we have no parameters to assess the operational efficacy of the budget. The 13th plan was junked in May 2016. Its replacement, 10-year Integrated Capability Development Plan (ICDP), is yet to be formulated. The relevant question is: Are we procuring without planning?

If we look at performance-based parameters, most procurement is through strategic government routes like Rafale or by invoking emergency powers. The latter is an avoidable mechanism to be used for crisis management. The obvious inference is that the process and ecosystem for structured procurement remain sub-optimal.

### **Way forward**

China has a great affliction for calendar milestones: 2021 was the CCP centenary and the next one is the PLA centenary in 2027. Integration of outlying territories like Tibet and Taiwan would be high on their agenda. Unrelenting forays — Doklam 2017, Ladakh 2020 and Yangtze 2022 — have to be seen as part of the ChineseGo matrix. It is imperative that we ramp up our preparations to ward off Chinese designs.

<https://timesofindia.indiatimes.com/blogs/generals-jottings/defence-budget-trends-in-security-environment/>



# The Tribune

Sat, 25 Feb 2023

## 4 Years since Balakot Strikes, Rafale Jets Boost IAF Capability, Ceasefire Holds

*By Ajay Banerjee*

On February 25, 2019, the Indian Air Force (IAF) base at Gwalior was abuzz with activity. There were discussions on the operational readiness of the security forces after the February 14 terror attack on a convoy that killed 40 CRPF personnel in Pulwama, Jammu and Kashmir.

Around 4 pm on February 25, things became clear when Mirage 2000 fighter jets were fitted with Israeli-made Spice 2000 bombs and "fed in" with geo-coordinates of the Jaish-e-Mohammad terror camp at Balakote, Pakistan, which was hit by pilots some 12 hours later at 3.30 am on February 26.

This was the first penetration into Pakistan since the 1971 Indo-Pak War.

How geopolitics has changed since then is a turnaround. The Balakote airstrikes and what followed on February 27 and 28 - the air battle in which IAF and Pakistan lost a plane each - showed there was a possibility of a clash outside the nuclear threat.

Director General of Centre for Air Power Studies Air Marshal Anil Chopra (retd) says, "Balakote was the first time ever in peacetime that the IAF struck targets deep inside Pakistan. It has now set a new normal."

"It shall be repeated again in case of another terrorist incident," he said.

The IAF's strike capability has since been enhanced and Rafale jets have joined the fleet. "Rafale is a game changer. It has much more capable and longer-range stand-off weapons than other jets with the IAF," says Air Marshal Chopra. "

Rafale jets carry missiles that can travel a longer distance than the ones fired on the morning of February 26. They also have better air-to-air missiles.

Also, in August 2019, Parliament amended Article 370 of the Constitution by scrapping the special status to Jammu and Kashmir and bifurcating it into two separate union territories - J&K and Ladakh.

The two countries agreed to uphold the ceasefire along the Line of Control (LoC) in February 2021, which is still holding strong.

However, this does not mean that terror camps like those hit at Balakote four years ago don't exist anymore. Indian Security agencies estimate that four JeM terror camps exist across the 198-km International Border in J&K and another 18-20 camps across the LoC.

<https://www.tribuneindia.com/news/nation/4-years-since-balakot-strikes-rafale-jets-boost-iaf-capability-ceasefire-holds-482836>

## **India & Sri Lanka Review Defence & Security Cooperation at Annual Defence Dialogue**

Top defence officials of India and Sri Lanka have held the seventh edition of their annual dialogue during which the two sides reviewed the bilateral defence and security cooperation and identified new avenues for engagement. The two-day meeting of the 7th edition of the Annual Defence Dialogue (ADD) between India and Sri Lanka, which began in New Delhi on Thursday was chaired by Defence Secretary Giridhar Armane and his Sri Lankan counterpart General Kamal Gunaratne.

During the meeting which ended on Saturday, the two sides reviewed the defence and security cooperation, the Indian High Commission said here.

