

THE NEW DEFENCE ORDER STRATE HOBBIN GEOPOHHBIN SAKAS



I T I C A L L A N D

ORGANIZER



MINISTRY OF DEFENCE
OF THE RUSSIAN FEDERATION

RMY

INTERNATIONAL MILITARY-TECHNICAL FORUM "ARMY-2020"

23-29 AUGUST PATRIOT EXPO

WWW.RUSARMYEXPO.COM

EXHIBITION OPERATOR



INTERNATIONAL CONGRESSES AND EXHIBITIONS



CHANGING POLITICAL LANDSCAPE

olitical patterns change rapidly. Contents and forms, motivation and methods are changing. It is impossible not to recognize this, just as it is impossible not to reflect on the future. "The liberal idea has become obsolete. It has come into conflict with the interests of the overwhelming majority of the population." This statement by Russian President Vladimir Putin has recently caused a real media storm. Here is one of the answers quoted in the media. Donald Tusk, the European Council president, said he had "strongly disagreed" with Mr. Putin. "What I find really obsolete is authoritarianism, personality cults and the rule of oligarchs," he said. So Mr. Putin and Mr. Tusk are both right, the dispute has not taken place. Moreover, they do not contradict each other. Authoritarianism, personality cults and the rule of oligarchs are not an alternative to the liberal ideology, and vice versa.

Noam Chomsky, who for the last 50 years has been called the American Socrates, considers neoliberalism to be the third existential threat. Before neoliberalism, he mentioned, humanity created only two comparable global threats, that, in the event of a nuclear war, could destroy us; in the event of an environmental disaster, could create a serious impact, and then some.

It is important to note that key international organizations that have been founded after the Second World War were based mainly on liberal values and, unfortunately, now they do not fully correspond to the realities of our time. Then, who and how will control the security of the world? What do we need to defend ourselves and protect our future today?

New weapons, cyber technology, and the entire 4.0 industry are integrating into the dangerously unprepared humanitarian and political environment. In the era of post-truth, the only obvious thing is that ideas and ideals, like international rules, cease to be relevant. In recent years, American sanction wars illustrated this situation. And emotional rhetoric in the "highly likely" style can justify any political decision, leaving its true motivation outside the discussion.

Humanitarian, social, political research does not keep pace with technological progress and economic shocks. We do not have time to comprehend the impending threats, while continuing to generate them. The political landscape is changing spontaneously and assume an increasingly bizarre unpredictable pattern. ◆

Editor-in-Chief Alexandra Grigorenko



07–29

INTERNATIONAL COOPERATION

06 NEWS

- **10** RUSSIA, INDIA DEFENCE COOPERATION DESTINED TO GROW!
- **16** MTC OF RUSSIA WITH MIDDLE EAST AND NORTH AFRICAN COUNTRIES: STATUS AND OUTLOOKS
- 22 EXPORT OF GROUND FORCES EQUIPMENT FROM RUSSIA
- **26** AVIATION. MTC BETWEEN RUSSIA AND ALGERIA

30-41

SPACE

- **30** NEWS
- **32** UAE... FROM DESERT TO SPACE
- **36** "SPEKTR-RG": THIRD EYE IN THE UNIVERSE
- **40** CHANGE OF TRADE: CARRIER MISSILE "ROKOT"





43–69

STRATEGIES AND TECHNOLOGIES

- **44** NEWS
- **46** REVIEW OF UP-TO-DATE RUSSIAN EW SYSTEMS
- **50** WHAT CAN MODERN MBT DESIGNS TELL US ABOUT THE FUTURE?
- **58** FROM CITY AIR-TAXI TO OIL-WELL DERRICKS
- **64** COMPLEX AREA PROTECTION "ANTI-UAV"
- **65** AO ENERGIYA
- **66** KAF JSC. EVOLUTION OF QUALITY
- **68** ALWAYS AT A HEIGHT: EVACUATION, TRAVEL, CARGO DELIVERY





ONLY ACCURATE TRANSLATION MATTERS!

EGO Translating SB is a leading translation company that offers
full-service support to military industrial
complex enterprises:

- military interpreting and translation;
- 99 foreign languages;
- in-house secret information department;
- specialists having level 3 security clearance;
- extensive terminology database in various military industrial complex areas;
- teaching of foreign languages.

+7 (812) 200-43-00

military@egotranslating.ru www.egotranslating.com Moscow / Saint Petersburg / 12 regions



70-80

INTERNATIONAL SECURITY

70 NEWS

72 IRAN'S MISSILE SHIELD

78 ARMY 2020 FORUM

80 THE 'NEW DEFENSE ORDER. STRATEGY' MAGAZINE IS DISTRIBUTED AT THE FOLLOWING SHOWS AND EVENTS IN 2020

Rostec State Corporation, PJSC United Aircraft Corporation (UAC), the Ministry of Defense of the Russian Federation, Russian Helicopters Holding Company, the Federal Air Transport Agency Rosaviatsiya, Russian Aircraft Corporation MiG (a UAC member), Rosoboronexport JSC (Part of the Rostec State Corporation), EGO Translating Company, Hindustan Shipyard Limited (HSL), Ordnance Factory Board (OFB) (India), the Federal Service for Military and Technical Cooperation of the Russian Federation, Stockholm International Peace Research Institute (SIPRI), JSC SPC "Uralvagonzavod", JSC "Concern "Kalashnikov", the Ministry of Foreign Affairs of the Russian Federation, Roskosmos Space Agency, Special Design Bureau of Machine Building OJSC, Almaz-Antey Aerospace Defense Concern JSC, "Almaz – Antey" Corporation JSC, "Sukhoi" Design Bureau, GKNPTS named after M.V. Khrunchev, PJSC United Shipbuilding Corporation (USC), "Radioelectronic Technologies" Corporation (KRET), "Roselektronika" Holding (Part of the Rostec State Corporation), Voronezh Research Company "PROTEK", Special Technological Centre (STC), "VR-Technologies" LLC, Amira JSC, AO Energiya JSC, KAF JSC, ANTER LLC, "PROF TRANSLATING" LLC

EDITOR-IN-CHIEF **Alexandra V Grigorenko**AVG@DFNC.RU

DEPUTY EDITOR-IN-CHIEF Reem Mohamed RM.NDOS@DFNC.RU

PR Director Anna Starostenkova D5@Dfnc.ru

SITE CHIEF EDITOR Olesya Laricheva DFNCII@MAIL.RU

Advertising Director Elizaveta Guleeva di@dfnc.ru

ART DIRECTOR

Mikhail Tkachev

Editor of Strategy and Technology Section Leonyd Narsessian

Editor of Space Section Mikhail Kotov

Editor Dimitry Kornev

DISTRIBUTION:

- Ministry of Defence of the Russian Federation
- State Corporation Rostech
 Federal Service for Technical
- Federal Service for Technical and Export Control (FSTEC)
- Federal Service for Military and Technical Cooperation
 Federal Antimonopoly Service of the Russian Federation
- Ministry of Emergency Situations of the Russian Federation
- Department of mobilization, training, civil defence, emergency prevention and control
- Ministry of Industry and Trade of the Russian Federation:
 Department of militaryindustrial complex (MIC),
 Department of Aviation
 Industry, International Business
 Department, Department of
 Conventional Weapons and
 Munitions Industry, Department
 of Shipbuilding Industry
 and Marine Facilities
- Institute for Politics and Military Analysis (IPMA)
- Military Diplomats League
- Department of Information and PR of the Head Office

- of the Ministry of Emergency Situations in St. Petersburg • Government of Saint Petersburg
- The Association of Industrial Companies of St. Petersburg
- The Union of Industrialists and Entrepreneurs (Employers) of St. Petersburg
 FSBI "United Editors Office

 The Union of Industrialists and Entrepreneurs (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists and Employers (Employers) of St. Petersburg

 The Union of Industrialists (Employers) of St. Petersburg

 The Union
- FSBI "United Editors Office of the Ministry of Emergency Situations of Russia"
- Top-managers of Russian MIC companies
- Major industrial companies

GENERAL DIRECTOR "DEFENCE MEDIA" LLC Alexandra V Grigorenko

Founder (Publisher)
"Defence Media" LLC
199178 Saint Petersburg
Donskaya St. 19, lit. A, pom. 3 H
Address of the publication
V.O. 12 line, 11
Saint Petersburg
Russia
Phone +7 (812) 309-27-24
E-mail: avg@dfnc.ru
http://www.dfnc.ru

The publication is registered by

the Federal Service for Supervision of Communications and Mass Media (Roskomnadzor). Certificate of Mass Media Registration III № ФС77-69592, May 2, 2017. Published since 2008 Free price.
12+ Initial registration certificate PITU 78-00141 of November 01, 2008. Issued by the Office of the Federal Service for Supervision of Communications and Mass Media in St. Petersburg and the Leningrad Region.

Printed in Typography Uniprint Ltd 12/18 Tallinskaya 66
Saint-Petersburg 195196, Russia uniprint.eu
Issue has gone to bed on February 14, 2020
Date of publication: February 17, 2020
The number of copies: 12 000
Order number

EXHIBITIONS:

- UMEX 2020
- IADE 2020
- DIMDEX 2020
- DSA 2020
- St Petersburg TechFair 2020
- ArmHiTech 2020
- ExpoElectronica 2020
- Navitekh

- Russian week
- of High Technologies
- Eurasia Airshow 2020
- Helirussia 2020
- SIMBF 2020
- KADEX 2020
- Eurosatory 2020AKTO 2020

- ARMY 2020
- GidroaviasalonChipExpo 2020
- ADAS 2020
- Interpolitex-2020
- Indo Defence 2020
- Sfitex 2020
- EDEX 2020

The texts and photos submitted for publication are not reviewed and/or returned to the authors. Reprint of materials and their usage in any form, including e-media, is the subject of written approval of the publisher. Authors' opinion may differ from that of the editorial board. All advertised goods and services have the necessary certificates and licenses. The editorial board is not responsible for the content of advertising materials.





22-26 ANTALYA INTERNATIONAL AIRPORT 2020 TURKEY

WE **RISE TOGETHER**

capital

13 BILLION US DOLLARS

Russia has exported weapons and military equipment worth 13 billion US dollars in 2019, over 2 billion more than in the same period of 2018. In general, the portfolio of orders for Russian weapons is at a stable level exceeding 50 billion US dollars.

INTERNATIONAL MILITARY EXHIBITIONS

7 international military exhibitions held in Russia in the year 2019 have promoted the sales of Russian weapons and military equipment. Following these exhibitions, contracts were signed to the tune of roughly 35 billion rubles (559 million US dollars).

464 ADDITIONAL T-90S BATTLE TANKS

India's Ministry of Defense (MoD)
has signed a \$2.8 billion
contract with the state-owned
Ordnance Factory Board (OFB)
to license-build 464 additional
T-90S main battle tanks
for the Indian Army.



2A6FIN MBTs

The Finnish Army announced on October 25, 2019 that it had received the last of 100 Leopard 2A6FIN MBTs, which were ordered from the Netherlands as Leopard 2A6NLs in 2014 and subsequently upgraded. The Leopard 2A6FIN fleet was ordered for 199 million Euro.

20

F-35 AIRCRAFT

The Government of South Korea is preparing to launch the second phase of the F-X III in 2021 for the five years to come.

About 3.3 billion US dollars will go toward buying the additional 20 Lockheed Martin-made F-35 aircraft.

145 MILLION E U R O

On November 21, 2019 the Defense Materiel Agency under the Ministry of National Defense of Lithuania and the US Department of Defense signed the Letter of Offer and Acceptance concerning procurement of 200 units of the Joint Light Tactical Vehicle (JLTV). The Ministry of National Defense will allocate about 145 million Euro for the acquisition of JLTVs, equipment and weaponry complements, personnel training, spare parts, and sustainment in 2020–2024.

RUSSIA COMPLETES 1ST STAGE OF DELIVERING T-90S MAIN BATTLE TANKS TO IRAQ / TASS

he first stage of delivering Russianmade T-90S main battle tanks to Iraq is over and both sides are discussing the procedure and the terms of supplies under the second phase, Russia's Federal Service for Military and Technical Cooperation told TASS at the Dubai Airshow 2019.

"The material under the first stage has been delivered in full. The procedure and the terms of delivering the armor at the second stage will be agreed on additionally," the defense agency's press office said.

Chief of the Iraqi General Staff Othman al-Ghanmi said in February 2018 that Iraq had received the first batch of 36 T-90S tanks under a contract with Russia on the delivery of military hardware.

The T-90S is the export version of the T-90 main battle tank. It features powerful armament, a modern fire control system, reliable armor protection and high maneuverability. The T-90S is designated to fight tanks, self-propelled guns and other armored targets any time day or night in various climatic conditions. ◆



TURKEY IS LIKELY TO PURCHASE ANOTHER BATCH OF S-400 / ROSSIYA-24

R S-400, Deputy Prime Minister Yury Borisov told the round-the-clock television news channel Rossiya-24 in an interview.

"It is very likely they will use this option and keep working with us. We do hope for this," he said.

"As far as arms export is concerned, it should be noted that competition in the market of military hardware has always been harsh. We firmly hold the second place as to the volume of sales," Borisov stated.

Air defense systems, aircraft and some types of equipment for ground troops are leaders in the sales.

"Currently, our shipbuilders have good prospects, as some new types of products have emerged, such as small corvettes, patrol ships, and diesel-electric submarines. Also, we see good prospects in the market of radio-electronic warfare equipment," he noted.

"Turkey opted for this air defense system [S-400], because its parameters are the best in the world. Generally speaking, Russian air defense systems are head and shoulders above their foreign rivals. The situation in Saudi Arabia, where drones had attacked oil refineries, clearly demonstrated this. Patriot and other defense systems failed, while continued attacks against our base Khmeimim have invariably been repelled by our air defense systems," Borisov stated, adding that Pantsir performed very well.

"I believe that our task in this field is to retain a niche in the foreign market. As far as the export of weapons is concerned, we should retain the gained positions and step up sales by offering new products. We have stable contracts for \$55 billion in the long term and achieve impressive results every year," Borisov claimed. Russia exports \$15 billion of weapons every year. ◆

INDIAN DOWN PAYMENT RECEIVED FOR S-400 / JAME'S DEFENCE INDUSTRY

ussia has received a down payment for the S-400 Triumf (Triumph, US/NATO designation SA-21 Growler) from India, Jane's has been told. Speaking to journalists at the Dubai Airshow on 17 November, Rostec chief executive officer Sergei Chemezov said that production had already begun on the systems, with deliveries to be completed by 2025.

While declining to specify the amount that had been paid by the country, Chemezov said that negotiations on the system were continuing.

India signed a \$5.5 billion deal with Russia on October 5, 2018 to acquire five S-400 systems for the Indian Air Force (IAF). Jane's reported at the time that the deal was understood to be for about 30 launchers and more than 6,000 missiles and would be concluded without the Indian Ministry of Defence's mandatory 30% offset liability of the overall contract value. Deliveries were initially scheduled to be completed by 2023. However, this appears to have slipped to 2025. ◆



RUSSIA RECEIVES FIRST APPLICATIONS FOR SU-34 DELIVERIES FROM FOREIGN CUSTOMERS / TASS

ussia received the first applications for export version of Sukhoi Su-34 fighterbomber aircraft, Head of Rosoboronexport (part of Rostec) Alexander Mikheyev told reporters at the Dubai Airshow 2019.

"We are working on it. Several partners even flew these aircraft [Su-34]. So, we are waiting for decisions, we are working on marketing. There are applications," Mikheyev said.

Sukhoi Su-34 multirole supersonic fighter-bomber is designated to strike enemy ground and air targets day and night in any weather conditions. The Su-34 carries long-range air-to-surface and air-to-air missile armament with the multi-channel employment capability. The Su-34 has an operating range of 4,000 km, can develop a maximum speed of 1,900 km/h and is capable of carrying a weapon payload of up to 8 tons. The Su-34 is half as noisy as earlier models. •





FIRST BATCH OF RUSSIAN-MADE SU-30SM FIGHTERS ARRIVES IN ARMENIA / ARMENPRESS

he SU-3oSM fighter jets have been supplied to the Armenian military. Prime Minister Nikol Pashinyan and Defense Minister Davit Tonoyan personally visited on December 27 the airfield where the aircraft landed. The pilots performed maneuvers and showcased the jets' capabilities before landing.

The exact number of supplied planes is unclear at the moment. Previously it was announced that Armenia would acquire 12 jets.

The Prime Minister then stepped into the cockpit of one of the jets and was briefed by a military official about the SU-30SM's capabilities.

The Sukhoi Su-30 is a Russian-made twin-engine, two-seat supermaneuverable fighter aircraft. It is a multirole fighter for all-weather, air-to-air and air-to-surface deep interdiction missions. The Su-30SM is considered to be a 4+ generation fighter jet. The aircraft has been upgraded for radar, radio communications systems, friend-or-foe identification system, ejection seats, weapons, and other aircraft systems. It has frontal horizontal fins and steerable thrusters for supermaneuverability.

The aircraft can be used to gain air supremacy as well as for targeting adversary on the ground using wide range of weapons including air-to-air, air-to-surface and guided and unguided bombs with total weapons weight up to 8,000 kg. ◆

SERBIA RECEIVED FOUR MI-35M HELICOPTERS AHEAD OF SCHEDULE / MILITARY REVIEW

he Serbian Ministry of Defense received four Russian Mi-35M helicopters. On December 2, helicopters landed safely at the airfield of the Batainitsa military base near Belgrade.

Russia delivered four Mi-35M helicopters to Serbia ahead of schedule. Initially, it was reported that the cars would arrive in Serbia during the first quarter of 2020. In total, the Serbian Air Force will include seven Mi-35 helicopters and three Mi-17 helicopters.

Serbian Minister of Defense Alexander Vulin called these Russian helicopters the best in the world in their class. According to Vulin, Mi-35M are real flying tanks that can reliably protect the Serbian airspace and strengthen the combat potential of the country.

In the near future, the Serbian military is awaiting the arrival in Serbia of the Pantsir-S1 anti-aircraft missile-cannon systems (ZRPK), the supply of which Belgrade has fully paid for.

In 2018, the Russian Federation transferred six MiG-29 fighters to Serbia, in 2019, Serbia received ten BRDM-2 and, ahead of schedule, three Mi-17B-5 transport helicopters as part of Russian military-technical assistance. It is planned to supply to Serbia 30 T-72 and 20 BRDM-2 combat vehicles. ◆





RUSSIA, INDIA DEFENCE COOPERATION – DESTINED TO GROW!

India gained independence after centuries of British rule just a couple of years after the Soviet Union emerged victorious in the Great Patriotic War, bringing Nazi Germany to its knees through heroic sacrifices and sheer grit of its people.

Text by Vijainder K. Thakur

y the middle of the 1950s, an affinity had started to develop between the two nations nurtured by their geographical proximity and past struggles against invaders from the West. Slowly but inexorably, the Soviet Union and India gravitated into a strategic partnership by the early 1960s, a relationship that has not just endured for 50 years but has grown increasingly stronger with time.

INTRODUCTION

Today, Russia is India's foremost and most dependable strategic partner. The part-

nership is characterized by close political alignment in global affairs, the complete absence of any mutually contentious issues, and a groundswell of people to people support. Most Russians above the age of 50 today fondly recall Indian films and songs just as most Indians above the same age recall how a Soviet nuclear submarine stopped the USS Enterprise in its tracks in December 1971 when the 7th fleet entered the Bay of Bengal to prevent the Indian Army from liberating Bangladesh! They also recall the numerous occasions during the past 50 years when the Soviet Union/Russia exercised veto power in the UN Se-

curity Council to block resolutions detrimental to Indian sovereignty over Kashmir sponsored or supported by the West.

NATURE OF THE PARTNERSHIP

The nature of the strategic partnership between Russia and India is special. Paradoxically, bilateral trade volumes do not reflect the depth of the partnership. In 2002, bilateral trade between the two nations stood at a mere \$1.5 billion. Since then, as a result of concerted efforts by the leadership of the two nations, trade volumes increased by over 7 times to \$11 billion in 2012.

