

जून
June
2023

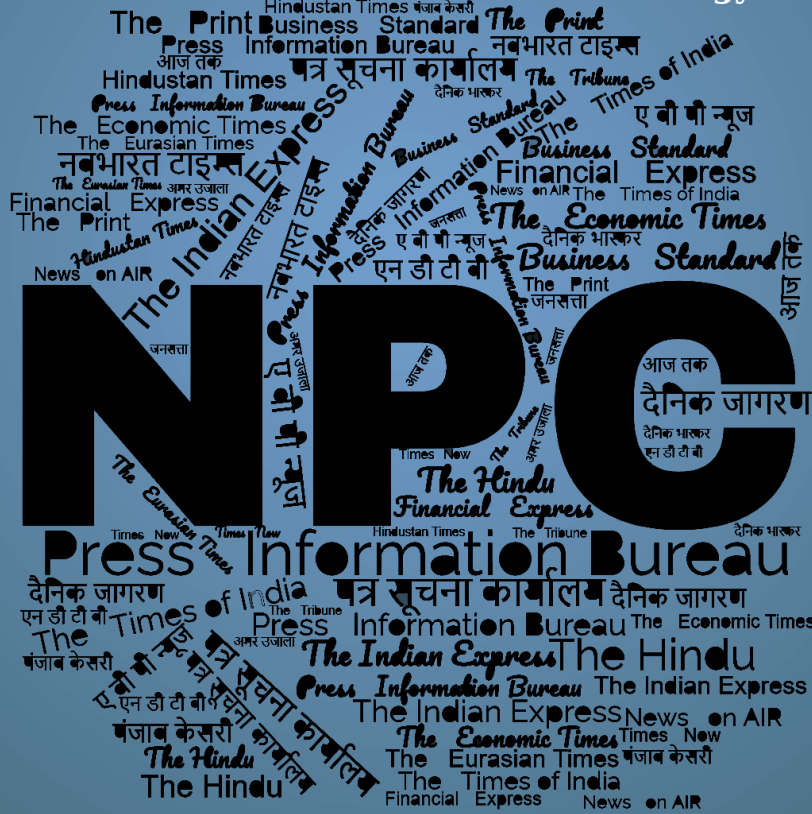
खंड/Vol. : 48 अंक/Issue : 110

13/06/2023

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

Metcalf House, Delhi - 110 054

CONTENTS

S. No.	TITLE	Page No.
	Defence News	1-16
	Defence Strategic: National/International	1-16
1.	भारत-मालदीव का संयुक्त सैन्य अभ्यास “एकुवेरिन” चौबटिया, उत्तराखंड में शुरू हुआ	पत्र सूचना कार्यालय 1
2.	Indo-Maldives Joint Military Exercise Commences	<i>Mint</i> 1
3.	India Focusing on Long-Range Weapons Capable of Reaching Targets Across China: SIPRI Report	<i>India Today</i> 2
4.	We can Work on Hypersonic Missiles too: Former BrahMos Aerospace Chief Dr Sivathanu Pillai	<i>The Economic Times</i> 3
5.	Laser Weapons, Neutron Bombs, Railguns: Next-Gen Weapons India Needs to Fend off Strategic Threats	<i>India Today</i> 4
6.	AI Makes Way for Chinese Strategic Command; can India have One?	<i>Financial Express</i> 8
7.	Doval-Sullivan Deals to Power PM Modi’s Historic Visit to US	<i>Hindustan Times</i> 10
8.	Greece's Air Force Chief Meets India's CDS, Army and IAF Chiefs	<i>The Economic Times</i> 11
9.	Nukes: India, Pak Neck and Neck, Far Behind China	<i>Deccan Herald</i> 11
10.	China Fast Expanding Nuclear Arsenal, but India Confident of its Strategic Deterrence	<i>The Times of India</i> 12
11.	Future Warfare: Liquid Metal Makes Origami Wearable and Conductive	<i>Financial Express</i> 14
12.	Chinese Aircraft Monitored US, France, Canada and Japan's Naval Drill	<i>Deccan Herald</i> 15
13.	North Korea’s Kim Vows to ‘Hold Hands’ with Putin for Strategic Cooperation	<i>The Indian Express</i> 16
	Science & Technology News	16-17
14.	Chandrayaan-3 to be Launched Between July 12 and 19: ISRO Chief	<i>The Economic Times</i> 16



पत्र सूचना कार्यालय
भारत सरकार

रक्षा मंत्रालय

Mon, 12 Jun 2023

भारत-मालदीव का संयुक्त सैन्य अभ्यास "एकुवेरिन" चौबटिया, उत्तराखंड में शुरू हुआ

भारतीय सेना और मालदीव राष्ट्रीय रक्षा बल के बीच 11 से 24 जून 2023 तक चौबटिया, उत्तराखंड में होने वाले संयुक्त सैन्य अभ्यास "एक्स एकुवेरिन" के 12 वें संस्करण का आगाज़ हो गया है। 'मित्र' अर्थ वाला एकुवेरिन, भारत और मालदीव में वैकल्पिक रूप से आयोजित होने वाला एक द्विपक्षीय वार्षिक अभ्यास है।

भारतीय सेना और मालदीव राष्ट्रीय रक्षा बल की एक पलटन जितनी क्षमता वाली टुकड़ी 14 दिनों तक चलने वाले इस अभ्यास में भाग लेगी। इस अभ्यास का उद्देश्य संयुक्त राष्ट्र के कहे अनुसार काउंटर इंसर्जेंसी/आतंकवाद विरोधी ऑपरेशन में इंटरऑपरेबिलिटी को बढ़ाना और संयुक्त मानवीय सहायता और आपदा राहत कार्यों को अंजाम देना है। इसमें सर्वोत्तम प्रथाओं को साझा करने, सामरिक स्तर पर दोनों बलों के बीच समन्वय और सहयोग बढ़ाने पर ध्यान रहेगा।

इस अभ्यास का 11 वां संस्करण दिसंबर 2021 में मालदीव में आयोजित किया गया था। दोनों देशों के बीच ये रक्षा सहयोग, संयुक्त अभ्यास करने से लेकर रक्षा प्रशिक्षण और उपकरण आवश्यकताओं के लिए मालदीव की सहायता करने तक फैला हुआ है। दोनों देशों के बीच आर्थिक, सांस्कृतिक और सैन्य सहयोग में बहुत नजदीकी और मैत्रीपूर्ण संबंध हैं। 'एक्स एकुवेरिन' दोनों देशों के बीच इन संबंधों को और मजबूत करने में मदद करेगा।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1931785>

mint

Mon, 12 Jun 2023

Indo-Maldives Joint Military Exercise Commences

The 12th edition of the joint military exercise "Ex Ekuverin" between the Indian Army and the Maldives National Defence Force has commenced at Chaubatia, Uttarakhand. The exercise, which started on 11 June, will continue until 24 June, 2023, the defence ministry said.