Various ongoing defence cooperation initiatives were jointly reviewed and new avenues for engagement were identified during the ADD, it said.

Sri Lanka's delegation included Air Marshal SK Pathirana, Commander of Sri Lanka Air Force along with senior officers from the Sri Lanka Army and the Navy.

The Indian delegation included officials from the Ministry of Defence, Headquarters Integrated Defence Staff, Service Headquarters and Ministry of External Affairs. Sri Lanka and India agreed to increase the intensity of bilateral military exercises and vowed to avail maximum benefits from each other's experience and capacities, a move that came amid China's attempts to expand its influence in the Indian Ocean region.

ADD is an annual apex-level defence engagement between the two countries to discuss regional security situations, common security challenges and avenues for closer defence cooperation towards ensuring 'Security and Growth for All in the Region' (SAGAR).

<https://economictimes.indiatimes.com/news/defence/india-sri-lanka-review-defence-security-cooperation-at-annual-defence-dialogue/articleshow/98238037.cms>

## **Looking Forward to Continue to Develop, Foster Relationship with Indian Military: Pentagon**

The United States is looking forward to continue to develop and foster its relationship with the Indian military, the Pentagon has said. "The US and India enjoy a good partnership. We look forward to continuing to develop and foster our relationship with the Indian military," Pentagon Press Secretary Air Force Brig Gen Pat Ryder told reporters at a news conference here on Friday.

In 1997, defence trade between India and the US was almost negligible, today it stands above USD 20 billion.

Last month during a press conference, Ryder said that India is a "great example" of countries who are choosing security assistance from the US, underlining that it was ready for any response to wean them away from Russia.

India has faced flak from US lawmakers, both Republicans and Democrats, for choosing to abstain from a UN vote to rebuke Russia's invasion of Ukraine.

US officials have expressed concern over India's purchase of the S-400 missile systems by Russia.

In October 2018, India signed a USD 5 billion deal with Russia to buy five units of the S-400 Triumf air defence missile systems to ramp up its air defence, despite a warning from the then-Trump administration that going ahead with the contract may invite US sanctions.

<https://economictimes.indiatimes.com/news/defence/looking-forward-to-continue-to-develop-foster-relationship-with-indian-military-pentagon/articleshow/98222107.cms>



*Sun, 26 Feb 2023*

## **How Air-To-Air Missiles have Completely Changed the Dynamics of Aerial Battles as Dogfighting Takes a Back Seat**

*By Air Marshal Anil Chopra (retd)*

The latest use of an Air-to-Air missile (AAM) was by the US Northern Command F-22 Raptor fighter jet launching an AIM-9X Sidewinder missile to take down a car-sized object flying above Alaska on February 10.

The same combination of jet and missile destroyed the Chinese balloon on February 4. While there have been a few air combat engagements in the initial days of the war in Ukraine, missile usage is not clear.

AAM began its operational journey in Vietnam War. They also saw significant use in the Arab-Israeli wars and the Iran-Iraq war. Pakistan Air Force's Atlantique was shot down by an IAF MiG-21 in 1999 and, more recently, during air combat in response to the Balakot strike.

### **Air-to-Air Missile Dynamics**

AAMs are typically powered by rocket motors, usually using solid fuel. Ramjet engines, as in Meteor missiles, are now becoming popular, as they allow for maintaining higher average speed across their engagement envelope.

The close-combat missiles (CCM) "dog-fight" within visual range weapons have shorter ranges of below 16 kilometers and are designed for agility rather than range. Most use infrared guidance.

More modern infrared-guided missiles can detect the heat of an aircraft's skin, warmed by airflow friction, in addition to the fainter heat signature of the engine when the aircraft is seen from the side or head-on. This, combined with more excellent maneuverability, gives them an all-aspect capability.

The pilot can also use a helmet-mounted sight (HMS) to slew the missile seeker's head towards the target for an off-boresight launch. The medium and long-range missiles are beyond visual range (BVR) AAMs. These use active or semi-active radar guidance, sometimes combined with inertial guidance.