TABLE I. MONETARY WORTH OF RUSSIA'S IMPORTS AND EXPORTS IN 2017–2018 (USD millions)

YEAR	Russia's import	Russia's export	Total	Russia's Trade Balance
	from India	to India	trade	w.r.t India
2017	2898.20	6454.70	9352.90	+3556.50
2018	3219.90	7750.20	10970.10	+4530.30

TABLE 2. RUSSIA'S SHARE IN INDIA'S TOTAL IMPORT IN 2017–2019 (USD MILLIONS)

Country	2017–2018	Share, %	2018–2019	Share, %	Growth, %
Russia	8,573.46	1.8415	5,840.44	1.1361	-31.88
India's Total Import	465,580.99		514,078.42		+10.42

In 2014, Russian imports from India amounted to \$3.1 billion or 1% of its overall imports, and 0.7% of India's overall exports!

The table (table 1), released by the Indian embassy in Moscow, shows the monetary worth (in USD millions) of imports and exports during the past two years (2017–2018).

The table 2 based on data released by the Government of India reiterates the underperformance in bilateral trade.

The true depth of the strategic partnership is best gauged by the nature of Russian exports to India over the past five decades comprising military, space, nuclear hardware, and technology that India could not have sourced from anywhere else in the world. In all cases, the hardware supplied represented the best in Soviet/Russian technology.



DMITRY SHUGAYEV, CHIEF OF THE FEDERAL SERVICE FOR MILITARY-TECHNICAL COOPERATION

Last year and today saw the emergence of a tremendous portfolio of contracts in contrast to all previous years, \$14.5 billion. This is an impressive figure, it's a real breakthrough A complete list of highly coveted military, space and nuclear hardware supplied is beyond the scope of this article but it includes fighter jets (MiG-21, MiG-23, MiG-25, MiG-27, MiG-29), warships (Osa class missile boats, Petya class corvettes, Foxtrot class submarines, Kashin-2 class destroyers, Kilo class submarines, Krivak-3 frigates, aircraft carrier), cryogenic engines, and nuclear reactors.

The Indian government's "Make-in-India" may represent a paradigm shift for Western and Israeli weapon system OEM, but it has been integral to the DNA of many Russian weapon systems' exports to India from the early 1960s as illustrated by the list below:

- 1. Licensed manufacture of MiG-21 variants
- 2. Licensed manufacture of Su-3oMKI
- 3. Licensed manufacture of Konkurs 9M113M ATGM at BDL
- 4. Licensed manufacture of T-72 tanks
- 5. Licensed manufacture of T-90 tanks
- 6. Licensed manufacture of BMP-2 APC

Examples of Transfer of Technology (ToT) that India could not have sourced from elsewhere include:

- I. SAM-2 missile technology under DRDO's Devil project. DRDO's Akash surface-to-air missile's antecedents can be traced to the
- 2. Construction of Arihant class SSBN and its nuclear reactor
- 3. Construction of SSN and its nuclear re-
- 4. Development of cryogenic rocket engines that facilitated ISRO's cryogenic upper stage (CUS) development
- 5. Missile RF seeker technology used on the Akash-IS, QRSAM and Astra

Slowly but surely, Russia and India have moved from a buyer-seller relationship to joint research, design development and production of state of the art military platforms. Examples of Russian-Indian defense technology development projects include:

- I. Brahmos, Brahmos-A, Brahmos-NG and Brahmos-2 missile variants
- 2. Solid Fuel Ducted Ramjet (SFDR) missile engine
- 3. Hypersonic Technology Development Vehicle (HSTDV)

RUSSIAN WEAPON EXPORTS AND INDIA'S THREAT PERCEPTION

India is embroiled in border disputes with two neighbours – China and Pakistan, both strong military powers, the former is also an economic giant. Since China and Pakistan are strategic partners with intertwined economies, India perceives a collusive threat from the two nations that prompts India to acquire the finest military hardware that it can acquire. As a result, India's domestic arms industry hasn't had the opportunity to grow and flourish.

India's reliance on imported weapon systems frequently make it the largest arms importer in any given year. Historically, Russia, by a wide margin, has been the largest arms exporter to India.

However, from 2014 to 2017 Russian weapon exports to India ceded significant ground to weapon exports from the US and Israel, raising concerns that Russia and India are perhaps drifting apart as can be seen in the chart (Fig. 1) compiled from SIPRI Arms Transfers data.

Of late, the US has stepped up in its defense interactions with India with an aim to contain the threat that it perceives from China's rapid military expansion and modernization. Also – to force India to reduce its dependence on Russian weapon systems and thereby intensify the economic squeeze

FRANCE, ISRAEL, RUSSIA AND UNITED STATES

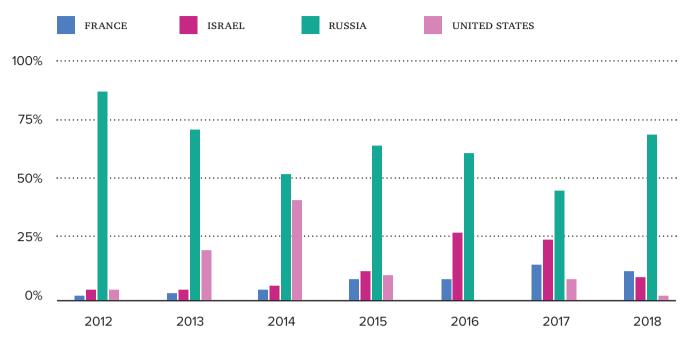


Figure 1. India's main arms imports in 2012-2018

of Russia. The US appears to be using its characteristic stick and carrot approach to dissuade India from purchasing Russian weapon systems, threatening sanctions if India does not comply and promising better weapons if it does. Some analysts believe the US pressure on India is working.

However, the drop in Russia's share of arms exports to India can be more logically explained in other ways.

The rise in the US weapons exports to India is linked to the 2005 India-US nuclear deal that gave India access to civilian nuclear technology and fuel from other countries. The deal was steered and supported by major US weapon system OEMs. As a qui-pro-quo, since 2008 India has awarded the US arms supply contracts worth more than \$15 billion including that for the C-17 Globemaster and C-130J transport planes, P-8 (I) maritime reconnaissance aircraft, M777 light-weight howitzer, Harpoon missiles, and Apache and Chinook helicopters. Another \$10 billion worth of orders are in the pipeline.

The rise of Israel as an arms exporter to India could be attributed to:

- I. The parallels between the external threats faced by Israel and India from bordering countries. Very often, Israel has just the weapon that the Indian armed forces need;
- 2. India's desire to diversify its defense equipment sources.

A swing back in favour of Russia was evident in 2018. It's likely that Russia will continue to regain more of the lost grounds through forthcoming deals, such as:

- 1. Supply of five S-400 systems
- 2. Joint manufacture of Ka-226T helicopters
- 3. Lease of another Akula-1 class SSN
- 4. Supply of Project 11356 stealth missile frigates
- 5. Supply of upgraded T-90S kits

On a somewhat longer timescale, India and Russia are negotiating an upgrade of the entire IAF fleet of 272 Su-30MKI aircraft.

The following are some very good reasons why India would continue to look favourably at weapon systems that Russia has to offer:

- I. Cost effectiveness of Russian military hardware
- 2. Willingness to transfer latest weapon systems to India (Su-57, Su-35, MiG-35, S-400)
- 3. High levels of mutual trust
- 4. No-strings-attached nature of weapon exports
- 5. Russian flexibility
- 6. Suitability of Russian weapon systems to India

The first four points listed above require no elaboration.

RUSSIAN FLEXIBILITY

Russia has shown a lot of flexibility in meeting India's defense aspirations in contrast to the US.

In pursuit of a deeper strategic relationship to India, in 2012 the US signed an agreement with India referred to the Defense Trade and Technology Initiative (DTTI) which was aimed at streamlining the approval process for release of the US technology to India, removing bureaucratic hurdles with the aim of increasing defense trade and exploiting the potential for coproduction/co-development.

Over the years, the US has alluded that it would be willing to transfer the following technologies to India under DTTI:

- 1. Aircraft carrier
- 2. Radar signature reduction
- 3. Hot engine
- 4. Stealth coating
- 5. Advanced military helicopters
- 6. Infantry combat vehicle

However, during negotiations, the US inflexibility rapidly came to the fore. In all the above cases, the US subsequently balked from substantive ToT. Instead it offered ToT for relatively low technology weapon systems, such as:

- I. Javelin Anti Tank Guided Missile (ATGM)
- 2. Sealink Advanced Analysis (S2A) systems to track vessels and enhance maritime domain awareness
- 3. Raven mini-drones
- 4. Roll-on/Roll-off reconnaissance modules for C-130J
- 5. Mobile electric hybrid power sources
- 6. Chemical-biological warfare protection gear for soldiers



EUROSATORY

08-12 JUNE 2020 / PARIS

THE UNMISSABLE WORLDWIDE **EXHIBITION**



1,802 exhibitors



from 63 countries 65.9% of international

65 startups at Eurosatory LAB

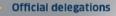


98,721

Total attendance press, organisers)



227



from 94 countries and 4 organisations (representing 760 delegates)



696

journalists from 44 countries



75 Conferences

2 102 Business meetings made







Ironically, the Javelin ATGM ToT offer was made only after DRDO successfully tested its own man portable ATGM.

Only in the cases of systems listed at points 5 and 6 has there been tangible progress.

Now the US is offering:

- I. C-130J/C-17 launched small drone swarms
- 2. Light-weight small arms technology
- 3. ISTAR systems
- 4. Maritime domain awareness (MDA) solutions
- 5. Virtual augmented reality solutions for aircraft maintenance (VAMRAM)

The non lethal nature of the technology that the US is ready to transfer is evident.

In the same timeframe, Russia has offered to India substantial ToT and local production for a 5th generation fighter based on the Su-57, Ka-226T helicopter, Project 11356 frigate, MiG-35 fighter, Su-35 fighter, and Project 75I submarine.

In the past, Russia has skirted Western technology denial regimes using creative solutions such as lease to transfer SSNs to the Indian Navy, and the use of non state actors for cryogenic engine ToT.

Russia has been quick to adapt to growing Indian technological capability and desire for local manufacture through joint ventures.

Besides the existing Russia-India JVs listed earlier, Russia has proposed JV/ToT for:

- I. Building Project 12701 mine countermeasure vessels at GSL
- 2. Building Project 75I with MoD chosen strategic partner.



SB DEO, FORMER VICE CHIEF OF THE INDIAN AIR FORCE AIR MARSHAL

Russia's technology transfers to India in the defence sector have been without any strings attached and there is scope for further deepening the military ties

SUITABILITY OF RUSSIAN WEAPON SYSTEMS

Both India and Russia believe in a multipolar world order. They both face financially stronger adversaries. Their defense postures are aimed at deterring military coercion rather than indulging in aggression.

To keep deterrent costs within limits, Russia responds asymmetrically to threats through the use of disruptive technology. Unique Russian systems such as terrestrial air combat EW systems (like the Krasukha-2 and Krasukha-4) are examples of disruptive technology fielded by Russia for conventional wars.

India could do well to adopt the Russian approach and jointly develop low cost systems to counter overwhelming adversary technological and financial superiority.

Despite its significant strides in developing and manufacturing weapon systems such as missiles, radars, communication and combat management systems, India has a long way to go. It could take India between 20 to 30 years of relentless efforts and financial investments to create a large enough scientific and engineering talent pool with matching industrial base to address the entire spectrum of its weapon system needs. Every year spent in catching up with OEMs in Russia, Germany, France, the USA and Israel will put India one year back in developing the next generation weapon systems. The challenge ahead isn't trivial.

It would make sense for India to continue its fruitful partnership with Russia through more and more JV development of advanced next generation systems.

THE IRRELEVANCE OF THE CHINA FACTOR

Many defense watchers in India are concerned about Russia's close defense ties with China. Such fears are baseless because operational effectiveness of modern weapon systems is more dependent on sensor capabilities and software algorithms rather than hardware. The formers are known and understood only by the original developer. For example, despite their common Russian origin, not only are IAF Su-30MKI physically different from PLAAF J-II fighters but they differ to such a great extent in their sensor and software capabilities that no operationally significant assumptions can be made by a potential adversary.

The cost of developing software algorithms in support of weapon systems now invariably exceeds the cost of developing the hardware.

THE PATH AHEAD

Unlike in the past, when India's bureaucracy was sceptical about sincerity and reliability of the Indian private sector, today there is a strong desire in the country to leverage the talent and financial clout of the private sector for defense manufacturing. Western OEMs such as Boeing, Lockheed and Dassault, being private enterprises themselves, have quickly adjusted to the change in sentiment and established JVs with numerous private sector entities. Similarly, Israel's Rafael has set up numerous JVs with the private sector.

Russian OEMs, being state enterprises, have hitherto limited their local manufacture and technology transfer tie-ups to public Indian sector companies such as HAL, Hindustan Shipyard Limited (HSL), and Ordnance Factory Board (OFB). Also, the tie-ups have focused on weapon systems integration more than manufacture of spare parts and assemblies required to keep the weapon system functioning. As a result, even when using Russian weapon systems integrated in India the Indian armed forces have been forced to rely on spares manufactured in Russia and channelled to India through a torturous logistics pipeline easily blocked by bureaucratic ineptitude or differing obsolescence perception between the Indian integrator and the Russian OEMs. Hence, Russian weapon systems posed maintenance challenges that have unnecessarily brought them disrepute.

Russia needs to harness the groundswell of support for manufacture of defence equipment and spares in the private sector through business to business tie-up with Indian private companies in general and Indian MSMEs in particular.

Russia understands the situation, that is evident from the joint statement issued by the Prime Minister Narendra Modi and the President Vladimir Putin calling for action to "improve the after-sales service" of Russian equipment and "to encourage joint manufacturing in India of spare parts, components, aggregates and other products for maintenance of Russian-origin arms... through transfer of technology and setting up of joint ventures."



Incorporating

Hosted, Supported & Co-organised By:



MINISTRY OF DEFENCE AND MINISTRY OF HOME AFFAIRS

20 - 23 APRIL 2020 MITEC, KUALA LUMPUR

ADVANCING INTO NEW ERA OF DEFENCE

Fully Supported By:





















A Member Of:



MALAYSIA EXTERNAL RADE DEVELOPMENT

Strategic Partner:



Official Publication:

Official Online Media Partner:



Official E-Show Daily



Official Naval Media:

Official Destination





For further information, kindly contact DSA 2020 Sales Office: DSA EXHIBITION AND CONFERENCE SDN BHD (423338-H)

Suite 5-01, Level 5, Sunway Visio Tower Lingkaran SV, Sunway Velocity 55100 Kuala Lumpur, Malaysia Tel: +603 9771 2688

Fax: +603 9771 2799 E-mail: enquiry@dsaexhibition.com

MALAYSIA & ASIA SALES

EZWAN EFFENDY E-mail: ezwan@dsaexhibition.com

E-mail: hazdi@dsaexhibition.com

WORLDWIDE SALES

SHAUN WHITE E-mail: swhite@dsaexhibition.com Tel: +44 20 7560 4040

SPONSORSHIP / BRANDING

PETER MCKENNA SPONSORSHIP PRODUCER E-mail: info@official-events.net



HAZDI HASRUL













MTC OF RUSSIA WITH MIDDLE EAST AND NORTH AFRICAN COUNTRIES: STATUS AND OUTLOOKS

It is not a secret that the Middle East and North Africa region is one of the world's most attractive for arms manufacturers and exporters. According to data of Stockholm International Peace Research Institute (SIPRI), out of 10 largest arms importers in 2014–2018 five countries (Saudi Arabia, Egypt, Algeria, UAE, Iraq) were from this region. In these circumstances, in three cases, Russia was among the three largest suppliers for these countries¹.

Text by Andrey Frolov



s of itself, this market is quite broad in terms of finances and demonstrates a tendency for further growth. According to data of the SIPRI, it grew by 87% through 2014 to 2018 as compared to the previous five-year period. In light of this, it is interesting to take a look at this market in regard to Russian arms exporters and track its dynamics. It should be noted that in connection with relatively low coverage of this topic in Russian media the regional data are incomplete and patchy.

So, the regional structure of order portfolio in 2015 was as follows: Asian-Pacific Region – 42%, Middle East and North Africa – 36%, Latin America and CIS – 9% each, other regions – 4%. In this regard, the largest importer is India and in total the first ten importing countries cover up to 70–80% of supplies².

According to data of the FSMTC, the geographical composition of exports in 2017 looked as follows: 48% – Middle East and North African countries, 45% – Asian-Pacific Region. Europe accounted for only I-2% of supplies, it was mainly effective contracts for repair and maintenance of

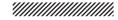
helicopter equipment in Eastern Europe³. However, in November it appeared that Middle East and North African countries accounted for about 20%, or 8 billion US dollars in JSC "Rosoboronexport" portfolio (in other words, it is possible to conclude that the special export portfolio was 40 billion US dollars at that moment)⁴. As it can be seen, the share of this region grew through 2015 to 2017 for Russian arms and military equipment manufacturers.

There was some information reported for 2018. As of the end of August, 60% of the orders portfolio were from North African countries and APR including India and China. Middle East countries and Arabian Peninsula all together accounted for about 20%, Sub-Saharan Africa - about 10%, CIS countries - 5%5. At that time, the whole order portfolio reached 45 billion US dollars, in other words, these values amounted to 27 bln, 9 bln, 4.5 bln, and 2.25 bln US dollars respectively. It is interesting that in the end of September the order portfolio from "African countries" without stating details was reported to be 3 bln US dollars6.

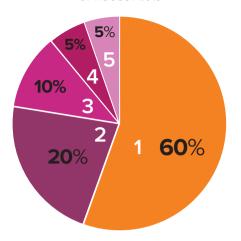


DMITRY SHUGAEV,
DIRECTOR
OF THE FEDERAL SERVICE
FOR MILITARY TECHNOLOGY
COOPERATION (FSMTC)

This is a very important region for us – the Middle East, North African countries, approximately half of our exports of military products go to these regions. Vietnam and China are also important: China will be among the top five by the results of 2018. We are also looking at Indonesia as a country that is of priority for us



ARMS SUPPLY GEOGRAPHY AS OF THE END OF AUGUST 2018



1. THE COUNTRIES OF NORTH AFRICA
AND ASIA-PACIFIC,
INCLUDING INDIA AND CHINA
2. MIDDLE EAST COUNTRIES
AND THE ARABIAN PENINSULA
3. SUB-SAHARAN AFRICA
4. CIS COUNTRIES
5. THE REST



Pantsyr-S1 ADMGS



ALEXANDER MIKHEEV, DIRECTOR GENERAL, JSC "ROSOBORONEXPORT"

......

Today, for products manufactured by Concern "Kalashnikov" there is a great demand for joint manufacture in the markets. African countries, Middle East countries, South East Asian countries – all of them are interested in manufacturing Kalashnikov machine guns

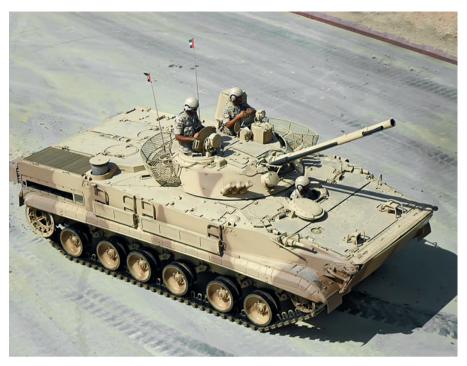


This region from the viewpoint of Russian Defense Industrial Sector is believed to be insistent on high standards of arms and equipment to be purchased. This often results in a situation when local clients become the launch customers for many Russian armament systems. This is what happened, for instance, in case of UAE: The Air Force and Air Defense of this country became the launch customer of Pantsyr-S1 ADMGS, having received 50 combat machines mounted on MAN SX45 (8x8) truck from 2010 to 2013 under a contract signed in 2000 with Russian JSC Instrument Design Bureau. Much earlier, in 1992, the UAE purchased the largest batch of infantry combat vehicles BMP-3, having actually introduced this vehicle to the global market.