Ekuverin meaning 'Friends' is a bilateral annual exercise conducted alternatively in India and Maldives. The primary objective of the exercise is to enhance interoperability in counter insurgency/counter terrorism operations under the UN mandate. Additionally, it aims to facilitate joint humanitarian assistance and disaster relief operations, it added. A platoon strength contingent from the Indian Army and the Maldives National Defence Force will be participating in the 14-day

exercise. The focus is to share best practices, enhance coordination and cooperation between both the forces at tactical level.

The previous edition of the exercise, the 11th edition, was held in the Maldives in December 2021. The defence cooperation between India and the Maldives extends beyond joint exercises to include assistance with defence training and equipment requirements.

"Both the nations have very close and friendly relations in economic, cultural and military cooperation. 'Ex Ekuverin' will assist in further bolstering of these ties between the two nations," the ministry said.

<https://www.livemint.com/news/india/indomaldives-joint-military-exercise-commences-11686578997066.html>



Tue, 13 Jun 2023

India Focusing on Long-Range Weapons Capable of Reaching Targets Across China: SIPRI Report

India is intensifying its efforts to bolster its nuclear capabilities, with a particular emphasis on developing longer-range weapons, according to a report by Sweden-based think-tank Stockholm International Peace Research Institute (Sipri). This strategic shift is driven by escalating tensions and perceived threats from neighbours China and Pakistan, the report stated.

According to the report, India and Pakistan appeared to be expanding their nuclear arsenals and developing new types of nuclear delivery systems.

In the Sipri Yearbook 2023 released on Monday, the think-tank pointed out that India appears to be placing growing emphasis on longer-range weapons, including those capable of reaching targets across China.

"While Pakistan remains the main focus of India's nuclear deterrent, India appears to be placing growing emphasis on longer-range weapons, including those capable of reaching targets across China," the report stated.

The rapidly increasing geo-political tension in the Indo-Pacific region, marked by China's assertive behaviour and rapid military modernisation, has compelled India to reassess its strategic priorities.

India's focus on longer-range nuclear weapons aims to bolster its deterrence capabilities against China. India's pursuit of longer-range nuclear weapons involves advancements in missile technology and infrastructure.

The Defence Ministry's ongoing enhancement of Agni series ballistic missiles, such as Agni-V with a range of over 5,000 kilometers, demonstrates its commitment to extending its strike capabilities.

Additionally, India's investments in advanced missile defence systems aim to protect its assets and counter potential threats, enhancing its overall nuclear deterrent.

Meanwhile, the Sipri report estimated that China's nuclear arsenal had increased from 350 warheads in January 2022 to 410 in January 2023, and that it was "expected to keep growing". The report also speculated that India currently has 164 nuclear warheads.

<https://www.indiatoday.in/india/story/india-long-range-nuclear-weapons-targeting-china-ladakh-issue-sipri-report-defence-ministry-2392177-2023-06-12>

We can Work on Hypersonic Missiles too: Former BrahMos Aerospace Chief Dr Sivathanu Pillai

The grand Silver Jubilee Year celebration by India-Russia JV entity BrahMos Aerospace culminated on a high note on Monday in the presence of the company's Founder CEO and MD Padma Bhushan Dr A.S. Pillai.

Pillai addressed a gathering of BrahMos scientists, engineers and other staff members in the presence of Atul Dinkar Rane, (DG, BrahMos), DRDO and CEO and MD of BrahMos, Sanjeev K Joshi, Dy CEO, Praveen Pathak, Director, Market Promotion and Export and other esteemed officials.

He said, "With the BrahMos programme, we proved to the world that India was the first country to have a supersonic cruise missile system."

"India had thus broken the 'Fifth Nation Syndrome', as was once said by former President and 'Missile Man' of India Dr APJ Abdul Kalam, the Founder and CEO of BrahMos, who played a pivotal role in the Military-Technology partnership programme between India and Russia", he added.

Dwelling upon the many milestones the JV entity has achieved since its formation on February 12, 1998, followed by the maiden successful launch of supersonic BrahMos on June 12, 2001, Pillai said that the thought process in establishing a unique organisation like BrahMos was completely different.

"Every challenge was accepted...We never said 'No' to any challenge," he said.

Referring to the current geopolitical volatility, Dr Pillai, while equating BrahMos to 'Brahmastra' of the 21st century, said, "In a democracy, only a strong Nation can advocate peace. And a powerful weapon like BrahMos gives strength to India to advocate peace in the world."

He appreciated the efforts of BrahMos Aerospace in developing more advanced variants of BrahMos, including the BrahMos Next-Generation (NG) and hypersonic BrahMos.

"We can work on hypersonics and can definitely prove (to the world) that we are capable here too," Dr Pillai said.

BrahMos Chief Atul D Rane in his remarks said that it takes a lot of courage and fortitude and Dr. Pillai had the vision to lead the JV programme from the front...he's one of the best leaders one could have.

"If BrahMos today stands on any pillar, then Dr Pillai is that pillar," Rane said.

On this occasion, Dr Pillai inaugurated the BrahMos auditorium which has been dedicated to him and named 'Dr A Sivathanu Pillai' auditorium. The 'Founders Gallery' section of BrahMos Museum also showcases the many awards and accolades he has received throughout his long, illustrious career as an iconic scientist of India.

BrahMos work centres at Hyderabad, Nagpur and Pilalso celebrated BrahMos 'Silver Jubilee' event in a grand way. CEO and MD Atul D Rane addressed the staff in these work centres in virtual mode.

Previously, BrahMos organised 'BRAHMOS Users Meet 2023' on May 31, and 'Industry Meet 2023' on June 2, to commemorate '25 Supersonic Years of Success' of the JV programme involving DRDO of India and NPOM of Russia.