Passive anti-radiation homing missiles could be used against AEW&C aircraft. Most missiles have a conventional explosive blast, fragmentation, or continuous rod warheads that detonate on impact or through a proximity fuse.

IR flares may deceive the infrared missiles and chaff and electronic countermeasures a radar-guided missile.

The initial AAMs came around 1956 when US aircraft began equipping with AIM-4 Falcon, AIM-7 Sparrow, and AIM-9 Sidewinder. The Soviets introduced the K-5 missile in 1957. Ever since AAMs have improved in both agility and range.

### **AAM Combat Engagement Statistics**

On June 17, 1965, two US Navy F-4 Phantom aircrew recorded the first confirmed US air-to-air kills of the Vietnam War, shooting down two North Vietnamese MiG-17s using AAMs.

F-4 Phantom is reported to have had the highest aerial missile kills at 306, which included 151 in Vietnam, 86 in Arab-Israeli wars, and 68 in the Iran-Iraq war (1980-88).

MiG-21s shot 240 aircraft with AAMs, including 85 in Vietnam, 82 in the Arab-Israel wars, 32 in Iran-Iraq War, and six in the 1971 Indo-Pak War. Among the others, the F-14 Tomcat has had 135 AAM kills (130 in the Iraq-Iran war); F-15 had 102, and the F-16s had 76.

In January 1981, an Iranian F-14 flown by Asadullah Adeli shot a Phoenix missile at a formation of three MiG-23s targeting the middle aircraft in close formation, destroying all three with a single missile, a record.

The AIM-9 is one of the oldest, lowest cost, and most successful AAMs, with an estimated 270 aircraft kills in its history. The modern fighters that have yet to have AAM combat kills are F-22 Raptor, Rafale, Tornado ADV, Saab Gripen, Eurofighter Typhoon, J-10, MiG-31, Su-30, Su-33, Su-35, JF-17, LCA, among others.

In April 2021, a US Air Force F-15C Eagle fighter claimed to have fired the longest known air-to-air "kill" shot in an air test. The fighter fired an AIM-120D Advanced Medium-Range Air-to-Air Missile (AMRAAM) at a BQ-167 target drone.

The exact range was not revealed due to operational secrecy. The base AIM-120 version first entered service in the early 1990s.

### **AIM-9 Sidewinder**

AIM-9 Sidewinder (Air Intercept Missile) short-range AAM entered service with the US Navy in 1956 and later the US Air Force in 1964. Since then, it has been significantly upgraded, and its latest variants remain standard equipment in most Western-aligned air forces.

Americans claim that the Soviet K-13 was a reverse-engineered copy of the AIM-9B and was widely adopted by several nations. Originally it had an infrared seeker head and was used in tail-chase mode.

The initial success rate in the Vietnam War was low. AIM-9L all-aspect variant proved much more effective in the Falklands War and the Bekaa Valley in Lebanon.

The newer variants include the AIM-95 Agile and SRAAM. The Sidewinder is the most widely used air-to-air missile in the West, with more than 110,000 missiles produced for the US and 27 other nations, of which perhaps one percent have been used in combat.

Boeing won a contract in March 2010 to support Sidewinder operations through to 2055, guaranteeing that the weapons system will remain in operation until at least that date. The Russian equivalents, K-13, R-60, and R-73, also have an excellent track record.

### **Modern AAM Statistics**

The Russian Vypel R-37 is a hypersonic air-to-air missile with a very long range. It is designed to shoot down tankers, AWACS, and other C4ISTAR aircraft while keeping the launch platform out of the range of any fighters that might be protecting the target.

According to Janes, there could be two variants, the R-37, and the R-37M; the latter is conceived as having a jettisonable rocket booster that increases the range to “300–400 km”. It is also considered the fastest at over Mach 5 speed.

AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) is an American beyond-visual-range AAM that employs active transmit-receive radar guidance instead of semi-active receive-only radar guidance.