Other examples include the first purchase of Yak-130 combat-capable trainer aircraft by Algeria. The same country has become a full-scale export customer for Iskander-E Tactical Ballistic Missile System and MI-28NE assault helicopter. It was also reported that Algeria could become the first customer of SU-32 front-line bomber, however, up to now this information has not been confirmed yet. It is interesting that the second contract (and the last one so far) for MI-28NE has been concluded by a country from this region - Iraq. Egypt could not stay away from purchasing new products either - it has become the launch customer for Ka-52 attack helicopters and MIG-29M/M2 jet fighters. Jordan has become the first and the only buyer of the extended modification of IL-76 – IL-76MF military transport aircraft. Even Gaddafi's Libya managed to purchase first self-propelled ATGM Khrizantema-S and to receive some of them prior to the beginning of combat activities.

Also it's worth to note such a factor as series production. Almost all contracts with countries of this region are of large scale. So, in total the UAE purchased 815 BMP-3 and 50 Pantsyr-S1 ADMGS, Egypt - 46 Ka-52 and the same amount of MIG-29M/M2, Algeria - 38 Pantsyr-Si ADMGS and 42 MI-20NE, Iraq - about 300-500 BMP-3, 200 tanks T-90CA, 28 attack helicopters MI-35M and 15 MI-28NE. It is obvious that this list can be continued. Such great amounts of supply not only bring in hard currency revenues to Russian defense enterprises but are also highly profitable and make it possible to keep up production and build long term plans.

Finally, recently this region has acquired a new meaning for Russia. The outbreak of combat operations in Syria with Russia's involvement (September 30, 2015) became the important factor. To a wide extent, Syria has been used as a "showroom" for Russian arms and weapon systems and many of them have finally become labeled as "combat proved". Military and political success in the Syrian





ILIYA TARASENKO DIRECTOR GENERAL FOR MTC. UNITED AIRCRAFT CORPORATION

.....

Today, the MIG aircraft operate in over 50 countries worldwide. We are promoting for export the deeply modernized MIG-29 aircraft in M/M2 modification and also work to promote the MIG-35. Interest in these aircraft is shown by countries which use MIG-29 in the South East Asia, Middle East and Latin America



BMP-3

direction made also possible the fact that some regional states of those previously oriented towards Western suppliers (first of all, Qatar and Saudi Arabia) have taken interest in Russian arms and systems and in some cases even started to purchase them, however, in small amounts so far.

On the other hand, over the last years, armament exhibitions in the Middle East have actually turned out to be the main venues (together with China and India) for showcasing Russian armaments, apart from exhibitions and show rooms in Russia and CIS, - due to no access to the largest Western exhibitions.

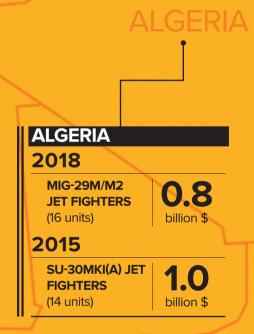
The following factors may pose risks for Russia in this market. First of all, this is a global threat in the form of American sanctions. Regional countries have already encountered this: for example, Egypt – in connection with a contract to purchase SU-35 jet fighters. One more risk that can be deemed is the outbreak of "Arabian spring 2.0", because the internal instability of this region may lead to a reduction in armament purchases. A serious challenge to be dealt with is increased competition on the part of the main Western armament manufacturers and China as well as new players, such as Turkey (which has started to play an active part in this region over the last few years) or South Korea. Finally, it should be pointed out that there is risk of running into technological inferiority of products offered by Russia in the local market, as they have to compete with most advanced competitors' offers.

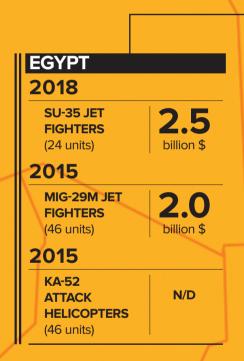




- ¹ Trends in international arms transfers, 2018. SIPRI Fact Sheet, March 2019.
- ² Web-page: http://bmpd.livejournal.com/1547499.html
 ³ The FSMTC evaluated Russia's position in the global arms market // Lenta.Ru, 18.07.2017.
- ⁴ The order portfolio of Rosoboronexport from Middle East and North African countries is worth of 8 billion US dollars -
- head of Rosoboronexport Mikheev // Interfax-AVN, 15.11.2017.
- Dmitry Shugaev: Russia has found ways to bring in new partners for MTC // RIA "Novosti", 20.08.2018. 6 FSMTC Director: Russian arms get back to Africa // Interfax-AVN, 20.09.2018.

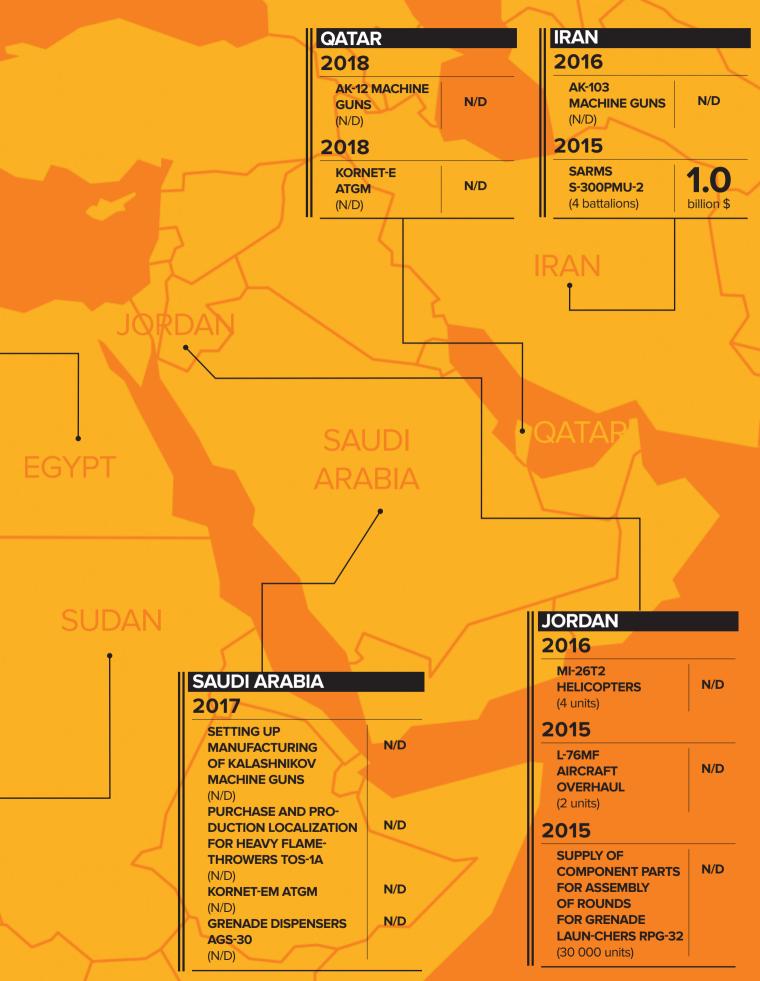
RUSSIA'S MAJOR ARMS CONTRACTS WITH MIDDLE EAST AND NORTH AFRICA COUNTRIES IN 2015–2018











EXPORT OF GROUND FORCES EQUIPMENT FROM RUSSIA

Russian export supplies of aviation equipment and AD systems traditionally exceed 50% of the entire product range, however, the importance of ground forces equipment supplies should not be underestimated.



Text by **Andrey Frolov**

or example, in 2017, the share of aviation equipment was traditionally 50%, after that ground forces equipment followed (there were estimates from 20 to 30% during the year), then up to 20% - AD systems and around 6-7% navy equipment¹. The same year it was announced that there was a rising demand for small arms, close combat weapons, sights, and ammunitions. With this, over 2014 to 2017 the order portfolio of JSC "Rosoboronexport" for these products increased by more than five times. A year earlier the share of ground equipment was slightly less (16%), it was at the third position having let aviation and AD systems ahead2. Just about the same picture was observed in 2014: the same third position, although with much higher share - 21%, just a little behind the AD equipment with its 25.7%3.

Some absolute indicators were announced as well – so, in the beginning of September 2015 the order portfolio for this weapons segment accounted for about 12 bln US dollars, however the total portfolio was about 38–45 bln US dollars during that year.

All this makes it possible to state that exports of ground forces equipment are an important element in the Russian MTC system and generate several billion dollars in hard currency revenues per year. To tell the truth, it is possible to identify very few contracts, in addition, for a number of popular positions it is difficult to say whether it is a new production or the supplies are delivered from inventory of the Russian Ministry of Defense.

It is important to note that exports in the past made it possible to save production for a few critical products. This is what happened with BMP-3, which was literally "saved" by a contract with the UAE in the beginning of the 1990s as well as T-90 tank, contract for which with India significantly improved positions of its manufacturer JSC SPC "Uralvagonzavod". It is interesting that due to the first large contracts with "launch" customers it was possible to sign new contracts, which allowed production lines to run in years to come. Once again, in the near past it was Iraq with BMP-3 and Algeria with T-90, that has become the second largest buyer of this tank after India (by purchased units). It is also encouraging that there are export supplies of new generation Russian equipment, as it was in the case of Uzbekistan and protected motor vehicles 3A-53949A, which were delivered to foreign customer one year after they had been put in service in the Russian army.



VLADIMIR PUTIN. PRESIDENT OF RUSSIA

Defense industry enterprises are almost fully loaded with tasks of the Ministry of Defense manufacturing certain types of army weapons, and it becomes more and more difficult to meet the MTC orders in the timely manner as declared. Obviously, if we turn down foreign orders today then tomorrow we may lose our promising partners and leave the market





ALEXANDER MIKHEEV DIRECTOR GENERAL. JSC "ROSOBORONEXPORT"

Biggest amounts of military and dualcapable supplies go to countries of the South-Pacific region, the Middle East and North Africa. Traditionally, aviation equipment accounts for up to half of the total supplies volume. Ground forces equipment and AD systems hold the second and third positions





VLADIMIR DROZHZHOV. DEPUTY DIRECTOR, **FEDERAL SERVICE** FOR MILITARY AND TECHNICAL **COOPERATION**

All kinds of Russian military equipment are widely represented in Indian armed forces, ground-based, Navy, and aviation

•••••



For a long time, Russia could not boast with large supply contracts for small weapons. Until recently, the peak success was contracts with Venezuela for supply of 100 thousand AK-103 machine guns (2005) and construction of a new factory for manufacturing machine guns and 7.62 x 39 caliber rounds for them (2006). Russian machine guns were supplied quite fast, within one-year time, but the factory is still under construction. Another big contract was the contract with Azerbaijan for licensed manufacture of 120 thousand AK-74M machine guns (Azerbaijan designation Xəzri) in a period of up to 2021, in this case 100 thousand machine guns were manufactured already by the middle of 20194.

After that there has been a slack period for almost 10 years which was broken only by unpleasant losses in the traditionally Russian markets, though some separate contracts have still been signed. For example, in Vietnam the Russian offer lost to Israel Galil ACE.

However, everything changed in 2019 when a joint venture for licensed production of 7.62 mm Kalashnikov AK-203 machine guns opened in India. In total, India is planning to manufacture 650 thousand AK-203 machine guns5. This joint venture was established by Indian State Defense Industrial Association Ordnance Factory Board (OFB, a share in JV - 50.5%) and Russian JSC "Rosoboronexport" and JSC "Concern "Kalashnikov" (49.5%). This contract has become one of the biggest contracts for small arms supply and it seals Russian positions in the Indian market for many years to come. At this background, a separate contract - also with India - for supply of 50 thousand AK-203 machine guns made in Russia, which was executed in 2019, may be regarded as a "warm-up" before the abovementioned large production contract⁶. It seems that a contract with Saudi Arabia. formally signed earlier for licensed production of Kalashnikov machine guns, is not being executed yet.

Supplies of ground-based equipment to Syria should be mentioned separately. These supplies go through the Ministry of Defense and are extremely well known due to Turkish ship spotters (who record passages of Russian transport and assault landing ships in the straits) as well as to a great number of photos taken on-thescene in Syria. Due to these it is possible to monitor quite quickly the arrival of a new batch of Russian equipment in Syria. Russia actively supplies big amounts of armored force vehicles (tanks T-90A, T62/62M, infantry combat vehicles BMP-I, armored cars K-43269, motor vehicles, haulers MT-LB, artillery systems, ammunitions, uniforms etc.). Probably, Syria may be considered as the largest receiver of ground forces equipment from Russia in terms of actual volumes.

In general, it is possible to make a conclusion that Russian exports of groundbased systems have entered a kind of "plateau", which amounts to about 2-3 bln US dollars annually. Some growth can be expected if new generation platforms enter the market, first of all such as tanks T-14, heavy armored vehicles BMP T-15, BMP "Kurganets-25" and "Bumerang", new samples of small arms and individual protection means as well as anti-tank systems.



¹ Presidential advisor Kozhin: Over 50% of worldwide demand for military equipment from the Russian Federation is aviation // Rambler News Service, 23.03.2017; Order portfolio for Russian weapons amounts to about 50 bln US dollars // Rambler News Service, 30.08.2017.

² The share of armaments in Russian exports is 4.2% // TASS, 03.11.2016.

³ Russia does not plan to increase arms export in years to come // PRAIM, 12.08.2014.

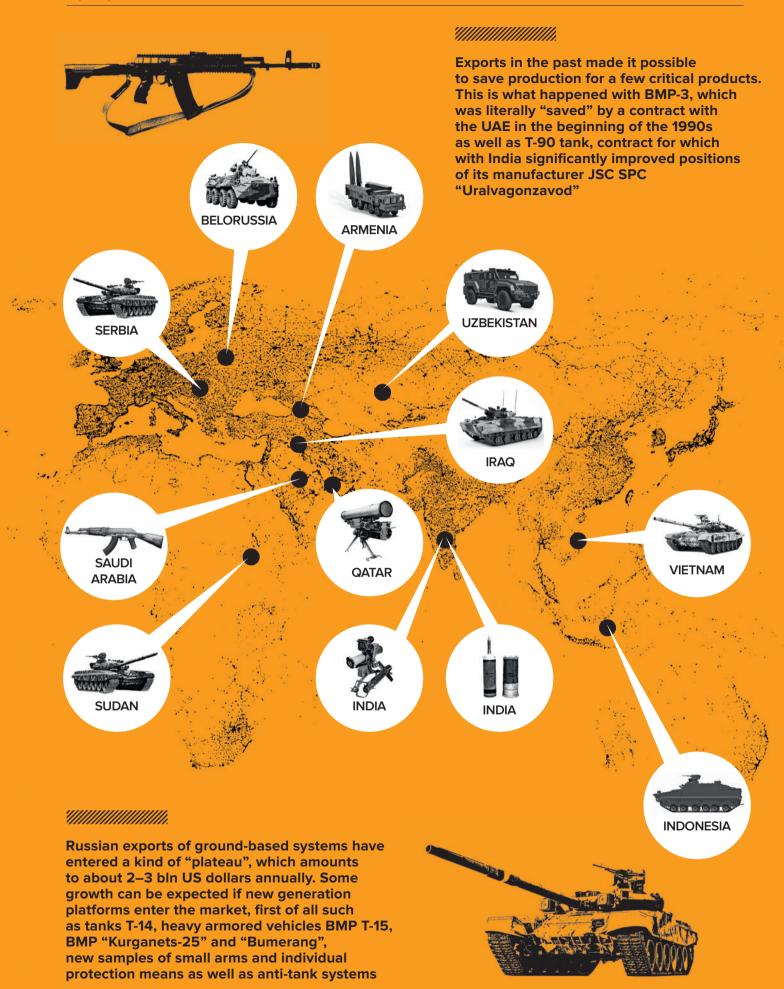
⁴ Over a 100 thousand AK-74M assembled in Azerbaijan // bmpd.livejournal.com, 19.05.2019.

⁵ Indian defense industry will be able to meet the national army's needs for small weapons based on advanced Russian technologies – Putin // Interfax-ABH, 03.03.2019

⁶ Russia supplied 50 thousand Kalashnikov machine guns AK-203 to India // Interfax-ABH, 03.03.2019.

THE LARGEST AND MOST IMPORTANT KNOWN CONTRACTS FOR SUPPLY OF GROUND FORCES EQUIPMENT SIGNED BY RUSSIA IN 2014–2019

COUNTRY	YEAR	SUPPLIED PRODUCT	NOTE
IRAQ	2014	Infantry combat vehicles BMP-3	Contract is estimated to be from 300 to 500 BMP-3 units. First supplies under this contract took place in 2018
INDIA	2014	Sub-caliber 125-mm shells 3BM42 "Mango"	66,000 shots are to be supplied under this contract
BELORUSSIA	2015	Armored vehicles BTR-82A	Supplied batch was 32 machines
SUDAN	2016	Tanks T-72	Tanks were supplied from inventory of the Ministry of Defense of Russia. 150 tanks were handed over in operational condition, 20 as a source of spare parts
ARMENIA	2016	"Iskander-E" Tactical Ballistic Missile System	Supply included maximum one squadron. This is the first export supply for this TBMS
SERBIA	2016	Tanks T-72S	Tanks were handed over to Serbia free of charge from storage of the Ministry of Defense of Russia
VIETNAM	2017	Tanks T-90S/SK	Vietnam ordered 64 tanks, which were supplied in early 2019
SAUDI ARABIA	2017	A package of contracts for direct purchase and licensed production of a number of armaments	This includes manufacture of Kalashnikov machine guns
QATAR	2018	"Kornet-E" ATGM, AK-12 machine guns	Despite low volumes and not so big money, these contracts are of important symbolic nature, because Qatar hase never purchased Russian armaments before
UZBEKISTAN	2018	Armored vehicles 3A-53949A	Supplies of first vehicles took place in 2019. This is the first export supply of such an armored vehicle, and also the first shipment of fully protected mine resistant vehicle (MRAP) of Russian design and manufacture
INDIA	2019	9K113M "Konkurs-M" ATGM	A new contract for manufacture of anti-tank guided missile systems "Konkurs M" for Indian army was signed
INDONESIA	2019	Infantry combat vehicles BMP-3F and floating armored vehicles BT-3F	Indonesia contracted 22 BMP-3F and 21 BT-3F to a total amount of 175.2 mln US dollars. This became the first contract for BT-3F which was designed specially for Indonesia



AVIATION. MTC BETWEEN RUSSIA AND ALGERIA

Algerian Air Force has a pressing need for upgrading its aircraft in service. After almost fifteen-years embargo (1990–2005) Algerian AF has started an extensive modernization program. This process was initiated after the official visit of the President of Russia Vladimir Putin to Algeria in 2007 and conversion of Algerian debt to the Russian Federation into a weapons supply contract.

Text by Akram Kharief

fter this visit Algeria placed an order for two squadrons of SU-30 MKI (A) jet fighters, one squadron of Yak-130 combat aircraft and 28 MIG-29 CMT iet fighters under a 7 billion USD contract signed between Algeria and Moscow. The emphasis was also laid on air defense, which involved several regiments of S-300PMU-2 ADMS and several dozens of Pantsyr-SI ADMGS. This contract has become a new turn in military and technical cooperation between the two countries and revived trust to such an extent that Algeria has made a decision to allocate a substantial part of its defense budget to purchase Russian equipment.

This decision has been beneficial to France as well, this country managed to sell a great amount of optical/electronic and high-precision equipment under Russian contracts for weapons supply to Algeria. This step has speeded up the construction of factories and the setting up of branch offices of Safran and Thalès Groups in Russia. The deal with rejected MiG-29SMT delivered from a factory in Lukhovitsy and Nizhny Novgorod factory "Sokol" and the contract termination that followed later

nevertheless has had no influence on the relationship between the two countries despite the apparent error made by the Russian party.