<https://economictimes.indiatimes.com/news/science/we-can-work-on-hypersonic-missiles-too-former-brahmos-aerospace-chief-dr-sivathanu-pillai/articleshow/100945664.cms>



Mon, 12 Jun 2023

Laser Weapons, Neutron Bombs, Railguns: Next-Gen Weapons India Needs to Fend off Strategic Threats

By Amartya Sinha

The end of World War II in 1945 led to a new era in weapons development. The beginning of the Cold War in the second half of the 20th century led to the advent of a new age in which aircraft speeds increased by leaps and bounds due to the application of turbojet and turbofan engines. Ballistic missiles have also led to the development of new payload-delivery vehicles over longer ranges. The deployment of tactical nuclear weapons, aided by medium-range terrain-hugging and radar-evading cruise missiles, played a huge role in the domain of tactical/theatre-level battlefields. The widespread deployment of heavy armor, along with cutting-edge guided artillery systems, set a new benchmark in the history of modern warfare.

While the primary focus of the two superpowers, the US and the Soviet Union, during the Cold War was on the development and testing of weapons of mass destruction and heavy intercontinental ranged ballistic missiles tipped with nuclear and thermonuclear warheads capable of wiping out entire metropolitan cities, the focus shifted towards the development of precision strike and purpose-built weapons in the last two decades of the 20th century. Whether it be a strategic level battlefield or a tactical level war, the intention was to reach the necessary objectives at the earliest without prolonging the conflict. Smart weapons with increased lethality and precision remain an area undergoing evolution and massive technological transformation since the beginning of the new millennium. Facing an unstable Pakistan in the west and an expansionist China on the east and northeast frontiers, India must tread the path towards the development of a whole gamut of next-generation smart and lethal weapons.

Laser and directed energy weapons

While conventional anti-satellite weapons armed with kinetic kill vehicles and anti-aircraft missiles tipped with incendiary/explosive warheads have been persisting for a long time, the focus has now shifted towards the development of new generation directed energy weapons capable of destroying aerial targets and space-based threats with high energy pulses and lasers. Such weapons can also use particle beams and microwaves to fuse and burn high-velocity mobile targets.

In the United States of America, organizations like DARPA (Defense Advanced Research Projects Agency), the Pentagon, AFRL (Air Force Research Laboratory), ARDEC (Armament Research Development and Engineering Centre), and NRL (Naval Research Laboratory) are actively working towards the development of directed energy weapons for anti-ballistic missile and anti-cruise missile warfare. The focus is on shooting down targets flying at hypersonic and high-hypersonic velocities. Russia, China, and the United Kingdom are also working on similar

weapons. India is actively pursuing the same, albeit in a covert manner. The DURGA (Directionally Unrestricted Ray Gun Array) and KALI (Kilo Ampere Linear Injector) weapons have been in the works since the late 1980s.

While DURGA is expected to be a space-based laser weapon capable of destroying satellites in any orbit, KALI is speculated to be a linear electron initiator capable of firing very powerful pulses of Relativistic Electron Beams (REB). The new weapon is being jointly developed by the Defence Research Development Organisation (DRDO) and Bhabha Atomic Research Centre (BARC). Unlike laser weapons, KALI will not bore a hole in the surface of the target but rather fuse all electronic systems in it. It can be used as a beam weapon emitting large bursts of microwaves packed with gigawatts of power. When aimed at hostile aircraft and missiles, it can burn the onboard computer chips along with electronic circuitry and bring them down immediately. KALI is also capable of converting electron energy to EM (Electromagnetic) radiation, which can be further adjusted to flash X-Rays and high-powered Microwave frequencies as per operational needs. The weapon can be used as a high-powered microwave gun against flying projectiles.

Some of the Kali series of accelerators, like KALI-80, KALI-200, KALI-1000, KALI-5000, and KALI-10000, are described as 'Single Shot Pulse Gigawatt Electron Accelerators.' These are single-shot devices using water-filled capacitors to build the charge energy. The discharge is in the range of 1 gigawatt. The initial discharge starts at 0.4 gigawatts in some devices and reaches as high as 40 gigawatts. The microwave radiation emitted by KALI-5000 is in the 3 to 5 gigawatt range.

It is noteworthy to mention that the microwave-producing version of KALI has been used by DRDO scientists to test the vulnerability of the electronic systems of the Light Combat Aircraft-Tejas. It has helped in designing electrostatic shields to harden the LCA and missiles from microwave attacks by the enemy, as well as protecting satellites against deadly Electromagnetic Impulses (EMI) generated by nuclear weapons and other cosmic disturbances that can fry and destroy electronic circuits.

The weaponization process of KALI is still under implementation as efforts are underway to make it more compact and improve its recharge time. Multiple components are being developed to make it a fully operational system. According to the latest reports, KALI is currently being integrated for testing onboard an Ilyushin IL-76 military aircraft at an undisclosed location in peninsular India. The prototypes are likely to be airborne versions.

Fractional Orbital Bombardment System (FOBS)

A fractional Orbital Bombardment System (FOBS) is a space-based nuclear weapon delivery system through which nuclear and thermonuclear warheads are launched into space (Low Earth Orbit) and brought down near the target cities. As the warheads re-enter the Earth's atmosphere before completing a full-cycle orbit around the globe, FOBS doesn't violate the Outer Space Treaty signed in 1967. Similar to a kinetic bombardment system, but with nuclear weapons, FOBS has several attractive qualities. The warheads have no range limits and can be launched over the South and North Poles, evading detection by many of China's East and West-facing early-warning radars and anti-missile systems. The nuclear payloads can also be launched into near-equatorial orbit as per operational requirements. FOBS payloads are faster than ICBMs (Intercontinental range Ballistic Missiles) and can be launched towards the target from any direction. The system gives the user a massive pre-emptive nuclear strike capability. Russia's upcoming heavy ICBM, the 'RS-28 Sarmat,' has a potential FOBS capability.

As India builds up a steady and large force of active nuclear warheads and long-range ballistic missiles, the country's future ICBMs like Agni-VI and Surya must be armed with FOBS warheads. This cutting-edge technology will give the country a massive global strike capability with unlimited range, bringing many heavily populated urban centers and big metropolitan cities directly

within India's killing radius. It is high time that the Union government gives the mandatory go-ahead for the Agni-VI ICBM and FOBS programs.