It is a fire-and-forget weapon. Manufactured by Raytheon, its latest variant, AIM-120D, with speeds up to Mach 4, costs over a million dollars. Over 14,000 missiles have been produced. The Norwegian Advanced Surface-to-Air Missile System (NASAMS) is a ground-based air-defense system using six AMRAAMs launching from canisters. AMRAAM-ER is the extended-range variant of the same. Raytheon has proposed an air-launched adaptation of the missile called AMRAAM-AXE, or Air-launched Extended Envelope.

The US Air Force plans to eventually replace the AMRAAM with the Lockheed Martin AIM-260 Joint Advanced Tactical Missile (JATM), a longer-range air-to-air missile expected to better compete with China’s PL-15 missile. This program differs from the AMRAAM-AXE. The AIM-260 program began in 2017. Around 30 Full-Scale Aerial Target drone tests had already been conducted.

The initial operational capability (IOC) is expected in 2023. The AIM-260 production is expected to overtake AIM-120 output by 2026. The missile is similar in dimensions to the AIM-120. Triple Target Terminator (T3) is DARPA’s advanced weapons initiative awarded to Boeing and Raytheon. The long-range missile can engage enemy aircraft, cruise missiles, and air defense targets. T3 will be designed for internal carriage on stealth aircraft like the F-35, F-22, and F-15SE or externally on fighters, bombers, and UAVs.

The missile will likely be equipped with multi-mode seeker and network-centric data links, providing high target discrimination, kinetic network-centric applications, and human-in-the-loop control employment. An advanced multi-purpose warhead will be required to engage a wide

range of targets with maximum lethality. In parallel, the US Air Force Research Laboratory (AFRL) is also examining new technologies for a future air/air weapon known as 'DRADM.'

The Meteor is a European active radar-guided BVR AAM developed and manufactured by MBDA. It can also engage small targets such as UAVs and cruise missiles in a heavy electronic countermeasures (ECM) environment with a maximum range of around 180 km.

It flies at Mach 4, and the solid-fueled ramjet motor provides the missile with thrust and mid-course acceleration to target intercept. A two-way data link enables the launch aircraft to provide mid-course target updates or retargeting, including data from off-board third parties.

According to MBDA, Meteor has three to six times the kinetic performance of current AAMs. This nearly 2 million dollars missile has the highest no-escape distance of 60 km.

Chinese PL-15 is an active radar-guided long-range AAM first test fired in 2011. It entered PLAAF service around 2017 and currently arms the Chengdu J-10C, the Shenyang J-16, and the Shenyang J-11B, and the Chengdu J-20, JF-17 Block III, replacing the earlier PL-12. The Mach 4+ missile reportedly has a range between 200 and 300 km.

The PL-21 is an active radar-guided long-range AAM reportedly comparable to the American AIM-260 JATM and the Russian R-37. Powered by a ramjet, it has an estimated range of over 300 km.

Astra is an Indian BVR AAM developed by the DRDO which can engage targets up to 110 km range. Astra Mk-1 has already been integrated on IAF's Su-30MKI and will be integrated on Mirage 2000, LCA Tejas, and MiG-29. Bharat Dynamics Limited (BDL) is a production agency. Each missile will cost around Rs 7-8 crore.

The IAF and Indian Navy have placed significant orders. The Astra Mk 2 was launched from Su-30MKI in late 2022. Progressively these variants will replace all Russian-origin long-range air-to-air missiles. Astra Mk-3 is based on Solid Fuel Ducted Ramjet (SFDR) engine being jointly developed by India and Russia.

The missile has been under testing and has completed separation trails in flight. The program aims to develop an indigenous missile rivaling AIM-260 JATM and MBDA Meteor.

The Novator KS-172 was a Russian air-to-air missile project designed as an "AWACS killer" with up to 400 km ranges. At one stage, India was to become part of this project.

### **Combat Implications And Way Ahead**

A USAF study that analyzed over 1,450 air-to-air engagements since 1965 found that long-range weapons and sensors have dramatically decreased instances of dog-fighting.