Since 2011 due to an increase in oil prices Algeria boosted up its revenues in US dollars fourfold, created a big financial reserve and could repay all its external debt. This situation had a positive effect on the arms programs and defense budget, which increased from 5 billion USD (on average) in a period from 2000 to 2010 up to 10 billion USD (on average) within a time interval from 2012 to 2019. The country has managed to strengthen its positions as one of the key importers of Russian weapons, first of all in the field of military aviation, and has become the third largest buyer of Russian weapons between 2010 and 2019, besides it acquired the leading positions following the results of the year 2018.

Nevertheless, it seems that for a number of reasons the Algerian Air Force still encounter difficulties in implementing its modernization program, first of all ones related to preparation and training of aviation specialists. Since 2010 it was decided



SERGREY LAVROV, MINISTER OF FOREIGN AFFAIRS OF THE RUSSIAN FEDERATION

There are good outlooks, and good results have been already achieved in the area of military and technical cooperation. The plans that exist here must be fulfilled, and we intend to implement them as our Algerian friends do







SERGEY SHOIGU, MINISTER OF DEFENCE OF THE RUSSIAN FEDERATION

China, India, Egypt, Algeria, and Vietnam have been our priority partners in the area of military and technical cooperation



The deal with rejected MiG-29SMT delivered from a factory in Lukhovitsy and Nizhny Novgorod factory "Sokol" and the contract termination that followed later neveartheless has had no influence on the relationship between the two countries despite the apparent error made by the Russian party

to give up on aviation schools in favor of specialized fighter jet, transport aviation and helicopter academies. Establishing these training institutions greatly delayed the implementation of the modernization program owing to the need to select aviation equipment for training as well as because these training institutions had to be established at the same time. Thus, hundreds of western helicopters AgustaWestland (at present - Leonardo) were purchased for the helicopter academy. Appropriate trainer aircraft compatible with training literature and training aids of the Soviet and Russian manufacture have been purchased for the Navy and AF. A lot of time was lost because of this.

Yak-130 turned out to be an engineering failure for the jet fighter academy due to some problems related to the aircraft ill-considered design and its engine, as a result it could not be put in service on time. The transport academy had problems with equipment that was heavily used in normal conditions for transport airlifts. This delayed the opening of the academy despite the fact that simulators were handed over and a modern airbase was constructed.

The air transportation fleet through 2000 to 2018 had a great number of accidents and lost five aircraft and this happened in conditions when no replacement could be found in the market. As a result, Algeria has chosen to go with the IL-76MD-90A military transport aircraft, however, the first machines will be delivered only by 2022 or even later. The same relates to the C-130J aircraft, the negotiations on which lasted for about 10 years due to the sanctions imposed by the USA on export supplies to Algeria. Now the country has to wait for 2022 and then it can hope to get the six aircraft on order.

While the neighboring country and competitor – Morocco – has purchased several squadrons of F-16 jet fighters, Algerian Air Force has spent a lot of time on choosing its main jet fighter. This delay was possible to compensate by ordering two batches of extra 14 SU-30, but this did not help make the final choice. For a long time along with the SU-32 front-line bomber the SU-35 has been offered, especially after starting to use these two types of aircraft in the Syrian conflict, however due to some reasons the decision to purchase these aircraft has



DMITRY SHUGAEV, DIRECTOR OF THE FEDERAL SERVICE FOR MILITARY TECHNOLOGY COOPERATION

At present, the Intergovernmental Committees [for MTC] work closely with the United Arab Emirates, Bahrain, Jordan, Morocco, Algeria, Egypt, and Lebanon – we have practically embraced this entire region, sound and long-term mutual relationships have been built







not been made yet. Two important aspects were given special focus in relation to the SU-32 in Algerian specification: it should be a two-seater aircraft equipped with a radar with APAA (active phased array antenna) with a great number of changeable modules.

The Russian industry needed time to answer Algeria's requests. Although, the need to change the SU-24M front-line bomber has become increasingly more and more urgent, and given the excellent results demonstrated by the SU-34 in Syria, nevertheless Algeria found the export version of SU-32 front-line bomber to be lagging technologically. The time spent on negotiations resulted in an unprecedented problem for the Algerian army: it was the US threat to impose CAATSA sanctions (US Public Law "On Countering America's Adversaries through Sanctions Act") on Algeria as the principal buyer of Russian arms and Russia's friend. Pressure from the USA further delayed Algeria's decision making related to the available options of jet fighters and bombers. The Americans have gone so far that offered Algeria to

purchase American aircraft or to order Chinese aircraft.

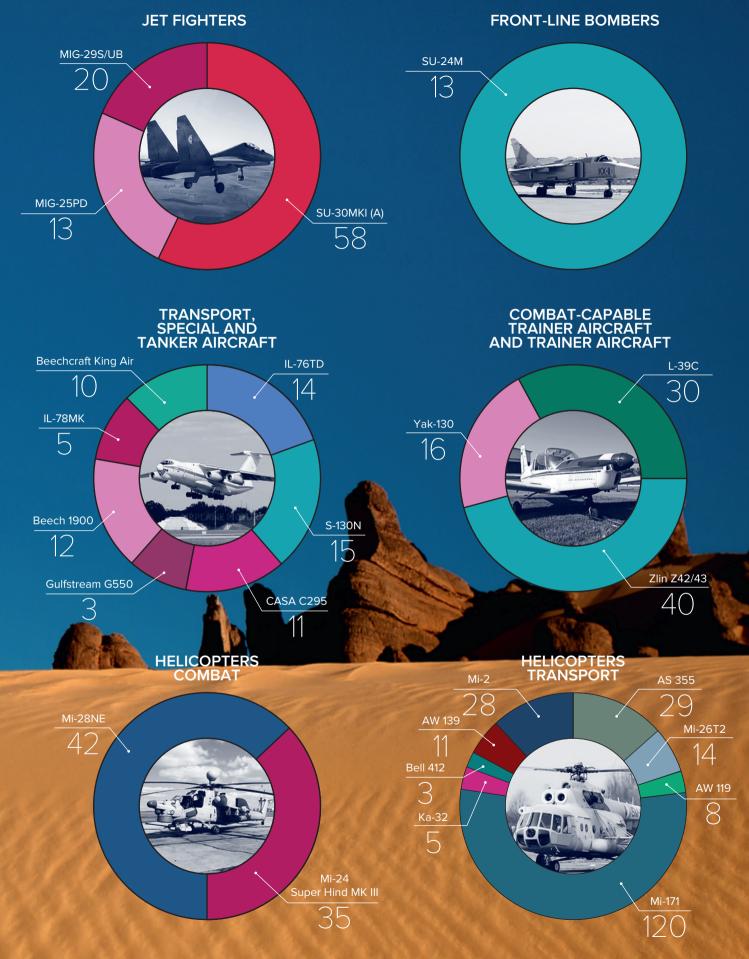
What was even worse, that on February 22, 2019 millions of Algerians took to the streets to put an end to the 20-year rule of President Abdelaziz Bouteflika. And all this taking place in a situation of emerging economic crisis, high inflation rate and uncertainty about the country's financial future. Thus, 2018 was a year of reduced imports, although the army still seemed to avoid cutting down on its expenditures. But with Bouteflika's fall, Chief of Staff Ahmed Gaid Salah had to lead the country that was suffering from financial difficulties and was amid a serious political crisis. This situation may have severe consequences for the aviation modernization program.

International pressure, internal political tension, financial crisis and the lack of priorities in procurement sector will most likely further delay the implementation of Algerian Air Force modernization program. To save time, some urgent measures have been taken including the

upgrade of 40 SU-24 front-line bombers to M2 class with navigation target acquisition system SVP-24 installed or a possible order of the MIG-29M/M2 to replace the MIG-29C, which will be taken out of service by 2020. ◆







ALGERIAN AIR FORCE AIRCRAFT



FIRST ANGARA ROCKET WILL BE USED BY RUSSIAN DEFENSE MINISTRY

/ SPUTNIK.COM

ussia's space agency Roscosmos, which runs the engineering firm behind the design of the heavy-lift Angara rocket, may ink a deal to supply it to the military after a test launch scheduled to be held later this year, a space industry source told Sputnik on Friday.

"The state corporation plans to sign a contract with the Defense Ministry to supply it with Angara-A5 launch vehicles to be used in regular launches after their flight tests resume," the source said.

The rocket will be handed over to the military for the test launch from the Plesetsk spaceport in northwestern Russia by the end of the first quarter of this year, they added.

The test was initially expected to follow the rocket's maiden launch in 2014 but the government's decision to shift Angara production from the Khrunichev Space Center's Moscow factory to a subsidiary near Omsk pushed the second launch back by years.





BLUE ORIGIN START SPACE CONTRACT WITH AIR FORCE RESEARCH LABORATORY / SPACE.COM

n December 2019, Blue Origin, a spaceflight company founded by Amazon founder Jeff Bezos, signed a 15-year cooperative research and development agreement (CRADA) with the Air Force Research Laboratory. The contract laid out plans for the testing of Blue Origin's BE-7 engine, which will be used for the company's lunar lander. On January 27, 2020, the two organizations announced that the engine would be tested on an AFRL site at the Edwards Air Force Base in California.

While the specific financial terms of this contract have not been made public, AFRL did share in the announcement that Blue Origin will provide "capital improvements" to 1-42 (or the Space Environment Propulsion Complex), the facility where tests on this engine will occur.

Because 1-42 creates upper atmospheric or vacuum conditions, the facility can currently test rocket engines and pieces of spacecraft. Improvements to the facility that will allow it to optimally test the BE-7 engine include new liquid hydrogen and liquid oxygen propellant capabilities along with other facility upgrades, the announcement read.

These upgrades and additions will allow I-42 to create a "space-like environment," which will be ideal for testing the engine, the announcement said. The improvements to the AFRL facility will also be available for others to use for future testing, according to the announcement.

"Repurposing the infrastructure at the 1-42 test site enables us to accelerate development of the BE-7 engine for our Blue Moon lunar lander," Eric Blumer, senior director for Blue Origin's BE-7 engine program, said in the announcement. "It will play a critical role in Blue Origin's support of the Artemis program to send women and men to the moon by 2024." ◆

NASA'S SPITZER SPACE TELESCOPE'S MISSION HAS COME TO AN END / NASA.GOV

fter more than 16 years of studying the universe, NASA's Spitzer Space Telescope's mission has come to an end. Mission engineers confirmed that by January 30, 2020 the spacecraft was placed in safe mode, ceasing all science operations. After the decommissioning was confirmed, Spitzer Project Manager Joseph Hunt declared the mission had officially ended.

Launched in 2003, Spitzer was one of NASA's four Great Observatories, along with the Hubble Space Telescope, the Chandra X-ray Observatory and the Compton Gamma Ray Observatory. The Great Observatories program demonstrated the power of using different wavelengths of light to create a fuller picture of the universe.

Among its many scientific contributions, Spitzer studied comets and asteroids in our own solar system and found a previously unidentified ring around Saturn. It studied star and planet formation, the evolution of galaxies from the ancient universe to today, and the composition of interstellar dust. It also proved to be a powerful tool for detecting exoplanets and characterizing their atmospheres. Spitzer's best-known work may be detecting the seven Earth-size planets in the TRAPPIST-1 system – the largest number of terrestrial planets ever found orbiting a single star – and determining their masses and densities.



FIRST ONEWEB SATELLITES WILL LAUNCH FROM THE BAIKONUR / SATELLITEPROME.COM

neWeb Satellites, a joint venture between Airbus and OneWeb to design and manufacture satellites, is set to launch around 34 satellites for the OneWeb constellation from Baikonur, Kazakhstan on February 7, 2020.

The satellites which arrived in two shipments, including one last week, have been tested and have now been fitted into the dispenser of the Soyuz-2.1b rocket. The satellites, which are manufactured at 1/50th of the cost of a traditional spacecraft, are all fitted with plasma thrusters enabling them to reach their correct position in low Earth orbit at 1,200 kilometers. The OneWeb constellation will provide global connectivity with initial 650 satellites. OneWeb aims to provide affordable, high-speed internet connectivity everywhere for everyone, by 2021.

Commenting on the upcoming launch, Jean-Marc Nasr, Head of Airbus Space Systems, said: "This launch will be a massive step forward for OneWeb – one step closer to the ambition of improving global connectivity. These 34 satellites will join the six currently operating flawlessly in orbit. Our joint venture OneWeb Satellites produces two satellites a day – in series production, just like Airbus makes planes."



CHINA READY TO



CHINA READY TO LAUNCH NEW MANNED SPACECRAFT / SPACE.COM

he new spacecraft is designed to boost China's capabilities in sending humans into orbit, reduce costs through partial reusability, and allow astronauts to survive the radiation environment and higher-speed reentries of deep-space missions.

The as-yet-unnamed spacecraft is 8.8 meters long with a mass at lift-off of 23.8 tons, according to the China Manned Space Agency. It will be capable of carrying six astronauts, or three astronauts and 500 kilograms of cargo.

The new spacecraft arrived at Wenchang Satellite Launch Center on Hainan island in the South China Sea on January 20, 2020 and it is due to launch sometime in the next few months.

Like NASA's Orion EFT-I crewed spacecraft test in 2014, the spacecraft will be sent into a relatively high, elliptical orbit, reaching an apogee of 8,000 kilometers before reentry — far beyond that of China's previous human spaceflight-related flights.

The flight will test the spacecraft's performance on the orbit, a lightweight heat-resistant coating for reentry, parachute systems and a new airbag-cushion-landing design. Some systems, such as life support will be absent from the spacecraft for the first flight.

The mission will be launched by the first Long March 5B rocket, a variant of the huge Long March 5, which had a dramatic and successful return-to-flight mission in December, 2019. The rocket components are due to join the new spacecraft at the Wenchang Satellite Launch Center in early February, 2020. ◆





NASA SELECTED MANUFACTURER FOR THE FIRST COMMERCIAL ISS MODULE / CONSTRUCTIONS PECIFIER. COM

ASA has selected Houston-based space station manufacturer Axiom Space to provide at least one habitable commercial module to be attached to the International Space Station (ISS) as the agency continues to open the station for commercial use.

This selection is a significant step toward enabling the development of independent commercial destinations that meet NASA's long-term needs in low-Earth orbit, beyond the life of the space station, and continue to foster the growth of a robust low-Earth orbit economy, NASA said.

The element will be attached to the space station's Node 2 forward port to demonstrate its ability to provide products and services and begin the transition to a sustainable low-Earth orbit economy in

which NASA is one of many customers. Next, NASA and Axiom will begin negotiations on terms and price of a firm-fixed-price contract with a five-year base performance period and a two-year option.

Developing commercial destinations in low-Earth orbit is one of five elements of NASA's plan to open the ISS to new commercial and marketing opportunities. Other elements of the five-point plan include efforts to make station and crew resources available for commercial use through a new commercial use and pricing policy, enable private astronaut missions to the station, seek out and pursue opportunities to stimulate long-term, sustainable demand for these services, and quantify NASA's long-term demand for activities in low-Earth orbit. \spadesuit



UAE... FROM DESERT TO SPACE



Salem Al-Marri, Deputy Director General for Science and Technology at the Mohammed bin Rashid Space Center (MBRSC) UAE

• What are the key milestones for the Emirates Space Program?

We started 15 years ago, at that time the main focus was on building satellites in the United Arab Emirates, collaborating with both governmental and non-governmental sectors. The first step was with the technology transfer program to get satellite technology. The result was Dubai Sat 1 then Dubai Sat 2 satellites, after which we successfully manufactured the first 100% UAE-made satellite: Khalifa Sat. The Dubai

Sat I and Dubai Sat 2 were launched aboard the Russian rocket Dnepr in 2009 and 2013 respectively with the aid of Russian expertise, thus succeeding in the indigenization of technology.

We've been working on the Mars Hope Mission for six years now to build the Amal (it means "Hope" in Arabic) probe which hopefully will be launched in 2020 from Japan, making it the first Arab mission ever to reach Mars. In April 2017, we launched the UAE Astronaut Program. We received more than 4,000 applications from people who

wanted to be astronauts, and two of them were selected; Hazza Al Mansouri and Sultan Al Neyadi. Roscosmos was a very important partner during the whole process from selecting the astronauts, to training them, to launching the mission and using the Russian part of the International Space Station (ISS). Part of the preparation program for the astronauts was learning Russian language; they have been learning it in the UAE and Russia for almost 18 months and have put a lot of efforts into it as it is a part of their mission.

• How would you describe your cooperation with Roscosmos and whether was it different from cooperating with your European or American partners?

Cooperation was uniquely different with all of them, all of them were very good. Roscosmos was very cooperative, they stood by us at different events. Flexibility is a key word when describing our experience with Roscosmos. We have had problems scheduling the launch to space after the Soyuz MS-10 failure, but they were very flexible and helped us set a date for sending Hazza Al Mansouri to space. Although signing contracts and sealing deals often implies adaptability and strong relations, it is not until crisis time that the strength of these relationships is best tested. We have had difficulties after launching the Soyuz MS-10 last year, and that was the time we realized the flexibility and resilience of our relationship with Roscosmos. In simple words, our cooperation with Roscosmos was outstandingly fruitful.

The scheduling issue was the biggest challenge, because it involved parties other than Roscosmos. There were other challenges like designing the scientific program, training, and learning Russian language on the part of the astronauts. Nonetheless, we were able to deal with all those difficulties thanks to our exceptional partnership with Roscosmos, Gagarin Research & Test Cosmonaut Training Centre (GTCT), Institute of Bio-Medical Problems (IMBP) and all the other Russian parts of this mission.

• Where are you on the Mars 2117 program? Are you still planning on launching it in the summer 2020?

Mars 2117 is a strategic program for the Emirates to be a part of the humanity's endeavor to reach Mars in 100 years and build an inhabitable city on the planet. We have five-year plans when it comes to research and development expenditures focused on space-related issues and studying human life sustainability on the Mars and on the Moon. Our first project is "Mars Science City". It is a place where all the research related to energy, water and food can be conducted because these are the three main elements that should be addressed when we talk about people living in space. The Mars Science City will be launched in two years in Dubai, with focus on studies simulating Mars environment and analogue studies as well. It will become a platform for international cooperation with various partners.

• Khalifa Sat was 100% UAE-made. Was it based on a certain prototype?

Khalifa Sat was completely designed in UAE. Part of the technology used to make it has been developed in the UAE, the other part was bought from different countries around the world, including Russian technology; we did not make the whole thing from scratch. This is exactly like car manufacturing: you design the car and its engine, but you buy tires for it because they require a special know-how and it would be much more convenient to buy than to manufacture them. Khalifa Sat includes many Russian parts like the gyroscope, but the overall design and layout was completely Emirati.

After Khalifa Sat we have other projects in progress. There are miniature satellites under development like DMSat (Dubai Municipality Satellite), which is set to be launched next year. It was designed to track any environmental or climate change or any fluctuations in CO2 levels. There are also other satellites, but we cannot disclose any information about them for the time being.

• Being the first Arab country to reach the International Space Station, how does the UAE view its responsibility towards the Arab world when it comes to going to space?

Investing in space endeavours is very important. By investing in space today, we are trying to be part of the global efforts to conduct research and scientific missions to improve life on the Earth. We do believe that investing in space improves life on the Earth. We see how some powerful countries invest in space to improve life on the Earth, like education, business, and technology sectors. We, and two other Arab pioneers in the 1980s, have gone a long way in space, and today there are Arab countries making satellites. We, as Arabs, should work together and unite our efforts in such projects, like building an all Arab satellite, to be more involved in the global movement to go to outer space.

 Are your space-related programs open only to UAE citizens or for everybody?



In September 2018, Sheikh Mohammed bin Rashid Al-Maktoum announced Hazza Al Mansouri and Sutlan Al Neyadi as the first Emirati astronauts to go on this mission who will "raise the bar of ambition for future Emirati generations." On September 25, 2019, the mission Soyuz MS-15 was successfully launched carrying three members of the Expedition 61 crew to the ISS from the Baykonur Cosmodrome in Kazakhstan. Hazza Al Mansouri is not only the first Emirati astronaut on the mission to ISS, he is the very first Arab to make it there.