Neutron bomb

A neutron bomb, also known as an Enhanced Radiation Weapon (ERW), is a low-yield thermonuclear weapon designed to maximize lethal radiation near the blast while minimizing the physical power of the blast itself. The neutron release generated by a nuclear fusion reaction is intentionally allowed to escape the weapon, rather than being absorbed by its other components. The neutron burst, used as the primary destructive action of the warhead, can penetrate enemy armor more effectively than a conventional warhead, making it more lethal as a tactical weapon. ERWs were first operationally deployed for anti-ballistic missiles (ABMs). In this role, the burst of neutrons would cause nearby warheads to undergo partial fission, preventing them from exploding properly. For this to work, the ABM would have to explode within a range of 100 meters from its target.

In a standard thermonuclear design, a small fission bomb (atomic weapon) is placed close to a larger mass of thermonuclear fuel. The two components are then placed within a thick radiation case, usually made from uranium, lead, or steel. The case traps the energy from the fission weapon for a brief period, allowing it to heat and compress the main thermonuclear fuel. The case is normally made of depleted uranium or natural uranium metal because the thermonuclear reactions give off massive numbers of high-energy neutrons that can cause fission reactions in the casing material. These reactions can add considerable energy to the reaction. In a typical design, as much as 50 percent of the total energy comes from fission events in the casing. For this reason, these weapons are technically known as fission-fusion-fission designs. However, in a neutron bomb, the casing material is selected either to be transparent to neutrons or to actively enhance their production. The burst of neutrons created in the thermonuclear reaction is then free to escape the bomb, outpacing the physical explosion. By carefully designing the thermonuclear stage of the weapon, the neutron burst can be maximized while minimizing the blast itself. This makes the lethal radius of the neutron burst greater than that of the explosion itself. Since the neutrons disappear from the environment rapidly, such a burst over an enemy armored column would kill the crews and leave the area vulnerable to quick reoccupation.

Compared to a pure fission weapon with an identical explosive yield, a neutron bomb would emit about ten times the amount of neutron radiation. In a fission bomb at sea level, the total radiation pulse energy, composed of both gamma rays and neutrons, is approximately 5 percent of the entire energy released. However, in neutron bombs, it would be closer to 40 percent, with the increased percentage coming from the higher production of neutrons. Furthermore, the neutrons emitted by a neutron bomb have a much higher average energy level (close to 14 MeV) than those released during a fission reaction (1 to 2 MeV). Neutron bombs are designed to cause more damage to life than property and can be used against invading ground forces.

Electromagnetic railgun

An electromagnetic railgun (EMRG) is a device that uses electromagnetic force to launch high-velocity projectiles. It works by employing a sliding armature that is rapidly accelerated through a pair of conductive rails. Instead of relying on conventional or incendiary explosives in the warhead, the projectile utilizes enormous kinetic energy to hit and destroy the target. The railgun is based on the principles of the homopolar motor. While normal explosive-powered guns typically cannot achieve a muzzle velocity of more than 2 km per second, railgun-based projectiles can reach speeds of over 3 km per second. Increased muzzle velocities, combined with better aerodynamically streamlined projectiles, offer the advantages of extended firing ranges. Furthermore, higher terminal velocities enable the use of kinetic energy rounds incorporating hit-to-kill guidance, serving as replacements for explosive shells. Therefore, typical military railgun designs strive for

muzzle velocities in the range of 2 to 3.5 km per second, with muzzle energies ranging from 5 to 50 Megajoules.

Railguns have been under development in the United States, Germany, Turkey, and China for the past couple of decades. India has also joined the race to develop these next-generation weapon systems. In 1994, India's DRDO's Armament Research and Development Establishment developed a railgun with muzzle energies of 240 Kilojoules, utilizing a low inductance capacitor bank operating at 5 Kilovolt power, capable of launching projectiles weighing 3 to 3.5 grams at a velocity of over 2 km per second. On November 6, 2017, India made significant progress in developing futuristic weapon platforms when the country tested an electromagnetic railgun capable of firing a projectile at a speed exceeding 6 km per second. DRDO officials claimed to have tested a 12 mm square bore EMRG (Electromagnetic Railgun) and stated that they would move on to the 30 mm variety in the next stage. At a time when India faces hostile neighbors in South Asia, railgun-based surface-to-surface and surface-to-air weapons will prove to be a game-changer for the country's military. Efforts should be focused on increasing research and development expenditures to facilitate the development and operational deployment of such advanced systems on the tactical level battlefield.

Laser Ordnance Disposal System (LORDS)

The Laser Ordnance Disposal System, developed by DRDO, is an engineered vehicle-mounted laser system designed for the standoff neutralization of explosive hazards such as surface munitions, unexploded ordnances (UXOs), and improvised explosive devices (IEDs) from safe, stand-off ranges. The system consists of a laser system and its support systems, including a compact electrical generator, mounted onto a vehicle for standalone operation.

The overall system includes a Beam Directing Optical Channel, a motorized beam director assembly integrated with a high-accuracy laser range finder (LRF)-assisted autofocusing system, and a 2-axis servo pedestal for precise pointing and directing of the high-power laser beam onto the target. The waste heat generated in the laser source is managed through a thermal management chiller unit. For target sighting, a day camera with variable zoom, integrated and bore-sighted with the laser head, is used. Additionally, a visible (green) laser beam is provided for target designation.

The entire operation of the system is controlled by a single operator through a command control console (HMI) located in the co-driver's seat. The system can be modified accordingly for higher or lower-power lasers, either on the same or different vehicles or tripods, to accommodate different versions of the Laser Ordnance Disposal System.

Hypersonic cruise missiles

Over the past two decades, we have witnessed the emergence of ramjet-powered terrain-hugging supersonic cruise missiles like BrahMos. However, the focus is now shifting towards the development of more lethal hypersonic cruise missiles powered by scramjet (supersonic combustion ramjet) engines. The DRDO is currently working on the HSTDV (Hypersonic Technology Demonstrator Vehicle) project, while simultaneously developing another game-changing weapon system in the same category, BrahMos-2.