More missiles will have ramjet engines. Propulsion will be made more efficient. Thrust vectoring would give high off-bore-sight capability, including taking on rear-hemisphere targets. The missile accuracies are increasing, but they are becoming costly. Counters to the missiles will keep evolving. The adversary missile envelope can be shrunk through maneuvers or by using other countermeasures.

Electronic warfare and directed energy would also act as counters to the missiles. The AEW&C and FRA will be pushed further away from the tactical area to keep safe. This would have operational implications. Meanwhile, large platform stealth is evolving. Both Russia and China

are developing low-frequency radars to allow stealth platform detection. Stealth itself is expensive to design and maintain.

The introduction of stealth-designed, sensor-fused aircraft with new secure communication systems with multi-domain combat assets would be the foundation for what comes next.

AAMs will remain one of the most critical components of all combat platforms. India has a well-conceived AAM design and development program. The same needs to be hastened to stay with and later ahead of the competition.

<https://eurasianimes.com/how-air-to-air-missiles-have-completely-changed-the-dynamics/>

## THE TIMES OF INDIA

*Sat, 25 Feb 2023*

### **Russia's Medvedev says Defence Factories Meeting Demand, Denies Missile Shortage**

Former Russian president Dmitry Medvedev said the country's factories are working round the clock to meet an exponential increase in defence orders, mocking the idea that Moscow's forces in Ukraine were running out of missiles.

Medvedev said Moscow had increased military production "by tens of times" at some factories and was closely studying weapons fired into Russian-held areas from the Ukrainian side in an effort to gain an advantage.

Russia moved defence production into overdrive last year as its forces burned through huge quantities of ammunition in Ukraine and had thousands of armoured vehicles destroyed or captured. A leading Western think-tank said last week that Russia had lost around half of its most modern tanks and was struggling to replace them. Ukrainian and Western officials have said that Moscow is running low on some types of missiles, and that Western sanctions are hampering its ability to replenish its stocks of guided weapons that rely on imported microchips.

"It was funny to hear the Kyiv fantasists reasoning that 'missiles ran out' in Russia or 'production stopped'. The reality convinced them of the opposite - they still cannot get over the shock," Medvedev said in an article published on Saturday in monthly magazine National Defence.

"We are not just expanding production, but also introducing the latest technologies, perfecting them literally 'on the march'."

Medvedev is deputy chairman of Russia's Security Council and was appointed in December to be President Vladimir Putin's deputy on the Military-Industrial Commission that oversees the defence industry.

Defence factories were "fully coping" with the increased demand from the state, he said.

"Incidentally, we have also studied enemy weapons quite well, which were taken as trophies and dismantled to the last screw at our military construction bureaux," Medvedev added.

"We extracted a lot of useful things for ourselves - we turned the enemy's experience to our own advantage." Medvedev, 57, has adopted an increasingly hawkish tone and made a series of outspoken interventions since the war began with some political analysts suggesting he is one of the people that Putin might one day consider as a successor. On Friday, he said the only way for Moscow to ensure a lasting peace with Ukraine was to push back the borders of hostile states as far as possible, even if that meant the frontiers of NATO member Poland.

<https://timesofindia.indiatimes.com/world/europe/russias-medvedev-says-defence-factories-meeting-demand-denies-missile-shortage/articleshow/98231654.cms?from=mdr>

# The Tribune

*Mon, 27 Feb 2023*

## **Vladimir Putin: Wary of NATO's Nuclear Potential, Battling for Survival**

President Vladimir Putin cast the confrontation with the West over the Ukraine war as an existential battle for the survival of Russia and the Russian people — and said he was forced to take into account NATO's nuclear capabilities.

"They have one goal: to disband the former Soviet Union and its fundamental part — the Russian Federation," Putin told Rossiya 1 state television in an interview recorded on Wednesday but released on Sunday. Putin said Russia would only resume discussion once French and British nuclear weapons were also taken into account. "In today's conditions, when all the leading NATO countries have declared their main goal as inflicting a strategic defeat on us, so that our people suffer as they say, how can we ignore their nuclear capabilities in these conditions," Putin said.