Some of our programs are exclusively for UAE citizens, like the UAE Astronaut Program. Nonetheless, scientists and researchers of any nationality are welcome to join, we actually do have many international professors and researchers, and our satellite photos are available for everyone.

What can you tell us about the first Arabic tour at the International Space Station?

We have collaborated with the Russian side to prepare national Emirati space dishes because they have a laboratory specialized in space food: The Russian Laboratory of Space Food. We agreed on three traditional Emirati dishes to be made into space food packaging, and worked out their ingredients and amounts, and the results were marvellous. The food was great and the International Space Station staff were going to try it.

All of our activities are going to be in Arabic language, since Hazza Al Mansouri is the first Arab astronaut to visit the International Space Station. Arabic food will be served, 16 scientific experiments will be performed in addition to educational ex-

periments which had been performed by 150 children on the Earth and will be repeated in space conditions, and the results compared. There will also be storytelling in both English and Arabic, and many other activities. We hope to make the best out of this opportunity by using social media so that we can share our experience with everyone.

The last Arab astronaut was the Syrian astronaut Mohamed Fares in 1987, and before him Prince Sultan Bin Selman Bin Abdul Azziz Al Saoud of Saudi Arabia in 1985, this means that the last Arab venture to space was 32 years ago, a big gap in time that we hope won't happen again.

• What comes after the astronauts return to Earth?

There will be a period for rest definitely, following that there will be a series of activities and events all around the UAE and the Arab world to share UAE's space experience. We are going to continue the training and preparation for the next space trip, but it is too early to talk about this now, we still have the future ahead of us. •



The astronaut Al Mansouri returned to the Earth on October 3, 2019. together with Roscosoms cosmonaut Alexey Ovchinin and NASA astronaut Nick Hague. The three touched down in Kazakhstan under the supervision of the Russian part of the ISS. After landing, Al Mansouri was draped in Emirati flag after the completion of his historic mission. During his presence in the ISS, Al Mansouri conducted scientific experiments in zero gravity environment and shared his experience in details with his Instagram followers. Al Marri had added in an interview with Emirati national media that in the future we could see an Emirati woman astronaut going on future space missions.





According to Roscosmos, Alexey
Ovchinin and Nick Hague spent
203 days in space, and Hazza Al
Mansouri – eight days.
The Soyuz MS-12 spacecraft
has been a part of the ISS since March
15, 2019. During the mission, the crew
completed some applied scientific
researches and the experimental
program, supported the station
working efficiency and performed
its re-equipment with the hardware
delivered by cargo vehicles.



"SPEKTR-RG". THIRD EYE IN THE UNIVERSE

RUSSIAN-GERMAN ASTROPHYSICS OBSERVATORY "SPEKTR-RG" DESIGNED TO PLOT UP A COMPLETE MAP OF THE UNIVERSE IN X-RAY BAND WAS LAUNCHED INTO SPACE ON JULY 13, 2019 BY MEANS OF CARRIER MISSILE "PROTON-M".

Author Mikhail Kotov



It has been built over thirty years and having undergone a lot of alternations during that time this laboratory will remain the most advanced in the world at least for the nearest ten years.

A LONG WAY

The construction of "Spektr-RG" started back in 1987. Back then the project vision was shaped by USST scientists together with a group of colleagues from other countries: Finland, GDR, Denmark, Italy, and the UK. The first scientist who proposed to design such a telescope was academician Rashid Syunaev in his speech at the conference dedicated to the thirtieth anniversary of the first Soviet satellite PS-1 launching. According to this project, it was proposed to design an X-ray telescope with a great area of detectors put together. Scientists planned to use it for plotting a large-scale map of the Universe – a model of the Universe visible to mankind, which was supposed to have all large clusters of galaxies marked.

Originally, it was planned to build several large telescopes at once to be operating in different spectrum – "Spektr-R" ("Radioastron"), "Spektr-RG", "Spektr-UF" and "Spektr-M" ("Millimetron"). Together they could have given a picture that was inaccessible before but very important to all astronomers and astrophysicists. The

construction of X-ray telescopes started already in 1988 in Lavochkin Production and Research Enterprise, but alas, came to a halt quickly enough. The 1990s started and the project was getting finances just slightly above zero.

It became clear that it was an impossible task to implement all four space observatories in parallel, that is why a decision was taken to put all four operations step by step and collect data successively and then integrate the data into a whole picture. "Spektr-RG" was one of the top priority projects for Russian space engineering at that time, however the money was short and most finances were allocated to cover the next "window" for a flight to Mars under "Mars-96" mission (however, it was not implemented due to a failure of the booster stage).

At that time X-ray telescope "Spektr-RG" weighed over six tons, out of which the research equipment weight amounted to over 2,700 kilograms. This is a very good ratio, showing design efficiency. However, already in the 1990s it became clear that it was impossible to meet the declared time frames. The launch date gradually started sliding to the right – from 1997 to 2006. But even such a delay could not help and the work on "Spektr-RG" came to a halt in 2002.





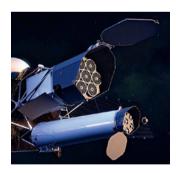




"SPEKTR-R"

"Radioastron", one of the largest space telescopes, has been working for eight years on the Earth orbit from 2011 to 2019.

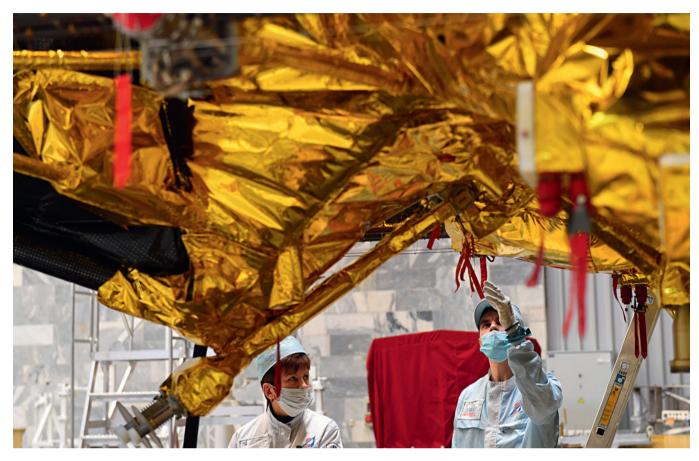
Unlike "Spektr-RG", it was operating much closer to the Earth on high geocentric orbit and made it possible to observe the sky in stars areas with a resolution, unprecedented even by the world's standards, down to millionths of an angular second. It helped to perform up to 100 scientific experiments per month and already in the first year of its operation it was possible to carry out observations of 29 active cores of galaxies and nine pulsars (neutron stars). Operation of this telescope allowed scientists to better understand the origin and nature of such celestial bodies as quasars.



WHY DOES "SPEKTR-RG" NEED TWO X-RAY TELESCOPES ABOARD?

The matter is that each of them operates within its own part of X-ray spectrum. The German eROSITE will cover a "softer" part of the spectrum and the Russian ART-XC – a much "harder" one. It is this joint operation, together with a much higher rate, that will make the Russian observatory much more efficient than the American telescope "Chandra" and European XMM-Newton. "Spektr RG" will be the world's most advanced X-ray telescope for minimum ten years to come.





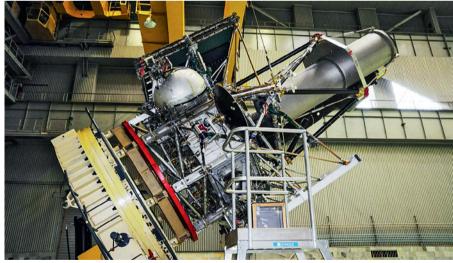
The top priority was given to "Spektr-R", which was launched on July 18, 2011.

GETTING RID OF EXTRAS

Already in 2002, after long talks it was decided to gradually simplify and cheapen the project. Only in September 2005 this project was ready and approved. "Spektr-RG" "lost its weight" to 2,385 kilograms, to tell the truth, and the list of equipment was noticeably reduced but finally financing started to pour in and real production kicked off. Unfortunately, it took Lavochkin SPE much more time than initially estimated.

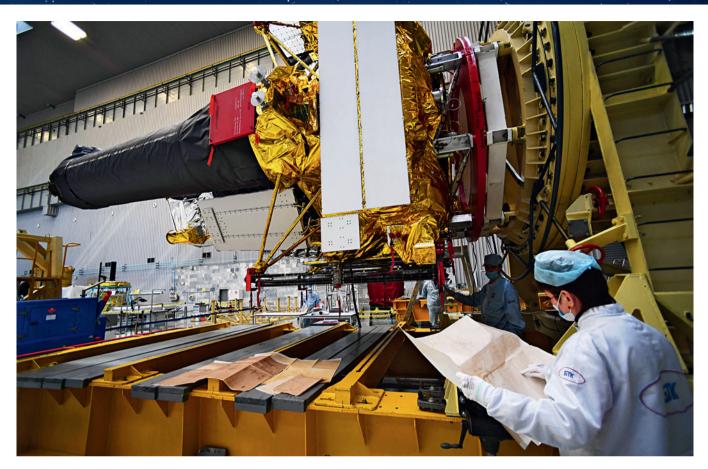
A "proto-flight" model was finalized only in 2013 and then there were problems with equipment, which was supposed to be supplied by foreign partners. The eROSITA telescope manufactured by Max Plank Institute was the main reason for further delays and as a result, it was at last delivered to Moscow only in February 2017. Moreover, it required extra time for reprogramming all the onboard complex.

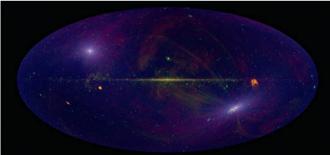
Then another delay happened due to sanctions: "Russian Space Systems" Com-

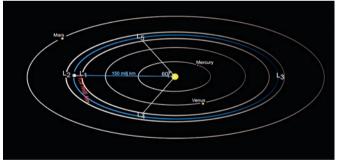












X-ray simulation of sky radiation

pany failed to manufacture an on-board radio complex on time for transmission of scientific data to the Earth. It cost several months more to delay. Consequently, the telescope was

ready and tested only on April 22, 2019.

LAGRANGE POINT

According to design, the space observatory "Spektr-RG" will spin around Sun – Earth Lagrangian Point L with a period of six months. This is a point between the Earth and the Sun, where gravitational forces of the two celestial bodies are mutually compensated. This will help "Spektr-RG" stay longer on required orbit without consuming fuel for its correction.

Lagrange Point

As of now, having completed its one hundred days long journey, with the speed reaching 16.2 kilometers per second, the X-ray observatory arrived to the Lagrange Point 2 (L2). All the equipment and the X-ray telescopes – Russian "Spektr-RG" and German eROSITA – work properly and will have to operate for at least 7.5 years.

It is believed that using "Spektr-RG" will allow scientists to carry out a complete observation of the sky within ranges that are unreachable from the Earth. Employing two telescopes, Russian ART-XC and German eROSITA, will allow scientists to get the maximum detailed

picture and catalogue millions of X-ray films. The observatory will "see" and can transfer to the Earth locations of more than 100,000 far clusters of galaxies, black holes, white dwarfs and other celestial bodies which are of great interest for scientists.

Taking into account the current status of the project, it seems that waiting for thirty years has not been in vain. "Spektr-RG" will become the main event in global extraterrestrial astronomy and astrophysics, and we most likely will hear in the nearest future about new discoveries made by the unique Russian-German space observatory. ◆



CHANGE OF TRADE: CARRIER MISSILE "ROKOT"

IF TO LOOK INTO THE MATTER DEEPLY AND SERIOUSLY, THE MILITARY AND CIVIL SPACE SECTORS DO NOT DIFFER MUCH FROM EACH OTHER. ORIGINALLY, THE WHOLE GLOBAL SPACE INDUSTRY HAS GROWN FROM MILITARY RESEARCH RELATED TO DESIGN OF FIRST BALLISTIC MISSILES. THE FIRST MISSILE THAT OVERCAME THE KARMAN LINE AND ENTERED SPACE WAS A GERMAN "FAU-2" WHEN BEING ON TESTS FOR FLIGHT ALTITUDE. ACTUALLY, THE SOVIET MISSILE "SPUTNIK" THAT WAS USED TO PLACE SPACE SATELLITE PS-1 INTO ORBIT WAS JUST INTERCONTINENTAL BALLISTIC MISSILE 8K71 (P-7).

Text by Michael Kotov

nd further on, the military and scientific space programs have been developed in parallel, similar carriers and achievements were employed. In 1980s, there was an actual issue raised related to disposal of ballistic missiles due to their completed service life. On the one hand, these missiles are expensive, and on the other hand, to dispose of them is quite costly as well. Even if missiles are simply eliminated by way of launching them from a launch site this will require substantial investments into preparation and management of launches.

Russia's signing START-II treaty banning the use of ballistic missiles with multiple warheads added to the problem (as a result, the treaty did not come into force, however it had heightened concerns over the need for disposal of a great number of missiles).

BIRTH OF "ROKOT"

Then specialists suggested an idea to turn ballistic missiles into space carriers. At the first glance, this idea is very simple and sound. If there is a missile capable of carrying payload, why not make use of it and get money for that? In addition, Khrunichev State Space Research and Production Center was the first to undertake this redesign, the organization that was highly experienced and respectful in the space market.

For the missile diversification project, it was decided to select ballistic missile RS-18 (SS-19 "Stylet" according to NATO classification). Even then it became clear that it

would be impossible to just change payload from military equipment to a space vehicle. The third stage – booster stage "Briz" was added to the missile for placing it into orbit. In this modified version the carrier missile was named "Rokot". In addition to modifications of the missile itself it was needed to modify its launch pad at Plesetsk launch site.

The result was a missile with starting weight equal to 107,500 kg, capable of carrying up to 2,150 kg of payload into circular orbit at an altitude of 200 km and inclination of 63°. This is not too much, but as a light-weight carrier the missile could work. Moreover, due to its booster stage it was possible to place satellites into required orbits in case of a multiple launch or provide placing space vehicles according to their optimal energy trajectories.

LAUNCHES

Since the first launch on November 20, 1990, only 32 launches have been performed over thirty years. This is not too much. Why did it happen? First of all, the total scope of work required to make all modifications for space vehicles launching turned out to be much greater than was estimated during initial design stage and took much more time. As a result, it was not possible to create missile "for a launch" in the shortest terms by just installing payload right to a military carrier. The waiting time in line for clients turned out to be approximately the same as for "civil" missiles. The second reason was relatively inconvenient

location of Plesetsk launch site. It is situated far to the north of many world's launch sites and hence can launch space vehicles into orbits with a greater inclination. That is why some commercial customers had to look for other launching sites. It might as well be said that despite all efforts taken by the sellers and launch managers (Khrunichev SRPSC), cooperation with the military has its own specifics: for most commercial clients it is not so comfortable as it might be with a civil launch site.

Besides, at present there is a very high competition within the light weight carrier missiles class in the global market. There are too many different carriers, but the number of vehicles is limited and in addition it became possible to have a package launch on medium class carrier missiles, when several dozens of different satellites are placed into orbits in one launch.

"Strela" is the most notable among conversed missiles – it is a liquid-fueled double-stage missile, light class carrier designed by Research and Production Enterprise "Mashinostroenie" based on intercontinental ballistic missile RS-18 (UR-100H). To reduce the modification costs, this missile is not equipped with a booster stage, instead an individual target guidance unit for the RS-18 missile warheads is employed. This missile is capable of transporting up to 2,000 kg payload into orbit. The most amazing thing is that "Strela" starts off into space right from the missile and not off the launch site as usual.

THE ROKOT LIGHTWEIGHT LAUNCH VEHICLE IS DESIGNED TO LAUNCH SPACECRAFT WEIGHING UP TO TWO TONS INTO LOW EARTH ORBITS

LAUNCH OF THE BOOMING ROCKET

REQUIRED ORBIT

THE FIRST PHASE OF OPERATION OF THE BREEZE-KM BOOSTER BLOCK

TRANSITION ORBIT

BOOSTER CREATED BASED ON INTERCONTINENTAL BALLISTIC MISSILES RS-18 (SS-19 – NATO CLASSIFICATION)

HISTORY

- The first successful launch November 20, 1990 (Baikonur)
- Launches are held as part of the EUROCKOT JV
 (Shareholders: European Aerospace and Defense
 Concern Astrium, Khrunichev State Space Research
 and Production Center named after M.V. Khrunchev),
 part of the launches with in the framework of the
 Federal Space Program of the Russian Federation
- All launches (except for the first three) were made from the cosmodrome in Plesetsk

It should be noted that American conversed missiles are not doing any better than their Russian "colleagues". The problems are the same: their complexity, high costs of operations required to carry out conversion, a small number of "customers" and low level of demand in the market. And the "Minotaur" carrier missiles assembled of components from solid-fueled carrier missiles, which are designed on the basis of cruise stages of the "Minuteman" and "Peacekeeper" IBM, are also used mainly for military space launches and the amount of launches isn't great.

WITH HOPE TO CONTINUE

As a result, it has become clear that there are no "practically free" carriers: even combat missiles themselves did not fit by several parameters. First of all, multiple modifications and modernizations were needed in control system design. Temperature and vibration loads posed a separate problem. A missile combat gear is much less fragile load than complex civil satellites.

In the 1990s, the possibility to launch a space vehicle by a Russian missile, which only yesterday had been taken out of combat duty, was considered to be exotic but possibly an interesting and promising solution, but nowadays the political situation washed away all romantic veil.

The "Rokot" program will continue to exist because the Ministry of Defense is interested in ballistic missiles diversification and will support the required state order level. Whether "Rokot" has a chance in taking a serious market share, is open to discussion. So far there is no mass demand observed in the world for light-class carriers. The last launch of "Rokot" was performed on November, 20 on behalf of the Ministry of Defense. One or two launches were scheduled for 2019 and they are for the military too.

28 000 mm

ROCKET ACCELERATOR BLOCK RS-18 (SS-19)

Anyway, the idea of turning ballistic missiles into commercial space carriers still remains and continues to be researched. Nowadays, the main efforts are put in to modify heavy double-stage missiles R-36 "Voevoda" for civil needs. At present there are over fifty of such missiles still in military service. But this is altogether another project. \spadesuit



16-18 MARCH www.dimdex.com

۱۸-۱۱ مارس

CONNECTING THE WORLD'S **MARITIME DEFENCE** & SECURITY COMMUNITY











FINCANTIERI













Official Show Guide Produce







MARITIME DEFENCE































MWANI (O LAL







UNIVERSAL LAUNCHERS

Instead of the 24 existing launchers for Granit missiles, the Irkutsk project 949A submarine will be equipped with 72 universal launchers capable of deploying Kalibr family of cruise missiles and Onyx supersonic antiship missiles.

2,200 MILES ON INTERNAL FUEL

The Su-35 has expanded fuel capacity, giving it a range of 2,200 miles on internal fuel, or 2,800 miles with two external fuel tanks. Both the lighter titanium airframe and the engines have significantly longer life expectancy than their predecessors, at 6,000 and 4,500 flight hours, respectively.

481 RECORD INDICATOR IN THE WORLD PRACTICE

In 2018, S-500 intercepted target at a distance of more than 481 km, which became a record indicator in the world practice. At the same time, the flight altitude of the hit targets can be up to 100 km, and according to some sources, even more.



4,500 MAXIMUM FLIGHT RANGE

In Russia, the development of a new sea-based cruise missile Kalibr-M is underway. A source in the Russian military-industrial complex said that its maximum flight range would exceed 4,500 km.

22 BALLISTIC MISSILES

On January 8, 2020, in a military operation code named Operation Martyr Soleimani, Iran's Islamic Revolutionary Guard Corps launched 22 ballistic missiles at the Ayn al-Asad airbase in Al Anbar Governorate, Western Iraq, as well as another airbase in Erbil, Iraqi Kurdistan, in response to the assassination of Major General Qasem Soleimani by the United States forces.