The HSTDV, capable of flying at speeds of up to Mach-12 (14,817 km/h), has the ability to penetrate any anti-aircraft or endo-atmospheric anti-missile interceptor due to its high-hypersonic velocity. On the other hand, prestigious academic institutions in India and Russia, namely IISc-Bangalore and Moscow Aviation Institute (MAI), are actively collaborating on the heatshield development for the BrahMos-2 hypersonic missile, which is designed to fly at velocities of up to Mach-7 (8,650 km/h). The prototypes of BrahMos-2 are expected to be ready for flight testing within the next three to four years, while the DRDO is nearing the completion of the HSTDV

project, which is set to undergo its fourth flight test soon, utilizing a slow-burning propellant in the booster rocket.

In the pursuit of India's aspiration to become a 21st-century global military superpower under the leadership of Prime Minister Narendra Modi, the uninterrupted development of smart and lethal weapons for both tactical and strategic battlefields is of the utmost importance. As the great Indian scholar Vishnugupta once aptly said: "The power of a king lies in his mighty arms. Security of citizens during peacetime is of paramount importance because the state is the only savior for men and women who suffer solely due to the negligence of the state." This age-old doctrine remains relevant and universally applicable in the 21st century and the new millennium.

<https://www.indiatoday.in/india/story/laser-weapons-neutron-bombs-railguns-next-gen-weapons-india-needs-to-fend-off-strategic-threats-2392083-2023-06-12>



Mon, 12 Jun 2023

AI Makes Way for Chinese Strategic Command; can India have One?

By Manish Kumar Jha

At the beginning of the year, when former Google CEO Eric Schmidt who is heading an Artificial Intelligence (AI) commission urged the US government to boost its AI skills to counter China, including by pursuing "AI-enabled" weapons, it rippled across with signs of warning.

Artificial Intelligence (AI) is shaping modern warfare like none. And among the countries which are leading the change with sheer speed is China. So much so that the People's Liberation Army (PLA) lays the ground for a Strategic Support Force (SSF) which is responsible for military informatization construction and defence in cyberspace.

Under the SSF, Chinese military strategies put entire elements of AI-based autonomous machinery into two divisions, including space, cyberspace, information warfare, and psychological warfare. The SSF now form those functions: the Space Systems Department, which is home to all space-related missions, and the Network Systems Department, which houses the PLA's information warfare activities.

While the advancement of AI is widely pursued by other nations for their national interest, China's pursuit of AI for military applications is beyond any accountability and bereft of ethical debates on its fallout. As FBI Director Christopher Wray recently warned that he was "deeply concerned" about the Chinese government's artificial intelligence program, asserting that it was "not constrained by the rule of law."

Also, with the numerous hacking operations which trace their roots to China, its advancement in artificial intelligence may result in global hacking operations, intellectual property theft and repression of dissidents inside the country and beyond.

The SSF: A new kind of warfare

The SSF was founded in 2015 as the PLA's fifth force along with other ground forces, navy, air, and rocket forces. China's military doctrine defines its innovation-driven development strategy and

highlighted that it will adopt differentiated strategies and asymmetric paths. That is about focusing on technologies that are already making an impact on the battlefield – a kind of asymmetric one.

In fact, China's national strategy for innovation-driven development clearly points out the research on such technologies as humanlike machine intelligence, natural interaction and virtual reality, microelectronics, and optoelectronics.

In addition to that, the PLA calls out the R&D and comprehensive application of technologies in specific areas like cloud computing, the Internet of things (IoT), Big Data, high-performance computing, and mobile intelligent terminals; expand R&D and promotional efforts for independent hardware and software products and network security technology, such as integrated circuits and industrial controls, providing safeguards for China's economic transformation and upgrading and the protection of national network security.

On top of that systems and components including sensors for artificial intelligence for military decisions and its applications are developed at China's National University of Defence Technology and its Academy of Military Science.

AI: Military-civil fusion

Largely, AI-enabled systems and processes depend on the semiconductor. Most of the development also takes place in the civil space—the commercial arena. China's leadership has prioritized semiconductors as a strategic area and planned to invest over \$100 billion within the next decade.

“It is to counter the AI superiority that the U.S. takes over China, says Professor Amit Das,” Head of the Center of AI, ICFAI University.

While the U.S. still enjoys a dominant market share in leading-edge GPU (Graphics Processing Units) and FPGA (Field Programmable Gate Array) design, AI-relevant ASICs (Application Specific Integrated Circuits), Chinese firms are breaking into.

Take a look at these two Chinese AI chip unicorns Cambricon and Horizon Robotics, which have designed and launched AI chips within just a few years, including Huawei's Ascend 910, for processing vast amounts of data for algorithms. In fact, based on such dramatic achievement, a report suggests that China is on track to possess as much as 30 percent of the world's data by 2030.

How the PLA wants to achieve this?

By Propelling the very concept of military-civil fusion in marine, space, network and other new fields. The SSF is carrying out the formulation and consolidation of general military-civilian standards. The strategy is to implement a two-way conversion of military-civilian standards and encourage the integration of military-civilian standards systems.

AI for Indian Military

While India is a late entrant, its armed forces have been gearing for addressing AI in military applications. The Indian Armed Forces has included Autonomous Weapons Systems (AWS) and Lethal Autonomous Weapons Systems (LAWS) in their domain.

In fact, last year, Air Force Chief V.R. Chaudhri emphasized that the service was working with the DRDO, academia, and industry to develop niche capabilities in the cyber and AI domains.

The IAF has defined AI applications in the areas of threat monitoring, training, data and intelligence fusion, and decision support. The IAF has been operating UAVs for various Intelligence, Surveillance and Reconnaissance (ISR) missions.

Lately, the Army has put a lot of thrust into AI, setting a Centre for Excellence (CoE) of AI in Madhya Pradesh. Some of the integration happened under the current Chief who is from Corps of Engineers and greatly understands the needs and gaps as well. The CoE will focus on key

integration and applications of AI, Cyber with Quantum Key Distribution, Quantum Communication, Quantum Computing, and Post-Quantum Cryptography.

How the army should be using AI is well laid out by the former Chief of Army Staff General M M Naravane as he outlined key areas: Situational awareness; the fusion of sensors; faster decision-making; and autonomous weapons systems. Despite all such efforts, there is a lack of coherence among the forces and one unified roadmap for AI in military applications and its development.