The NATO and the West dismiss such narrative, saying their objective is to help Ukraine defend itself against an unprovoked attack.

Putin said the West wanted to divide up Russia and then control the world's biggest producer of raw materials, a step, he said, that could well lead to the destruction of many of the peoples of Russia including the ethnic Russian majority.

"I do not even know if such an ethnic group as the Russian people will be able to survive in the form in which it exists today," Putin said. He said the West's plans had been put to paper, though did not specify where. The United States has denied that it wants to destroy Russia, while President Joe Biden has warned that a conflict between Russia and NATO could trigger World War Three, though he has also said Putin should not remain in power.

Putin said the tens of billions of dollars' worth of US and European military assistance to Ukraine showed that Russia was now facing off NATO itself - the Cold War nightmare of both Soviet and Western leaders.

<https://www.tribuneindia.com/news/world/vladimir-putin-wary-of-natos-nuclear-potential-battling-for-survival-483395>



### **Russia Launches Rescue Ship to Space Station after Leaks**

Russia launched a rescue ship on February 24 for two cosmonauts and a NASA astronaut whose original ride home sprang a dangerous leak while parked at the International Space Station.

The new, empty Soyuz capsule should arrive at the orbiting lab on Sunday.

The capsule leak in December was blamed on a micrometeorite that punctured an external radiator, draining it of coolant. The same thing appeared to happen again earlier this month, this time on a docked Russian cargo ship. Camera views showed a small hole in each spacecraft.

#### **Original delays**

The Russian Space Agency delayed the launch of the replacement Soyuz, looking for any manufacturing defects. No issues were found, and the agency proceeded with Friday's predawn launch from Kazakhstan of the capsule with bundles of supplies strapped into the three seats.

Until the new Soyuz pulls up, emergency plans call for Rubio to switch to a SpaceX crew capsule that's docked at the space station. Mr. Prokopyev and Mr. Petelin remain assigned to their damaged Soyuz in the unlikely need for a fast getaway. Having one less person on board would keep the temperature down to a hopefully manageable level, Russian engineers concluded.

Given the urgent need for this capsule, two top NASA officials travelled from the U.S. to observe the launch in person. To everyone's relief, the capsule safely reached orbit nine minutes after liftoff — "a perfect ride to orbit," NASA Mission Control's Rob Navias reported from Houston.

Officials had determined it was too risky to bring NASA's Frank Rubio and Russia's Sergey Prokopyev and Dmitri Petelin back in their damaged Soyuz next month as originally planned. With no coolant, the cabin temperature would spike during the trip back to Earth, potentially damaging computers and other equipment, and exposing the suited-up crew to excessive heat.

The damaged Soyuz will return to Earth with no one aboard by the end of March, so engineers can examine it.

#### **Astronauts to stay in space for one year**

The three men launched in this Soyuz last September on what should have been a six-month mission. They'll now stay in space for a full year, until a new capsule is ready for their crew replacements for liftoff in September. It was their Soyuz that just launched with no one on board.

The damaged supply ship was filled with trash and cut loose over the weekend, burning up in the atmosphere as originally planned. "The Russians are continuing to take a really close look" at both spacecraft leaks, NASA's deputy space station program manager Dana Weigel told reporters earlier this week. "They're looking at everything ... to try to understand that."

NASA has a fresh crew of four launching atop a SpaceX rocket early Monday morning from Florida's Kennedy Space Center. SpaceX's William Gerstenmaier said the four astronauts returning to Earth in a few weeks already have inspected the Dragon capsule that will carry them home and "it all checked out fine".

<https://www.thehindu.com/news/international/russia-launches-rescue-ship-to-space-station-after-leaks/article66547886.ece>

**© The news items are selected by Defence Science Library, DESIDOC from Print Newspapers and Authentic Online News Resources (mainly on DRDO, Defence and S&T)**