30 SECONDS PREPARATION TIME

The new automated control systems will allow to reduce the preparation time of Sarmat intercontinental ballistic missile for the launch – it will last only 30 seconds.

RUSSIA CLAIMS ITS NEW HYPERSONIC WEAPON IS READY FOR WAR / CNBC

ussia's Defense Minister declared a new hypersonic weapon, which is said to be capable of striking the United States, ready for war. Sergei Shoigu said in a conference call with Russian military leaders that the first missile unit equipped with Avangard hypersonic glide vehicle entered combat duty.

Russia's Strategic Missile Forces chief, Gen. Sergei Karakayev, added that Avangard was put on duty with a unit in the Orenburg region in the southern Ural Mountains.

Avangard can travel at least five times the speed of sound, or about one mile per second.

It was one of the six new weapons that Russian President Vladimir Putin unveiled in March 2018. At the time, the Russian leader claimed the hypersonic weapon was capable of reaching targets at 20 times the speed of sound and that it could strike "like a fireball." He also said that the device had already entered serial production. •



PUSSIA TO EXPAND NUMBER

RUSSIA TO EXPAND NUMBER OF ZIRCON HYPERSONIC CRUISE MISSILE-CAPABLE SHIPS / RT

n a new push towards re-arming the country's military with modern weaponry, Russian Defense Minister Sergey Shoigu has ordered an expansion in the number of vessels fitted with cutting-edge Kalibr and Zircon cruise missiles.

Russia has introduced a whole range of state-of-the-art arms in recent years, and is now seeking to equip at least 70% of troops with them. So far, however, the goal has not been met and the tally of the newest hardware in the military's possession is currently at about 68%.

Beefing up the capabilities of the country's Navy is among the top priorities, and Russia's Defense Minister ordered that the trusted Kalibr and perspective Zircon missiles be added to additional blue-sea military vessels.

The 3M-54 Kalibr cruise missiles boast an impressive operational range of up to 600 km, and they have already been battle-tested during Russia's counterterrorist operation in Syria, proving able to strike targets with pinpoint accuracy.

The 3M22 Zircon hypersonic missile is still under development, and a new test-fire is expected to be conducted later this year. While little is known about the munition, it is said to be able to travel at least eight times faster than sound.

It was not immediately clear whether this would involve building new ships from scratch or upgrading ones that are already commissioned or under construction – most likely, it means both. On October 31, for instance, Russian President Vladimir Putin announced the unexpected addition of Zircon cruise missiles to a new corvette, which is set to join the country's Pacific Fleet soon. •

ANOTHER SATELLITE MERIDIAN-M TO BE LAUNCHED IN JANUARY 2020 / TASS

he Russian Defense Ministry will launch another satellite Meridian-M from the Plesetsk cosmodrome in January 2020, the commander of the Space Force, Colonel-General Alexander Golovko, said during a distance conference.

"The upgrade of launch pad No 3 at the Plesetsk cosmodrome has been completed. The first launch from this facility was carried out on December 11, 2019. A Glonass-M satellite was put in orbit. The next launch, of the Meridian-M satellite, is due in January 2020," Golovko said.

Up to 20 launches of space satellites with light and medium class rockets Soyuz-2 may be carried out from Plesetsk in the year 2020.

In 2017, the Reshetnev Information Satellite Systems was commissioned to make four military satellites Meridian-M (an upgraded configuration of the Meridian family). The Meridian is a second-generation communication satellite, which has replaced Molniya and Raduga. Its guaranteed life cycle is seven years. ◆



RUSSIAN SHIPBUILDERS FLOAT OUT PROJECT 885M FIRST SERIAL-PRODUCED NUCLEAR-POWERED SUB / TASS

he Sevmash Shipyard in Severodvinsk in the northern Arkhangelsk Region has floated out the Project 885M Yasen-M first serial-produced nuclear-powered submarine Novosibirsk.

The Russian Navy currently operates the Project 885 Yasen nuclear-powered submarine Severodvinsk. The Project 885M Yasen-M lead submarine Kazan is undergoing trials. The sub is set to enter service in 2020.

The Project 885 and 885M nuclear-powered subs carry Kalibr-PL and/or Oniks cruise missiles. Eventually, they will get Tsirkon hypersonic missiles. The Sevmash Shipyard (part of the United Shipbuilding Corporation) is currently building six Project 885M nuclear-powered submarines. In 2019, the Shipyard signed a contract on building two more submarines of this Project. ◆



SERGEY SHOIGU, MINISTER OF DEFENSE OF RUSSIA

The year 2019 has come to a close. All the tasks defined by the Supreme Commander-in-Chief for this period have been fulfilled. The Armed Forces' combat capabilities have grown by 14% and the required level of maintaining the country's defense potential has been ensured



SERGEY CHEMEZOV, CEO OF ROSTEC CORPORATION

Large-scale work awaits us in 2020 to stabilize the aircraft industry... The first large-scale deliveries of the fifthgeneration Su-57 aircraft will begin. Of course, these are challenging tasks that will truly mobilize us

•••••



NEW COMBAT MODULE TO BE DESIGNED FOR RUSSIA'S BUMERANG PLATFORM / TASS

ussia's Military Industrial Company, the manufacturer of off-roaders and Tigr armored vehicles, will design a new combat module for the entire range of its products, including the advanced Bumerang wheeled combat platform, company CEO Alexander Krasovitsky announced.

"We have signed a contract with a Russian company and will start producing our own combat module, belonging to the Military Industrial Company. The module would feature different types of weaponry and ATGM [Anti-tank guided missile] control channels: Korvet or Ataka, whichever is needed," he said.

The company's press service said that "in future, the module may be fitted with a large-caliber automatic gun of up to 57 mm."

The module will be compatible with the entire range of wheeled armor produced by the company.

"Depending on the armored vehicle's type and capacities, the new combat module would have various configurations of weaponry," the Military Industrial Company said.

The Bumerang is the latest standardized wheeled platform for multiservice forces developed by Military Industrial Company. The platform was used as the basis for developing the K-16 armored personnel carrier and also the K-17 infantry fighting vehicle unveiled for the public at the Victory Day Parade in Moscow's Red Square in 2015. The combat vehicle's baseline version is outfitted with a combat module with a 30 mm automatic gun and Kornet anti-tank missile system. •



RUSSIA DEVELOPING AIR DEFENSE SYSTEMS BASED ON NEW PHYSICAL PRINCIPLES / TASS

ussia is developing air defense systems based on new physical principles, Air Defense Force Chief Lieutenant-General Alexander Leonov said on December 25, 2019.

"Eventually, there are plans to arm air defense troops with systems based on new physical principles, which are currently being developed," the General said in an interview.

"New physical principles" is a notional term used to underline that the weapon's destructive factors are based on processes and phenomena that earlier have not been applied for military purposes. The weapons based on these principles include laser and microwave guns, sonic weapons, electromagnetic bombs and others. •

REVIEW OF UP-TO-DATE RUSSIAN EW SYSTEMS

Electronic warfare systems (EWS) usually lose public attention to jet fighters, tanks, air defense missile systems etc. However, their importance in modern combat conditions is quite high and versatile: from jamming remotely exploded improvised explosive devices (IED) and interfering with enemy's communications to countering enemy's air defense systems or aircraft.

Text by Yuri Lyamin



Electronic warfare includes three areas. An electronic attack is a combination of measures and actions related to functional soft kill, electronic suppression and employment of weapons self-guided to emissions of enemy's radio and electronic facilities.

Electronic counter-countermeasure is a combination of measures and actions related to elimination or mitigation of interferences with own electronic and cyberspace facilities by enemy's electronic warfare, countermeasures against enemy surveillance and electromagnetic compatibility of own electronic means.

Electronic warfare support is a combination of measures and actions related to detection of enemy's electronic and cyberspace facilities in order to carry out an electronic attack as well as to monitor operations of own electronic and cyberspace facilities for their electronic counter-countermeasures.

Underestimating enemy's EW capabilities may result in very serious consequences. So, during the war in Lebanon in 1982 it was massive application of most advanced electronic warfare by Israel available at that time that played a key role in blinding the Syrian air defense forces deployed in the Lebanese Bekaa valley.

Russia is one the world's leaders in electronic warfare. It is impossible to describe all electronic warfare systems manufactured by Russian enterprises within this article due to their vast variety, that is why what there follows is a description of the best-known specimen and companies that manufacture them.

"RADIOELECTRONIC TECHNOLOGIES" CORPORATION (KRET)

"Radioelectronic Technologies" Corporation (KRET) included in Rostec SC plays a leading role among Russian designers and manufacturers of electronic warfare. This is designer and manufacturer of airborne electronic equipment and avionics, electronic warfare, friend/foe state identification, special-purpose measuring equipment, etc.

KRET incorporates 97 research institutes, factories and other enterprises including such well-known EW companies as Kaluga Research Radio Institute, research and production enterprise NPO "Kvant" (Veliky Novgorod), All Russian Research Institute "Gradient" (Rostov-on-Don),

Bryansk Electromechanical Plant, Taganrog Research Institute of Communication. Products manufactured by KRET are actively purchased for the Russian armed forces and in the field of electronic warfare it covers ground, airborne and shipborne systems.

According to open sources the share of "Radioelectronic Technologies" Corporation has been around 60% over recent years in the domestic electronic warfare market.

GROUND SYSTEMS

One of the most interesting ground electronic warfare systems are systems of "Krasukha" family. They are designed to blind radars (RDR) installed on enemy's aircraft and helicopters at a distance of up to 300 km. The systems detect and analyze a signal coming from an enemy's object and then when required engage powerful jamming with enemy's RDR to hinder target detection and high-precision weapon guidance.

EW complexes "Moskva-1" are designed for electronic reconnaissance of air space at a distance of up to 400 km, in other words, they detect radiation that comes from aircraft or weapon electronic systems. Whenever an enemy is detected, the information is transmitted to electronic attack systems, air defense systems (ADS) and air forces, which respond to a threat. Thus, these complexes "Moskva-1" operate as a passive analogue of air surveillance radars, enhancing the enemy detection capabilities of air defense systems without disguising their own location.

A new complex called "Divnomorie-U" was developed on the base of previous systems, however, there is very little information about it. According to data from open sources, it should replace complexes "Moskva-1", "Krasukha-2" and "Krasukha-4", in other words, it will be operating both as an electronic air space reconnaissance system and electronic countermeasure equipment for enemy's airborne RDR.

KRET manufactures complexes "Rtut-BM" to protect personnel and equipment against projectile weapons with radio proximity fuses. They detect emissions from radio proximity fuses of projectiles when the latter are fired and determine its frequency and form jamming, which make these projectiles detonate prematurely or cause their fuse to go into contact operation mode, which reduces firing efficiency. In addition, these systems can suppress

enemy's radio communication. "Rtut-BM" has a coverage area of 50 to 123 acres.

A ground-based EW complex called "Murmansk-BN" draws attention as well, it is designed to blanket up enemy's shortwave radio communication over great distances. When deployed this complex covers an area equal to 640,000 sq. m and its telescopic hydraulic antenna mast go up to 32 m.

AIRBORNE AND SHIPBORNE SYSTEMS

Among airborne EW systems manufactured by KRET the most interesting one is active jamming station "Rychag-AB". When equipped with this station, jammer helicopter MI-8MTPR-1 provides group protection of own front-line aircraft by way of EW jamming of enemy's aircraft radars and air missile defense systems. According to statements made by KRET officials, the area covered by this station is up to several hundred kilometers. There is also jammer aircraft IL-22PP "Porubshik", its electronic equipment is also designed by KRET enterprises.

Jammer airplanes and helicopters are intended to provide group protection, while airborne electronic warfare complexes of the "Khibiny" family are designed for individual protection of airplanes against missile attacks by enemy's jet fighters and air defense missile complexes. The "Khibiny" complex includes an active jamming station, which is located in the containers attached to the aircraft wing tips. It is known that the "Khibiny" complexes were supplied to the armed forces for SU-34 front line bombers and SU-35S and SU-30SM multi-purpose jet fighters. And the SU-34 can also carry the active jamming station containers for group protection - SAP-14 "Tarantul".

Individual electronic defense systems are manufactured for other aircraft as well. For example, active jamming stations are included in individual defense complexes "Vitebsk-25", which are installed on SU-23SM3 attack airplanes. As for new generation jet fighters SU-57, there is a completely new electronic complex designed, it is called "Gimalai". Elements of this complex are integrated directly into the airframe of this aircraft.

Up-to-date shipborne electronic warfare systems from KRET are represented by various multi-functional complexes for ships of different classes. Electronic countermeasure complex 5P-28 is designed for large ships, there is also complex TK-25



VLADIMIR PUTIN, PRESIDENT OF RUSSIA

In terms of performance the latest Russian armaments excel many similar foreign analogues; and advanced hypersonic weapons, air defense systems, electronic warfare, a number of systems in army field forces and some other systems are just second to none in the world



SERGEY SHOIGU, MINISTER OF DEFENCE OF THE RUSSIAN FEDERATION

Over the last five years, the EW forces have received more than 600 new generation systems, the share of up-to-date equipment has reached 67%. It is planned that by 2021 the electronic warfare forces will have staffing level up to 95% and the level of up-to-date equipment available will be 70%



VLADIMIR MIKHEEV, ADVISOR TO FIRST DEPUTY DIRECTOR GENERAL, "RADIOELECTRONIC TECHNOLOGIES" CORPORATION (KRET)

Electronic warfare is one of the main trends in developing up-to-date armed forces. Employing appropriate technical means significantly enhances survivability of troops and serves as a mandatory component in surveillance of enemy having up-to-date weapons

designed for smaller ships and complex MP-405 designed for small-size ships and hoats

"ROSELEKTRONIKA" HOLDING

EW systems are designed and manufactured by one more enterprise of Rostec SC – "Roselektronika" Holding. It combines over 120 research organizations and companies, which develop and manufacture radio and electronic components, communication devices, automated control systems, robotic complexes, SHF electronics, computing and telecommunications equipment.

Concern "Sozvezdie" in "Roselektronika" first of all develops and manufactures electronic warfare systems. Companies incorporated in the corporation specialize in manufacture of automatic communication and control systems as well as ground-based electronic countermeasure equipment for radio communication. It is possible to say that the most well-known are electronic countermeasure complexes "Borisoglebsk-2" and "Infauna" supplied now to the Russian army.

Complexes "Borisoglebsk-2" are designed for radio reconnaissance and jamming enemy's radio communication within HF and VHF bands, radio navigation systems and mobile satellite communication systems. Powerful jamming stations make it possible to have an efficient impact on different radio-controlled objects as well as to blind drone control channels, etc.

Complexes RB-531B "Infauna" are designed for radio reconnaissance and jamming enemy's communications within VHF band as well as to provide protection against remote detonated mines and explosive devices by way of barrage jamming and protecting nearby vehicles against enemy's aimed fire by way of setting aerosol screens.

The latest EW system from "Sozvezdie" Corporation that has just been supplied to the army is the "Palantin" complex. It is also designed for electronic reconnaissance and jamming enemy's communications within HF and VHF bands. The complex is also capable of blanketing enemy's mobile and trunk communication. An important feature of "Palantin" is its ability to link different EW systems into the unified operating network.

It is worth paying attention to such products by "Sozvezdie" Corporation as smallsized portable jamming transmitters RP-377VM1, RP-377UVM2 and RP-377UVM3, designed to blind the radio control channels of mines and explosives devices or blanket a radio signal from bugs (listening devices). And this is only some part of the corporation's products.

One more designer and manufacturer of electronic warfare incorporated in "Roselektronika" Holding under Rostec SC is All-Russian Research Institute "Etalon". It specializes mainly in information security and radio control systems. Among manufactured products there are the following: automated radio, technical and special information protection efficiency monitoring complexes "Plavsk" and "Dzudoist", active countermeasure equipment "Neitralitet" to counter enemy's radio reconnaissance systems, technical monitoring, electronic simulation and jamming complex "Leer-2" and many others.

"ALMAZ – ANTEY" AIR AND SPACE DEFENSE CORPORATION AND "DEFENSE SYSTEMS" GROUP OF COMPANIES

There are other companies specializing in design and manufacture of electronic warfare systems apart from above mentioned Rostec's companies. One of them, "Academician A.I. Berg Central Research Institute of Radio Technologies" (TsNIRTI) is incorporated in "Almaz – Antey" Air and Space Defense Corporation. It has a special position, because it specializes in designing space and aircraft systems for remote Earth probing, it participated in designing electronic reconnaissance satellites "Lotos-S". In addition, TsNIRTI also develops various ground-based and airborne electronic warfare systems, for example, containerized portable jamming station MSP-418K for individual protection of MIG-29 jet fighters or radio countermeasure system "Omul" for protection of SU-25 attack airplanes.

One more well-known Russian company operating in the field of electronic warfare is Research Center for Electronic Warfare ("NTC REB") – founded in Moscow in 2005, this company is incorporated in a Group of Companies "Defense Systems". "NTC REB" manufactures the following systems – ground-based complexes (passive radar) "Avtobaza-M" for electronic reconnaissance of airborne and maritime objects, countermeasure complexes "Repellent" to counter small-sized drones, electronic countermeasure systems "Pole-21" for blanketing global satellite user equipment, etc.

PRIVATE COMPANIES

Voronezh Research Company "PROTEK" incorporated in a private company "EGO-Holding" manufactures automated jamming complex R-330M1P "Diabazol". This complex is designed for electronic reconnaissance and electronic countermeasures of mobile VHF, cell, trunk and satellite communication systems within a frequency band of 100 to 2,000 MHz.

The complex consists of different electronic jamming stations, which can be employed autonomously as well. For example, station R-330Zh "Zhitel" automatically detects, guides and analyzes signals from radio sources within an operating frequency band, jams subscriber terminals of satellite communication systems INMARSAT and Iridium, user equipment of satellite navigation system GPS and mobile GSM standard communication base stations.

One more private company is Saint Petersburg "Special Technological Center" (STC) is mainly specializing in manufacture of radio monitoring equipment and "Orlan" family drones. Therefore, the electronic warfare manufactured by this company is related to this company's expertise. In the field of radio monitoring this STC has developed stationary EW complexes "Svet-VSG" and mobile systems "Svet-KU". They are intended for radio and technical monitoring and data security to prevent leakages via wireless communication channels.

Regarding drones, one of the most well-known EW systems manufactured by the STC is complex RB-341V "Leer-3". This complex is designed for radio reconnaissance and blanketing GSM standard mobile communication networks; its distinction is that the "Orlan-10" drone is used as a jamming source carrier. On the other hand, among products manufactured by STC there is a system designed to counter drones, which employs electronic blanketing of radio navigation and control channels. •



VI International Exhibition of Defense and Technologies



www.kadex.kz

office@astana-expo.com office@kadex.kz

28-31 May 2020

Kazakhstan, Nur-Sultan

Organizers













WHAT CAN MODERN MBT DESIGNS TELL US ABOUT THE FUTURE?



The battlefield must be examined as a whole, it is senseless to only evaluate a tank without thoughts on what war the tank will be fighting and where. In addition, other aspects such as the army using them must be considered.

uestions such as what other supporting elements the army has, the quality of their other service branches, and the likely opponents the army will be facing must all be considered when evaluating the merits of various tank designs. It must be remembered that no tank in history has proven itself to be invulnerable, and nearly every positive design decision also results in a trade-off somewhere, whether this is an immediate design trade-off, or an economic or manufacturing trade-off, all of which may help a country to win a war, which is the ultimate purpose of a tank after all.



DIFFERENCES IN EASTERN AND WESTERN DESIGN PHILOSOPHY

Engineers in the East and West had competing design philosophies which were largely borne out from experiences in the Second World War and the wars that followed. Both of these philosophies have led to the tank designs of today, and an analysis of their relative advantages provides clues about what to expect from the future.