As General Naravane called out the changes in combat doctrine, organisation and structure of the Army if it is to effectively leverage AI. And new military doctrinal orientation for our integrated theatre command.

<https://www.financialexpress.com/business/defence-ai-makes-way-for-chinese-strategic-command-can-india-have-one-3123090/>



Tue, 13 Jun 2023

Doval-Sullivan Deals to Power PM Modi's Historic Visit to US

US National Security Advisor Jake Sullivan will call upon Prime Minister Narendra Modi today even as he will sit with his Indian counterpart Ajit Doval to hammer out future multi-pronged bilateral cooperation including a USD 2.7 billion semiconductor chip-making facility in India by Idaho-based Micron Technology, sharing of high-performance quantum computing technology and finalize the manufacturing of US aircraft engines in India. Sullivan will also be meeting External Affairs Minister S Jaishankar.

Sullivan's visit to India comes on the eve of PM Modi's state visit to the US next week with both natural allies all set to push the bilateral cooperation to the next level. Accompanied by US Indo-Pacific Coordinator at the National Security Council Kurt Campbell, the US NSA will also discuss the situation in the Indo-Pacific in the wake of increasing Chinese assertiveness over Taiwan and the South China Sea. The recent incident of a Chinese warship making a dangerous and deliberate pass across the bows of a US-guided missile destroyer in the South China Sea has caused major concern among Quad countries.

It is understood that while the US State Department bureaucracy with its past legacy was resisting intensifying defence and hi-tech cooperation with India, it is the Pentagon and NSA Sullivan who have pushed the agenda to make PM Modi's forthcoming visit to the US historic. Fact is that the US has never shared aircraft engine technology for manufacturing in a third country including the "hot engine" technology with even their closest ally. Despite the State Department trying to place hurdles, the Pentagon and National Security Council under Sullivan have ensured that 100 per cent transfer of technology for the manufacture of GE's F-414 engine is possible in India. It is the same engine that will empower DRDO's designed and developed Tejas Mark II fighter, which will form the backbone of the Indian Air Force's capability. India is also looking towards US defence majors to manufacture high-end ammunition like loiter bombs, air-to-air missiles and long-range guided artillery bombs in the country.

While chip makers like Micron Technology have taken a decision to invest in manufacturing in India, the Modi government is looking at top semiconductor chip makers like Intel Corporation to come to India to establish a global supply chain that is not dependent on China or Taiwan only.

Both the NSAs will also discuss sharing of US technology with India on quantum computing for processing gazillion data collected all over the country as well as technology to make Indian critical infrastructure protected from cyber attacks from China and Pakistan.

Besides, the two sides will be deepening cooperation in the fields of telecommunication, 6G technologies, rare earth metals mining and in space. The two NSAs covered all the above grounds for cooperation during the meeting on initiative on Critical and Emerging Technologies (iCET) in Washington on January 31, 2023 and the required amendments to rules to translate these deals on ground were discussed during the first India-US Strategic Trade Dialogue meeting last week.

<https://www.hindustantimes.com/india-news/dovalsullivan-deals-to-power-pm-modi-s-historic-visit-to-us-101686626406410.html>

THE ECONOMIC TIMES

Mon, 12 Jun 2023

Greece's Air Force Chief Meets India's CDS, Army and IAF Chiefs

Greece's air force chief Lieutenant General Themistoklis Bourolias met India's top military brass here and discussed issues of mutual interest and ongoing and new avenues for defence cooperation, officials said on Monday. Lieutenant General Bourolias, the chief of the Hellenic Air Force General Staff, met Chief of Defence Staff (CDS) Gen Anil Chauhan, Army Chief Gen Manoj Pande and IAF Chief Air Chief Marshal V R Chaudhari.

The Integrated Defence Staff HQ tweeted pictures of the meeting between the visiting dignitary and Gen Chauhan. They discussed issues of mutual interest, ongoing and new avenues for defence cooperation, and opportunities for Greece to leverage India's vibrant defence industry, it tweeted.

The Army tweeted, "General Manoj Pande #COAS interacted with Lieutenant General Themistoklis Bourolias, Chief of the Hellenic Air Force General Staff, #HellenicAirForce, #Greece and discussed aspects of mutual interest. #IndianArmy #IndiaGreeceFriendship."

It also shared a photo of the meeting between the two generals on Monday.

In the meeting between Lt Gen Bourolias and Air Chief Marshal Chaudhari, bilateral issues of mutual interest and defence cooperation were discussed, the Indian Air Force said.

<https://economictimes.indiatimes.com/news/defence/greeces-air-force-chief-meets-indias-cds-army-and-iaf-chiefs/articleshow/100945647.cms>



Tue, 13 Jun 2023

Nukes: India, Pak Neck and Neck, Far Behind China

With an estimated 164 nuclear weapons, India's nuclear stockpile is comparable to Pakistan's but significantly less than China's, which seeks to match its Intercontinental Ballistic Missile (ICBM) numbers with that of the USA or Russia by the turn of the decade, according to the latest report from Stockholm International Peace Research Institute released on Monday.

As of January 2023, India was estimated to have a growing stockpile of 164 nuclear weapons, a small increase from the previous year's count of 160. These weapons are assigned to a nuclear triad of aircraft, land-based missiles and nuclear-powered ballistic missile submarines. Pakistan, on the other hand, had 164 such weapons in 2022 but seeks to increase the stockpile by adding another five with the existing stocks.

China is way ahead of India and Pakistan with the communist country having an estimated 350 nuclear weapons last year with Beijing planning to expand its stockpile with 410 such weapons by the end of 2023. Depending on how it decides to structure its forces, China could potentially have at least as many intercontinental ballistic missiles as either the USA or Russia by the turn of the decade. India and Pakistan appear to be expanding their nuclear arsenal, and both countries introduced and continued to develop new types of nuclear delivery systems in 2022. While Pakistan remains the main focus of India's nuclear deterrent, India appears to be placing growing emphasis on longer-range weapons, including those capable of reaching targets across China.

The Indian estimate is based on calculations of India's inventory of weapon's grade plutonium, the estimated number of operational nuclear-capable delivery systems, India's nuclear doctrine, publicly available information on the Indian nuclear arsenal, and private conversations with defence officials. The Pakistani estimate comes with a higher degree of uncertainty.

While India has adhered to a nuclear no-first-use policy since 1999, this pledge was qualified by a 2003 caveat (reaffirmed in 2018) that India could also use nuclear forces to retaliate against attacks by non-nuclear weapons of mass destruction.

Since a part of India's nuclear arsenal is being kept at a much higher state of readiness, there are speculations and theories among the strategic community on whether India is transitioning towards a counterforce nuclear posture to target an adversary's nuclear weapons earlier in a crisis scenario even before they could be used. However, there is no official word.

Of the total global inventory of an estimated 12 512 warheads in January 2023, about 9,576 were in military stockpiles for potential use, 86 more than in January 2022. Of those, an estimated 3,844 warheads were deployed with missiles and aircraft, and around 2,000, nearly all of which belonged to Russia or the USA, were kept in a state of high operational alert, meaning that they were fitted to missiles or held at airbases hosting nuclear bombers.

Russia and the USA together possess almost 90% of all nuclear weapons. The sizes of their respective nuclear arsenal (usable warheads) seem to have remained relatively stable in 2022, although transparency regarding nuclear forces declined in both countries in the wake of Russia's invasion of Ukraine in February 2022.

<https://www.deccanherald.com/national/nukes-india-pak-neck-and-neck-far-behind-china-1227315.html>

THE TIMES OF INDIA

Mon, 12 Jun 2023

China Fast Expanding Nuclear Arsenal, but India Confident of its Strategic Deterrence

China continues to rapidly expand its nuclear weapons arsenal, as does Pakistan albeit slowly, but India remains confident of its strategic deterrence capabilities with induction of new-generation Agni ballistic missiles and nuclear-capable Rafale fighter jets.

China now has 410 nuclear warheads, up from 350 in January 2022, while Pakistan has 170 and India 164, as per the latest assessment of the Stockholm International Peace Institute (SIPRI) released on Monday.

“Depending on how it decides to structure its forces, China could potentially have at least as many intercontinental ballistic missiles (ICBMs) as either the US or Russia by the turn of the decade,” it said. The Pentagon’s latest report on China’s military capabilities has also warned that the country will field a stockpile of about 1,500 warheads by 2035 if it continues with the ongoing acceleration in its nuclear programme. The SIPRI report said both India and Pakistan also appear to be expanding their nuclear arsenals, with the two introducing and continuing to develop new types of delivery systems in the shape of missiles.

“While Pakistan remains the main focus of India’s nuclear deterrent, India appears to be placing growing emphasis on longer-range weapons, including those capable of reaching targets across China,” it said.

Overall, all the nine nuclear-armed states continue to modernize their nuclear arsenals. Russia and the USA, of course, together possess 90% of the global inventory of an estimated 12,512 nuclear warheads. The numbers are Russia (5,889), US (5,244), France (290), UK (225), Israel (90) and North Korea (30), as per SIPRI.

Nuclear deterrence, of course, cannot be reduced to simplistic counting of the number of warheads, which themselves are just estimates, though well-informed ones, because countries keep them closely-guarded.

With long unresolved “active” borders with both China and Pakistan, which are expanding their nuclear arsenals, India needs robust and assured “second-strike capabilities” in keeping with its declared policy of “no first-use” of nuclear weapons.

India has been taking steps to consolidate its nuclear delivery systems, especially the Agni series of ballistic missiles. Just last week, the first “pre-induction night launch” of the new-generation Agni-Prime, which has a strike range from 1,000 to 2,000-km, was undertaken by the Strategic Forces Command (SFC).

The two-stage, solid propellant fuelled Agni-Prime is the smallest and lightest among all Agni missiles. Crucially, it is also a canister-launch system like the country’s first intercontinental ballistic missile (ICBM), the over 5,000-km Agni-V, which is now in the process of being inducted by the SFC.

A canister-launch missile -- with the warhead already mated with the missile -- gives the armed forces the requisite operational flexibility to store it for long periods, swiftly transport it through rail or road when required, and fire it from wherever they want.

The Agni-Prime will gradually replace the Agni-I (700-km) missiles in the arsenal of SFC, which also has the Prithvi-II (350-km), Agni-II (2,000-km), Agni-III (3,000-km) and Agni-4 (4,000-km) ballistic missiles.

The third leg of the “nuclear triad”, however, remains a major concern. India currently has only one fully-operational nuclear-powered submarine armed with nuclear-tipped ballistic missiles, called a SSBN in naval parlance, in INS Arihant. Moreover, it’s armed only with the 750-km range K-15 nuclear missiles. In contrast, countries like the US, Russia and China have a fleet of much larger SSBNs armed with well over 5,000-km range missiles.

<https://timesofindia.indiatimes.com/india/china-fast-expanding-nuclear-arsenal-but-india-confident-of-its-strategic-deterrence/articleshow/100946496.cms>

Future Warfare: Liquid Metal Makes Origami Wearable and Conductive

Chinese scientists claim to have created a new type of wearable technology by coating origami with liquid metal. The resulting material is both flexible and conductive, making it ideal for a variety of applications, such as soft robotics and medical devices. Although metal-coated paper can be folded like regular paper, it has the properties of metal, such as the ability to conduct heat and electricity.

It is possible to create skin-based electric circuits to track finger movements, heart activity, and body temperature.

Origami is the art of folding paper into various shapes and figures.

Paper coated with metal can be folded like regular paper, but it has additional properties such as tunable stiffness and the ability to conduct heat and electricity. This allows 3D paper structures to be controlled by electricity, temperature changes, or magnets.

A team of researchers from Tsinghua University, Beihang University, and the Chinese Academy of Sciences have developed this new material that could be used for wearable testing platforms, flexible devices, and soft robotics. The team published their findings in the peer-reviewed journal *Cell Reports Physical Science* last Friday.

Mercury is a rare, silvery-white metal that is liquid at room temperature. It is also highly toxic and can cause serious health problems if inhaled or ingested and it freezes at -39°C (-38°F).

The team in this study used two non-toxic liquid metal alloys, eGaIn and BiInS. eGaIn has a melting point of 15.5 degrees Celsius, while BiInS has a melting point of 62 degrees Celsius.

“eGaIn is a non-toxic, low-melting point alloy of gallium and indium. It is a conductive, shape-shifting material that can be used in a variety of applications, including electronics, robotics, and medical devices,” explains Girish Linganna, Aerospace & Defence Expert.