Soviet tank design philosophy had a preference for two tiers of tank, with one tank which is less capable, but can be pro-

duced in greater numbers, and a more capable tank which was less numerous, but better-suited to tank combat. These pairings can be seen with the T-54/55 and the T-64, or with the T-72 and the T-80. With the advent of the main battle tank concept, Western planners broadly speaking preferred to use a single main battle tank platform forming a unified fleet of tanks. Soviet designers exhibited a preference for making tanks relatively small, low-profile, and not too heavy, while Western vehicles became progressively larger and heavier through the second half of the XX century, with notable

exceptions to this trend being the Leopard 1 and AMX-30 tanks.

The results of this difference in philosophy can be easily seen when, for example, comparing the T-72 and the Leopard 2, or the M1 Abrams series of tanks. The T-72s are significantly smaller, shorter, and lighter than their Western counterparts. This has some advantages, insofar as the T-72s are significantly cheaper to produce and cost less to maintain, allowing the user to field a larger fleet of T-72s than they could with Western tanks for the same budget. In addition, they can be dug into protected positions more quickly, they don't require an engine as

powerful as those required by modern Western tanks, more of them can be transported per ship or other transport vehicle, and they can be more easily recovered by recovery vehicles. The low-profile layout of Soviet-designed tanks was intended to present a more difficult target to enemy fire, minimising the risk of being spotted or hit, and came at the cost of a more cramped and less comfortable interior and a lower range of gun depression. The lighter weight of Soviet tanks also presented its own trade-offs insofar as it meant that Soviet tanks tended to lag behind the heavier US and British designs such as the M60 and Chieftain in terms of the level of passive armour protection they provided. Although Soviet designers did adapt to the crucial threats of the day by developing layered armour solutions such as the Combination K package used on the T-64, the greater breakthrough which to an extent vindicated the lighter tank design philosophy was the use of explosive reactive armour (ERA). This provided significantly greater protection against shaped-charge threats in particular, and has since also become more effective against armour-piercing fin-stabilised discarding sabot (APFSDS) rounds as well.

Western tank designs from approximately 1980 onwards have been looked at more kindly in the public imagination, due in large part to the apparent successes of its designs shown through low losses in conflicts until around 2006. However, this perception has begun to change as the technologies built to defeat these tanks have landed in the hands of the people actually fighting against these tanks. In more recent conflicts such as Syria and Yemen, where rebel groups have had access to more modern anti-tank guided missiles (ATGM), many Western tanks have been shown to have significant vulnerabilities. However, while most attention tends to focus around tank losses, it is perhaps more significant to see the toll the heavier tank philosophy has exacted on their users and on budgets.

In the present day, Western tank fleets are often seen as cumbersome tools by their primary users, being too expensive to purchase and operate in large numbers, and too heavy, which prevents them from being rapidly deployed to where they are needed in any meaningful quantity^{1, 2}. The extreme costs of purchasing and maintaining an active tank fleet have led to repeated

cuts to active tank personnel and increasing numbers of tanks being mothballed in warehouses and relatively small tank fleets compared to those maintained by major European countries during the Cold War. Some of this is due to risk-averse strategies to increase survivability, such as simply adding increasing quantities of various passive armours and tolerating the weight increase, or an aversion to gambling on riskier technological advances and new designs, or budgetary constraints and greater budget priorities. However, regardless of the cause, in a time of strained defence budgets, and due to the changing character of modern warfare, it is becoming evident that fleets of post-1980 Western tank designs do not represent a sustainable and flexible option for most Western armies. A re-evaluation of some core design concepts will be necessary in the tranche of new tank designs which are due to emerge post-2035.

It is also important to note that over the past half-century there have been very few clashes between Western and Eastern tanks of the same generation, or between those upgraded to a similar standard. With the possible exception of several tank battles during the Iran-Iraq war there seem to be almost no examples of significant numbers of tanks of a similar standard clashing in combat. Even the examples in the Iran-Iraq war, such as the Nasr Operation which took place in 1981 and represented the largest of the tank battles during this war, holds relatively few lessons which pertain to tank design compared to the lessons it provided in tank tactics and the importance of reconnaissance^{3, 4, 5}. With all this in mind, it is still possible to evaluate some of the most significant modern tank designs and get an idea of the direction tank design is heading in.

T-14 ARMATA

The T-14 Armata has easily been the most-discussed tank in recent memory, and with good reason. The most notable feature of the tank is that it uses a layout of an unmanned turret and protected crew citadel which has previously not been used on any tank entering serial production. The concept however is not a new one, and has been examined by a number of countries over the years in various concept prototypes. These concepts notably include:

- Russian Object 195 (T-95) began development in 1988 and was cancelled in 2010⁶.
- US M1 Abrams Tank Test Bed (TTB) began development in the early 1980s, a prototype (SRV) built by 1983, and was cancelled in the early 1990s⁷.
- US Teledyne Expeditionary Tank began development in 1982, eventually losing out to other designs in the AGS competition in 1992, and was effectively cancelled by the mid-1990s⁸.
- Soviet Object 450 (T-74) began development in 1972 and was effectively cancelled by 1974°.
- British COMRES 75 test bed vehicle built in 1968 and did not progress significantly¹⁰.

Unmanned turret designs have therefore been of significant interest to militaries for a long time, and with good reason - while the turret is perhaps the most definitive feature of the tank, its presence is also greatly problematic for tank designers as it represents perhaps the tank's greatest vulnerability which must be addressed. In order for the gun to depress sufficiently to aim and fire at targets located lower than the tank, the turret needs to be reasonably tall, to allow the gun trunnions to be fitted higher in relation to the hull, and to allow sufficient space for the breech to move upwards. However, with manned turret designs this would lead to creating a bigger target, allowing the vehicle to be spotted at greater distances and more easily hit. In addition, because the majority of the crew are located inside the turret, it becomes necessary to add more armour to the front and sides of the turret, in order to protect the crew. If the turret is already large, the designers need to provide protection to a greater surface area, which makes the turret and the entire vehicle much heavier.

On most designs the turret face is the best-protected portion of the tank, simply because it presents the likeliest target for enemy fire and has to protect two or three members of the crew. However, doing so means adding much more weight to the front portion – typically the frontal 60° of the turret, and this can throw the turret off-balance, with too much weight centred on the front portion. This can be balanced by adding a bustle to the rear of the turret to act as a counterweight, but doing so makes the turret an even bigger target, and this added weight increases the

¹⁰ https://www.benning.army.mil/armor/eARMOR/content/issues/1984/MAR_APR/ArmorMarchApril1984web.pdf p. 18



¹ https://static.dvidshub.net/media/pubs/pdf_33759.pdf p38

https://static.uviushub.nev/media/pubs/pui_55/59.p.
https://apps.dtic.mil/dtic/tr/fulltext/u2/1010791.pdf

³ https://warstoriescast.com/wp-content/uploads/2017/02/Episode-Seven-Premium-Transcript.pdf

⁴ https://apps.dtic.mil/dtic/tr/fulltext/u2/a541655.pdf

⁵ http://www.tanks-encyclopedia.com/Iranian_Tanks.php

⁶ https://zen.yandex.ru/media/hazardtv/obekt-195-t95-on-byl-do-t14-armata--5aef59dc799d9d07601551bc

⁷ https://topwar.ru/45964-proekt-m1-abrams-block-iii-ssha.html

⁸ http://www.military-today.com/tanks/expeditionary_tank.htm

⁹ https://topwar.ru/18837-obekt-450-tankovaya-revolyuciya-iz-harkova.html

ALEKSANDR POTAPOV, GENERAL DIRECTOR OF URALVAGONZAVOD

I can say that our equipment is at a sufficient stage of readiness, and has a sufficient level of digital capability, that the transition to an unmanned vehicle variant is already a natural direction

.....



T-14 Armata, Russia

inertia of the turret while traversing, which requires more powerful motors to traverse the turret. Without more powerful motors the ability of a turret to aim at different targets in quick succession would be adversely affected¹¹. This increases weight and power requirements, which can lead to some of the previously-mentioned problems associated with modern tanks.

The unmanned turret of the T-14 Armata solves some of the greatest disadvantages of turreted tank designs. However, it has not managed to achieve this without some significant departures from Soviet tank design philosophy. For starters, the size, and reported cost of the vehicle has risen to standards almost comparable to Western designs, although the weight remains slightly lower. This is indicative of a cultural shift within the Russian Armed Forces which has been ongoing for the past decade, aiming to professionalise and modernise. With the replacement of conscripts by Kontraktniki (contracted professional soldiers) wherever possible, these professional soldiers became an investment which need to be protected by modern equipment, and for tanks this means a design which provides a radical increase in survivability. The T-14 certainly meets these criteria for crew survivability, however it has also made some significant trade-offs which affect its suitability for warfighting, and its cost and ease of production in order to attain its level of capability.

To start with the turret, the models shown so far have been fitted with a 'soft-skin' of steel approximately 5–7 mm thick around the turret's systems, which is unlikely to be capable

of protecting against heavy machine gun fire, to say nothing of its inability to keep out automatic cannon fire. Doing so is not necessarily bad - it saves a great deal of weight and allows the T-14 to be more deployable than its Western analogues, and makes the tank cheaper and simpler to manufacture. However, it also creates a problem of a lack of protection for the vehicle's expensive electronic components, such as the sighting systems and radars. As such, these expensive components are highly vulnerable to common battlefield threats - artillery, machine-gun fire, and cannons. Although the crew may survive such threats easily, the tanks which have sustained fire to their optics and radars will be unfit to send into combat. This forces the army which uses the T-14 to invest significantly more into logistics, repairs, and spare parts, or forces them to limit the conditions under which the vehicle can be deployed to combat. This last point is perhaps more significant one, as no army would like a vehicle which is limited in terms of deployability. The T-14 seems to be well-suited to engaging rivals in tank-on-tank combat, but much less suited to engaging nonstate armed groups in the complex, low-intensity conflicts which are more common today. In such conflicts, it is a more expensive and less efficient tool for the job than a T-72B3, and this is perhaps why the T-14 has yet to be spotted in Syria.

Ultimately, wars are won by achieving the right balance of priorities, and while the T-14 is undoubtedly a very advanced and capable tank, it is of less use to most armies than a more flexible platform such as an IFV, which is cheaper, more deployable, less of

a logistical burden, and has a more flexible mission profile. While these critiques have been raised here in discussing the T-14, in reality they are equally applicable to Western armies and Western tanks also. The tank still has an important place on the modern battlefield, but its primacy has been overtaken by its smaller and lighter cousins such as IFVs for cost and flexibility reasons. Modern Western tanks likewise have difficulty protecting their external components such as optics or radars from artillery and machine guns, simply because it is difficult to make a valid tank design which can protect these. As such, this problem is global, and without an obvious solution, it is likely to be a very expensive factor which every actor simply has to accept as a design limitation through the XX century. There are certainly a number of important innovations on the Armata which should influence future tank designs, and chief among these is the location of the crew and remote turret concept, and the level of automation invested in many of the tank's systems. As battlefield threats increase in speed and complexity, it is naturally to be expected that many human tasks will likely need to be fulfilled by machines.

M1A2 ABRAMS

The US M1A2 Abrams, while a highly capable vehicle, also suffers from a great many of the problems previously outlined with tank fleets. It is provided with high levels of protection for the turret based around a multi-layer sloped passive armour array in the turret sides and bustle, and on domestic variants the front of the turret includes depleted uranium (DU) armour elements^{12, 13, 14, 15}. It should be noted that the export variants of the tank, such as those in use by Saudi Arabia, did not receive the DU armour elements, and this may be a partial contributing factor in their loss rates in Yemen¹⁶.

¹² http://i.imgur.com/eJHI5XE.jpg

¹³ http://i.imgur.com/9tUL5YI.jpg

¹⁴ http://i.imgur.com/1mK5whx.jpg

¹⁵ http://i.imgur.com/5exYuo2.jpg

¹⁶ https://foxtrotalpha.jalopnik.com/houthi-rebels-destroy-m1-abrams-tanks-with-basic-irania-1726478735



ROSS COFFMANN,
BRIGADIER-GENERAL,
DIRECTOR OF THE NEXT
GENERATION COMBAT
VEHICLE CROSS-FUNCTIONAL
TEAM (CFT)

We're going to make a decision on what the Abrams replacement will be, which is really exciting, because it might not be a tank. It is decisive lethality – and what that decisive lethality is will be determined by academia, our science and technology community in the Army, as well as industry



M1A2 Abrams, USA

The wisdom of using depleted uranium (DU) as an armour material for the M1 Abrams has been put into question, having been cited in a number of cases related to health risks17, 18. While a clear consensus is unlikely to emerge, this issue may have been a contributing factor to the decision to add a graphite coating to the DU armour elements in the first Systems Enhancement Package (SEP v1) upgrade^{19, 20}. It is also notable that no other mass-produced tank design has copied this particular feature of the Abrams. Nonetheless, the Abrams family's performance in Iraq has shown that the protection along the frontal portions of the vehicle is extensive against many commonly-available AT weapons. However, the protection of the upper surface seems to have been a low priority, as the Abrams has notably thin and weak roof armour21, 22. While the roof armour of nearly all vehicles is rather thin, some NATO countries have taken the threat from artillery bomblets and top-attack missiles a bit more seriously, and have provided additional roof protection for the tanks, while on the Abrams this is notably absent, even on the M1A2C variant, judging by available images^{23, 24}.

The Abrams series has undergone significant upgrades since the original model, and these upgrades have largely focused on improving the passive protection, the engine, the sighting system, digitisation, and power storage. A key element which has not been upgraded is the gun, which remains the M265 L44 smoothbore gun used on the M1A1. This leaves it with a gun capable of generating significantly less muzzle energy than those used by the British Challenger 2 (L55), the French Leclerc (L52), and later variants of the German Leopard 2 (L55). The Russian 2A46 series guns are also alleged to provide a higher muzzle energy, however their potential in tank combat has been partially held back due to ammunition being limited to a length of approximately 640 mm to fit into the T-72 and T-80 autoloaders^{25, 26}. Although it became possible to fit the longer 740 mm Svinets round into the T-90A and T-72B3 models, overcoming the fundamental limitations to Russian tank ammunition and adopting longer penetrator designs was only truly possible by moving to a larger hull design which could provide the space needed to accommodate an autoloader with larger munitions of a new generation – the T-14²⁷.

The Abrams' impact on future tank design is difficult to quantify, as although it is a capable vehicle, two major design features, the gas-turbine engine and the DU armour elements, stand out as features unlikely to be used in a future MBT. The gas-turbine

engine for example requires significantly more fuel than high-end diesel engines and generates a larger heat signature. The DU armour, as previously discussed, is unlikely to re-emerge due to uncertainty regarding its effects on personnel.

LEOPARD 2

The most upgraded variants of the Leopard 2 are perhaps the most combat-capable tanks in the NATO arsenal. It is difficult to criticise vehicles such as the Leopard 2A7V

M1A2 Abrams, USA



 $^{^{17}\} http://www.nbcnews.com/id/14321787/ns/us_news-military/t/armament-sickening-us-soldiers/t/$

¹⁸ https://www.nato.int/docu/speech/2001/s010110b.htm

¹⁹ https://www.armyrecognition.com/united_states_army_heavy_armoured_vehicles_tank_uk/m1a2_sep_v2_main_battle_tank_technical_data_sheet_specifications_pictures_video_11610155.html

^{**} https://books.google.co.uk/books?id=e4zyP77jHjEC&pg=PA140&lpg=PA140&dq=M1A2+SEP+%22graphite%22&source=bl&ots=ovdMcyk6En&sig=ACfU3U0WZ5gpWMlatbjewlMaW8I0UZiysQ&hl=en&sa=X&ved=2ahUKEwjTje_H-OTiAhVOUIAKHcIZCwk4ChDoATAFegQlCRAB#v=onepage&q&f=false

²¹ http://i.imgur.com/ZCZqlym.png

²² https://youtu.be/S1AgQExstxc?t=88

 $^{^{23}\} http://leopardclub.ca/Spotlight/Spain/Leopard_2E/Lobitz/images/003.jpg$

²⁴ https://taskandpurpose.com/m1-abrams-tank-m1a2c

https://below-the-turret-ring.blogspot.com/2016/10/russia-is-mass-producing-improved.html

 $^{^{26}\} https://topwar.ru/145698-podkalibernye-snarjady-nastojaschego-i-buduschego.html$

²⁷ https://topwar.ru/145698-podkalibernye-snarjady-nastojaschego-i-buduschego.html

without reference to their extreme cost to build and operate, and their lack of an active protection system. The losses of Turkish Leopards in Syria should not be seen as a true lesson on the vulnerability of this vehicle, as the Turks were using the much older Leopard 2A4 standard, which is significantly less capable than more modern variants. In addition, the lack of support for the Turkish Leopards was a contributing factor in their loss, as tactics which do not provide adequate support are liable to be

punished, as was shown.

Perhaps the biggest lessons to be learned from the Leopard 2 is that the inbuilt modularity and upgradeability is a necessary factor in any future tank design to maintain pace with future threats. The newest variants of the Leopard 2, such as the 2A7, are almost a completely different vehicle when compared to the older models such as the 2A4, and are capable of withstanding fundamentally greater threats. Other tanks have shown themselves to also be upgradeable to a high standard, but none exemplify this characteristic to the same extent as the Leopard 2's evolution has shown. However, the still-greater significance of Leopard 2 may be political rather than its battlefield capabilities.

As Europe proceeds to seek greater integration in the defence matters, it is likely that European leaders will seek to coalesce future designs around a common platform for greater interoperability and to create larger economies of scale. This has already

started to happen with the 'OMBT-Leo2' pooling and sharing initiative of the European Defence Agency (EDA), which seeks to upgrade Leopard 2 tanks to the Leopard 2A7 standard and lease, rent, or sell these tanks to European countries which wish to replace their obsolescent (and often Soviet) tank fleets28. The legacy of the Leopard has also been shown by the increased cooperation between Germany's Krauss-Maffei Wegmann and France's Nexter Systems, with projects like the 'Leoclerc' designed to test the compatibility between the two companies in terms of expertise and cooperation²⁹. As Europe looks to the future, the idea of common vehicle fleets will seem increasingly attractive to its members.

A GLANCE TO THE FUTURE

The Israelis have shown in concepts a vision for what might be a viable alternative to existing MBT design with the Carmel. This vehicle is still in development, so hard facts about its performance cannot be drawn, but the major design principles can still be evaluated. To begin with, it represents a heavy IFV more than it does a tank. Concept art and small-scale presentations by Israeli defence companies involved with the project has shown the vehicle to use a two-crew layout, with the crew sat in a protected citadel like in the Armata. It has a remote turret which is armed with a medium-calibre automatic cannon, and on top of the turret there are two remote weapon stations which have



JENS STOLTENBERG, GENERAL-SECRETARY OF NATO

You know that in Europe there are 17 different types of main battle tanks. In the United States there is only one. In Europe there are 13 different types of air to air missile. In the United States they have three. And European nations have 29 different types of naval frigates. The United States have four. I mention this because it highlights the importance of more cooperation in Europe when it comes to European defence. Therefore, European Defence Fund is good, the PESCO is good, because these are ways to try to address this fragmentation, to increase efficiency and to make sure that European Allies, the European Union, is delivering more when it comes to defence. This is something I strongly welcome, and which I, on behalf of NATO, has many times expressed that we support

Leopard 2A7V, Germany



²⁸ https://www.eda.europa.eu/info-hub/press-centre/latest-news/2017/09/22/eda-seeks-european-defence-industry-s-input-on-main-battle-tank-optimization

²⁹ https://www.defensenews.com/digital-show-dailies/eurosatory/2018/06/11/french-and-german-armor-makers-test-the-waters-with-a-euro-tank/

³⁰ https://www.thedrive.com/the-war-zone/26170/france-tests-huge-140mm-tank-gun-as-it-pushes-ahead-with-germany-on-a-new-tank-design

³¹ http://www.imisystems.com/mediacenter/iron-fist-full-spectrum-active-protection-system/

a machine-gun and two ATGMs each. The vehicle relies on an active protection system such as Trophy for defeating RPGs and ATGMs. From the crew position, the crew have large displays showing them the tank exterior, and the Iron Vision 360° see-through armour system allowing them to see all around the vehicle without having to rely on exposing themselves or using periscopes. The vehicle also has a very high level of automation,



BARUCH MATZLIACH, BRIDAGIER-GENERAL, COMMANDER OF THE TANK PROGRAM ADMINISTRATION (MANTAK) AT THE ISRAELI MINISTRY OF DEFENCE

......