More about eGaIn liquid metal:

Melting point: 15.7°C

Conductivity: 100 times that of copper

Shape-shifting: Can be molded into any desired shape

Applications: Electronics, robotics, medical devices.

BiInS is a non-toxic, low-melting point alloy of bismuth, indium, and tin.

It is a conductive, shape-shifting material that can be used in a variety of applications, including electronics, robotics, and medical devices.

It has a melting point of 62°C , which is higher than eGaIn.

It is less expensive than eGaIn, making it a more attractive option for some applications.

Scientists have had trouble sticking liquid metal to surfaces like paper, plastic, cloth, and human skin because of its high surface tension. Some have tried using an adhesive, but this can weaken the material's electrical, thermal, or mechanical properties.

A Chinese team created a new way to print using liquid metal. They applied the liquid metal to silicone stamps and then rubbed the stamps onto paper. The force of the rubbing caused the metal droplets to bind to the paper.

The scientists demonstrated that the metal-coated paper could be folded into different shapes, such as a crane and a collapsible box, just like uncoated paper. And the treated paper was folded into a spring-like shape. The liquid-metal enhancers gave the spring the ability to self-glue, keeping it compressed until it was needed. The spring could then be stretched to the desired length or height.

Researchers also discovered that the new metal can be cooled to solidify it and that it can be reheated to restore it to its initial state. The study employed a metal that weighed 50 grams (1.8 oz), proving its potential as a versatile smart material.

Yuan Bo, a postdoctoral fellow in the department of biomedical engineering at Tsinghua University in Beijing and the study's lead author, has stated that liquid metal coating could transform readily available materials into long-lasting intelligent electronic devices.

<https://www.financialexpress.com/business/defence-future-warfare-liquid-metal-makes-origami-wearable-and-conductive-3122778/>



Mon, 12 Jun 2023

Chinese Aircraft Monitored US, France, Canada and Japan's Naval Drill

China deployed a reconnaissance plane over Pacific waters east of Taiwan last week that Chinese media said monitored and gathered intelligence on an exercise involving the navies of the United States, Japan, France and Canada.

A Y-9 cargo aircraft variant fitted with intelligence-gathering equipment most likely monitored and collected intelligence on the exercise, Chinese state-backed Global Times reported on Sunday, citing analysts. Two US aircraft carriers, the USS Nimitz and USS Ronald Reagan, had been operating around the geopolitically important Ryukyu Islands in the Philippine Sea since Thursday, Global Times cited a Beijing-based think tank as saying.

The islands separate the East China Sea from the Philippine Sea, and dot the West Pacific between Japan and Taiwan, which China claims as its territory.

On Friday, the US kicked off the exercise in the Philippine Sea, with two carrier strike groups jointly operating for the first time since June 2020, the US 7th Fleet said in a statement.

The Japanese defence ministry reported the sighting of one Y-9 reconnaissance variant in the Pacific on Thursday. Military encounters between China and the United States and its allies in the Western Pacific have risen in recent years as China has grown increasingly assertive in the East and South China Seas, as well as around Taiwan.

Days before the quadrilateral exercise, the coast guards of the Philippines, United States and Japan held their first trilateral exercise off the coast of a western Philippine province.

<https://www.deccanherald.com/international/world-news-politics/chinese-aircraft-monitored-us-france-canada-and-japans-naval-drill-1227073.html>

North Korea's Kim Vows to 'Hold Hands' with Putin for Strategic Cooperation

North Korean leader Kim Jong Un has vowed to "hold hands" with Russian President Vladimir Putin and bolster strategic cooperation on their shared goal of building a powerful country, state media KCNA reported on Monday.

Kim made the pledge in a message to Putin marking Russia's National Day, defending his decision to invade Ukraine and displaying "full support and solidarity."

"Justice is sure to win and the Russian people will continue to add glory to the history of victory," Kim said in the message published by KCNA. Kim called for "closer strategic cooperation" with Moscow, "holding hands firmly with the Russian president, in conformity with the common desire of the peoples of the two countries to fulfil the grand goal of building a powerful country," it added.

North Korea has sought to forge closer ties with the Kremlin and backed Moscow after it invaded Ukraine last year, blaming the "hegemonic policy" and "high-handedness" of the United States and the West.

<https://indianexpress.com/article/world/north-koreas-kim-vows-to-hold-hands-with-putin-for-strategic-cooperation-8658528/>

Science & Technology News

THE ECONOMIC TIMES

Chandrayaan-3 to be Launched Between July 12 and 19: ISRO Chief

If all the tests go smoothly, Chandrayaan-3, India's ambitious plan to land on the surface of the Moon, will be launched between July 12 and 19, Indian Space Research Organisation (ISRO) Chairman S Somanath said on Monday.

Speaking to the media after inaugurating a one-day workshop and space exhibition at Kothavara St Xavier's College organised by ISRO, Somanath said that the Chandrayaan has already reached the launch pad in Satish Dhawan Space Centre, Sriharikota, from U R Rao Satellite Centre.

"The final preparations are going on. It will be completed by the end of this month. At the same time, the rocket, LVM-3, is going to be used for this launch. Its assembly is going on. All parts for its assembly have reached Sriharikota," Somanath said.

He said the rocket assembly will also be completed by the end of this month and then there is a process to integrate Chandrayaan-3 with the rocket. He said that too would be done in the last week of June and many tests will follow.

"There is a window for launch between July 12 and 19 and we can only launch it during that window. We can do it later also but we will suffer fuel losses," Somanath said.

However, he said, the launch would be conducted during this window only if all the tests are conducted successfully. He said in order to prevent any problems during the upcoming launch, corrections have been made in Chandrayaan-3, in its hardware, structure, computers, software, and sensors.

"More fuel has been added, the landing legs have been strengthened further. Big solar panels have been fixed for more energy production. Another additional sensor is also added. "To measure its speed, a 'Laser Doppler VelociMeter' instrument, which was developed in the last year, has been added.

We have also changed its algorithm and new software has been added to help Chandrayaan to land in another area if there is any failure at the scheduled spot," the ISRO chief said.

<https://economictimes.indiatimes.com/news/science/chandrayaan-3-to-be-launched-between-july-12-and-19-isro-chief/articleshow/100945508.cms>