Battlefield threats are divided into three categories: short range shaped charge projectiles (antitank missiles) this is a category of threats that enables an infantry detachment to destroy a tank. The second category consists of anti-tank armor-piercing rounds fired by tanks, and the third threat category consists of belly or roadside explosive charges. Active protection systems provide a solution only for the first threat category. The kinetic threat does not have a full-proof solution. The Iron Fist system has the potential of reducing the severity of this threat, but you will still need reactive armor and passive armor to stop it completely

with automatic vehicle terrain navigation, automatic target recognition and independent target search functionality for all weapons. This means that in combat situations, the vehicle is capable of locating targets independently and the crew would simply need to prioritise or select the targets they want to engage and the vehicle conducts the engagement automatically. This level of automation also allows the crew to be removed from the vehicle altogether and for it to be used as an entirely unmanned platform.

As we noted at the start, the tank must be built first and foremost to be suited to the type of war an army is prepared to fight. Israel's Carmel design therefore reflects their likely opponents insofar as it prioritises extremely fast sensor-to-shooter times. flexible multipurpose armament choices, and deployability over raw protection and raw firepower. Insofar as the Carmel is a demonstration of what to expect in the future, the most prescient innovation is probably the level of automation, which reduces the level of cognitive load on the crew, and allows training to be simplified. The optionally-manned component is also a component likely to be copied in future designs, having already become a component of the US Optionally-Manned Fighting Vehicle (OMFV) program to replace the Bradley.

However, due to the wars which are likely to be fought, Western designs are likely to pursue a large-calibre gun instead of relying on missiles which are more easily intercepted by active protection systems. As such, the tanks will need to be bigger than the Carmel, comparable in size to modern tanks. Western vehicles are also highly likely to borrow the Russian design philosophy of using an autoloader and with it, the rationale of an unmanned turret. This is because larger-calibre guns are seen as a future requirement – a 130 mm gun has been developed by Rheinmetall, and the French have already tested a 140 mm gun

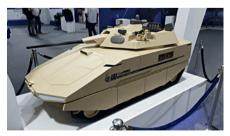
design³⁰. With larger guns, it becomes more difficult for a human to handle the heavier ammunition, and so an autoloader is a logical solution to the problem. This also allows a reduction from four to three crew, and makes it possible to eliminate crew from the turret altogether, as the Armata has done. The appeal of a smaller crew is simple – it means that engineers can make a smaller vehicle with a smaller protected surface area, and save some weight, and for military planners it allows them to simplify training and eliminate 25% of the personnel costs of a tank force. The Israeli innovation of moving to a two-person crew by providing the vehicle with an autonomous driving capability is likely to appeal even more for exactly the same reasons.

Top-attack threats deserve further discussion, because they remain a challenge for both existing tanks, even those fitted with rotating active protection systems such as Trophy and Iron Fist³¹. They are more difficult to intercept, and they target the weakest portion of the vehicle. As ATGM designs continue to evolve, a top-attack functionality is likely to become increasingly common, and so future vehicle designs will be required to factor in protection against them in order to remain relevant.

While there are some lessons to be learned from existing designs, there are sadly insufficient conclusions to draw because the modern vehicles discussed have never been engaged in the type of combat scenario which truly puts their design capabilities to the test. With an absence of such data, it is difficult to make a comprehensive assessment. However, the most concerning trend for tank fleets globally are the costs associated with running them. In order to remain relevant in the XX century, tank designers are faced with the colossal challenge of making their vehicles more deployable, and more affordable in large quantities in addition to being highly capable. •

Israelis' concepts: a vision for what might be a viable alternative to existing MBT design with the Carmel













Supported by

EXHIBITORS

Organised by

DELEGATION PROGRAMME















FROM CITY AIR-TAXI TO OIL-WELL DERRICKS

At MAKS-2019 Air Show "Russian Helicopters" Holding presented a whole new line of civil helicopters. MAKS-2019 Air Show held at the end of August in Zhukovski near Moscow showed that one of the most important trends in developing the Russian military and industrial complex with regard to diversification is confirmed by actual developments. The feasibility of presidential instruction to gradually increase the share of manufactured civil and dual-capable high-tech products up to 30% by 2025 and up to 50% by 2030 looks different for various branches of defense industry.

Text by Alexander Ermakov

nyway, "Russian Helicopters" Holding incorporated in Rostech Corporation is not one of those, who has got nothing to offer in the global market. Although, the company has stable positions in the military market (it is planned to supply 423 helicopters including two hundred Ka-52 and Mi-28 attack helicopters for the Russian army only, according to state armament program 2027), the domestic air show was held to showcase civil helicopters which make up a line of helicopters to meet any challenge.

TAXI AND LIMOUSINE

Light VRT500 was one of the most eye-catching novelties not only in the helicopter area but at the entire air show. It was showcased earlier as a simplified mock-up model at the specialized exhibition HeliRussia. It is now a project that bears no classic Soviet brands such as "Kamov" or "Mil" but has a new name – VRT, "VR-Technologies": the new design bureau of "Russian Helicopters" Holding established in 2014. This DB has already drones VRT300 and VRT30 in production.

VRT500 is a light six-seater single engine coaxial helicopter. In terms of weight — it is in the same class as world-famous helicopters such as Airbus Helicopters H120 or Bell 505. However, due to its coaxial rotor design it is much shorter and its overall dimensions are much smaller than those of not only the mentioned helicopters but of much lighter Robinson R44, too. As there is no need to install the tail rotor transmission, it became possible to arrange the power unit in a more compact manner and allowed to have the maximum-size cabin



for this class - by one cubic meter more than in above-mentioned H120/Bell 505. In addition, the helicopter has also received a big afterhatch right in the cabin, which is unusual for a helicopter of these dimensions and very suitable for its ambulance and rescue versions.

Its enhanced safety on the ground should be noted as well - due to elimination of constant danger coming from the tail rotor and height of the main rotors position (almost 3 m to the lower one), which completely removes any threat to passengers during boarding and unloading. The helicopter can be easily converted from one modification into another due to its quick-detachable seats and equipment. Among standard options it is worth mentioning a passenger one (for four or five passengers), ambulance, cargo, police and VIP-carriage versions.

At the moment the helicopter is being prepared for its first flight that will take place next year. It is going to be manufactured at Ulan-Ude aircraft factory. In 2023 after certification it is scheduled to be delivered to customers. The first deals have been already made - a contract to purchase five helicopters was signed at the air show by Malaysian company Ludev Aviation, which has dealer plans to promote this helicopter in the region. Negotiations are on-going with other potential buyers from Asia and Europe.

The biggest news related to VRT500 at MAKS-2019 was a joint project announced between Yandex and Russian Helicopters to establish an air-taxi service in Moscow and this helicopter was selected especially for its maximum economic effectiveness, which can make the project profitable with an affordable ticket price. At the airshow VRT500 was showcased in conventional "air taxi" colors with passenger cabin layout featuring five seats for air lifting on short distances.

VRT500 is aimed at the largest market, where Russian machines hardly have been presented before (Ka-226 and Ansat are much heavier helicopters). The project's key strengths are its coaxial rotor design, which is unique to the global market but at the same time well mastered in Russia, as well as its large cabin, modularity and application of most advanced technologies. One more project aimed at transporting passengers - this time not for mass transit but a luxury one, showcased at MAKS-2019 for the first time was a special version of well-proven light double engine helicopter Ansat developed together with Russian luxury car brand Aurus. What makes the car and the rotary-wing machine related is, first of all, common design solutions for cabin trimming. This has produced a machine with a unique ratio of highest comfort and price lower than that of competitors. Much lower operational costs as compared to the Mi-8 family helicopters may catch the state customer's interest as well.

Comfortability is created not only by using wide seats and cabin trim with premium quality materials but also by employing purely engineering solutions including sound insulation, adjustable tint coating,



VLADIMIR PUTIN. PRESIDENT OF THE RUSSIAN FEDERATION ABOUT MI-38T

"Functional and nice-looking"



SERGEY CHEMEZOV. **HEAD OF ROSTECH** STATE CORPORATION

We must manufacture and deliver 140 Ansats and 46 MI-8 to the medical aviation service by 2021. This project is worth of about 40 bln rubles. All these helicopters are outfitted with medical equipment



ANDREY BOGINSKY, DIRECTOR GENERAL, "RUSSIAN HELICOPTERS" HOLDING

With a significant decline in military exports and state defense order, civil supplies make it possible to develop factories and DB. First of all, we look forward to more growth in the civil segment bearing in mind such large projects with involvement of Rostech as the National Ambulance Aviation Service and use of Ansats for corporate transport services with participation of leasing company "Aviacapital service". There are export opportunities that were promoted by a last year demo-tour of our helicopters MI-171A2 and Ansat in China and South-East Asian countries

Helicopter «Ansat»

personal climate control, cabin ceiling redesign etc. The engineering solution employed in the basic version – the passenger cabin's overall dimensions, which are quite large for this helicopter class, make passengers comfortable. Interior trim of the helicopter demonstrated at the air show was finished right before the exhibition. Now it is necessary to complete the test cycle, obtain additional certificates and then it will be possible to supply the helicopter to clients.

Ansat is one of the examples confirming successful design of civil helicopters in Russia. Designed by Kazan helicopter plant design bureau and manufactured there, this helicopter is not only supplied to the Army as a trainer machine but is also produced in great amounts for civil needs. Purchases of ambulance Ansats form the core of a large-scale program for renovating Russian ambulance aviation. It also attracts much interest as a passenger machine - for example, at MAKS-2019 Rostech SC signed a contract with "Polar airlines" to supply seven helicopters, in this case, the helicopters will be provided with special technical features for the Extreme North: with increased fuel range, anti-ice system and an option for instrument-aided flight in adverse weather conditions.

The number of Ansats in operation grows: according to data by "Russian helicopter systems", in 2018 their flying time overpassed that of the previous year by 6.7 times. China has become the first foreign buyer of this helicopter, the supplies of ambulance helicopters under the contract for the PRC's Association of Disaster and Emergency Medicine will start this year.

IN THE MEDIUM CLASS

Medium multi-purpose helicopter Ka-62 was another debut demonstrated in the flight program at MAKS-2019. Despite similar appearance with Ka-60 designed for military customers and some common design solutions employed (one of the most noticeable is its tail rotor of Fenestron type, in other words, a multiblade rotor located in the tail unit ring), it is a new machine, development of which was started in 2008–2009.





Ka-62

At the air show the fourth built helicopter was showcased (considering one helicopter for tethered testing and one more, assembled but not air-tested yet), tests of which were started in August. Based on testing experience of the first two helicopters (the first flight was performed in 2016) a number of changes was introduced to design of the third helicopter, including reinforced design of its tail rotor and tail unit, air-frame, reworked transmission.

The helicopter demonstrated at MAKS-2019 was in a corporate transport modification, however, there will be other standard modifications as well. One of the most promis-

ing versions is for offshore carriage. Due to its six big windows – emergency exits, the 12-passenger helicopter (a basic passenger version is up to 15 people) will meet the strictest safety requirements. In 2020–2021 it is planned to have the basic corporate modification certified in Russia, there is already a solid contract for this version. When the European certification is passed in 2022, it is planned to enter the global market.

Key strengths of the helicopter include a powerful French engine providing good flight performance especially in hot climate or high mountains. With initially adopted principal approach in selecting components –









4-8 MARCH 2020

DJERBA-ZARZIS

ww.iadetunisia.com

Organised by **IADE EXHIBITIONS**

CONTACT US

contact@iadetunisia.com

16 rue Attarchia Ariana Supérieur 2080 Tunis, Tunisia Phone: +216 55 023 000 | Fax: +216 71 706 807

+216 5 288 84 38 | +33 1 88 33 58 17 | +33 6 47 30 93 51





UNMANNED SYSTEMS EXHIBITION & CONFERENCE

23 - 25 FEBRUARY 2020



Strategic Partner



Official Destination Management Partner



Co-located with



Host Venu



Organised by



In association with





Official Media Partner



Official Healthcare Provider





ALEXANDER OKHONKO, DIRECTOR GENERAL, "VR-TECHNOLOGIES" LLC

Europe and Asia are the priority potential markets for sales of VRT500. With its performance, this helicopter is capable of competing with the same class rotary-wing aircraft, which operate in these regions





Mi-38T



Mi-171A2

"picking up the best worldwide" – there was also a room for Russian components (where they met this strict rule). So, for instance, the cabin equipment and navigation system are designed and manufactured in Russia, as well as the fuselage.

Helicopters Ka-62 and Ansat must replace a significant number of large Russian fleet comprised of old Soviet MI-8 – quite often it is too over-sized for some tasks and as a consequence its operation becomes very expensive due to high fuel consumption.

However, the fact that a great number of MI-8 in service needs to be replaced with

modern machines does not mean that the proven family will vanish completely. A niche for the "upper-medium" class helicopter always remains, especially in Russia, where operation is often needed in adverse geographic and climatic conditions, and the oil and gas industry though operates mostly on the ground but in hard-to-access regions.

The latest civil representative of the MI-8/17 family, MI-171A2 was showcased at the air show, its commercial operation started in February 2019 in Western Siberia. Despite external resemblance to the old machines, this helicopter has a lot of distinctions: a more powerful engine, new main rotor

VRT500 air-taxi

blades made of composite material with longer life and thrust, X-shaped tail rotor, automatic obstacle detection system, completely upgraded cabin allowing to reduce the crew to two pilots and providing for instrument-aided flights at night time and in adverse weather conditions. The helicopter has passed the strictest flight safety certification in Russia. It has passed certification in China as well; in accordance with concluded agreements the first six helicopters are scheduled to be supplied to China in 2022.

To carry out special missions this helicopter can be quickly equipped with additional modular equipment such as a search spotlight, a loudspeaker, several types of winches as well as external load stores and fire-fighting equipment. This family continues to be developed, an offshore version of MI-173A3 with changed fuselage is under development.

The premier series MI-38, demonstrated for the first time and officially certified in its VIP version, symbolically ended a wide line of civil aircraft from "Russian Helicopters" at MAKS 2019. The newest, even more powerful and heavier than the MI-8/17 family helicopters this helicopter was showcased also in a military modification for assault forces. Supplies to the Russian army should start in the nearest future, in parallel this helicopter should be placed in trial civil operation by "Russian helicopter systems".

Civil supplies of these machines most likely will not be great in numbers, however the MI-38 will gradually take over the MI-8/17 in such missions as top officials air-transporting, most complex search and rescue operations, ambulance missions and air-lifting of large-sized cargo and big amounts (up to 29) of passengers in adverse climatic conditions.

The previous home air shows focused mostly on military aircraft, but this time, as we can see, "Russian Helicopters" Holding showcased a new line of civil helicopters. This allows the holding to look into the future with confidence and reach success not only in the domestic market but in the global market as well, where Russian helicopters are a time-proved sign of quality. \spadesuit

COMPLEX AREA PROTECTION "ANTI-UAV"

Security is one of the most important factors affecting operation of companies. The process of security provision always supposes a set of measures that allow excluding accidental or intentional intervention into operation of an organization.

One of the most popular and available intervention technologies is espionage by means of unmanned aerial vehicles (UAV). Light-weight small drones or full scale unmanned aircrafts can be used not only to satisfy unreasonable curiosity, but also for espionage: surveillance, event recording, determination of personnel and vehicle traffic schedule, surveillance within any radio band, installation of devices for video and radio surveillance / recording / transmission, as well as terroristic attacks.

Joint project of AMIRA Group (28 years of experience in engineering, manufacturing and installation of metal structures for different purposes: from illumination to lightning protection, particularly for industrial and military facilities) and Integra-S Group of Companies (20 years of experience in software and equipment development for enterprise integrated safety and security) is a complex solution for protection against UAV and control of technologically important industrial facilities (including distant branch offices), restricted areas, public, corporate, and private residences.

Integrated system allows the following:

- detect radio signals of control channels and radio signals of UAV data transmission:
- activate electronic interference within the appropriate frequencies;
- detect radio signals of UAV data transmission;
- transmit alarm signals to the control and signal panel;
- suppress UAV control channel;
- tap UAV control;
- maintain a database of penetrators;
- block UAV operation;
- detect location of UAV operator.





Features of the integrated protection system:

- System is open for integration of new entry systems in it;
- Operation in automatic mode with event registration;
- Possibility to camouflage poles and pillars for system installation: with painting and chosen height the pole can be camouflaged, for example, as a tree.

Area of unauthorized unmanned aerial vehicle movement detection is up to 1.5 km. UAV control can be blocked within the area of up to 1 km.

The system structure:

- Anti-UAV complex;
- Special purpose radio tower.

The system is in ready-to-operate mode: from engineering to installation and equipment setting.

The pole for monitoring system installation is made to be mounted on a radio mast or a high-mast pillar with mobile head frame and can be of dual purpose. Brackets for fastening lighting fixtures, video surveillance system, fire and security alarm, people and vehicle movement monitoring system and other equipment integrated into UAV monitoring system can be installed on it.

The proposed system is completely automated and can operate independently.

Such integrated systems have already been successfully used and operated at public facilities and in the state borders offices for several years. •

Systems that can be blocked: GPS, GLONASS, BEIDO, GALILEO

Operating frequency bands for UAV blocking: 433 - 5,800 MHz

The company's products are successfully used in Russia and abroad under conditions from -50 to +50 °C, including areas with seismic activity up to nine points on the Richter scale.



JSC AMIRA Saint-Petersburg, Russia export@amira.ru Tel: +7 (812) 441-25-00 http://amira-industry.com/



Management System of AO Energiva meets the requirements of ISO 9001:2015

AO ENERGIYA

Joint-Stock Company



Tel.: +7 47467 20167 (Secretary);

Tel./fax: +7 47467 21617, +7 47467 41614, +7 47467 27440 (Marketing);

Tel./fax: +7 47467 27103 (Sales);

E-mail: marketing@ao-energiya.ru; www.ao-energiya.ru



AO Energiya was established in 1941 and still holds a leading position among the manufacturers of the chemical sources of current in Russia and CIS. Today AO Energiya is a steadily working enterprise with considerable production capacities, its own research facilities, steady partnership relations, firmly following the course of innovative development. The company pays much attention to modernization of chemical sources of current, development of new products, application of new materials and technologies, relationships with partners and cooperation with research institutions.

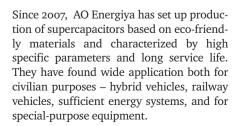
The main area of activity of the company is development and production of independent power supply sources for household appliances, general industrial and special-purpose equipment: aviation, river and sea fleets, radio equipment, household electronic and electric devices, medical equipment, toys and video games, emergency means of communication and alarm signaling in the air, on land and sea, fire extinguishing systems and other kinds of equipment for vari-

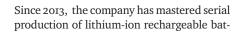


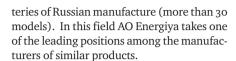
ous purposes.

In recent years the management of the company have charted the course toward import materials substitution and supply of exceptionally Russian-made products.

The company is carrying out integrated modernization of production facilities and maintaining close cooperation with research and production companies on R&D work for development of new sources of current. A strong science and technology base enables the company to develop customized sources of current of various electrochemical systems.







Since 2015, as part of the import substitution program, the company has purchased an automatic production line and set up serial production of primary 1.5 V 3 A·h AA cells of lithium iron disulfide electro-chemical system, characterized by reliable operation within a wide temperature range, high discharging currents, and long storage period – up to 10 years. The cells of this electrochemical system are highly competitive in comparison with foreign analogues. The cells are included into electronic database of component parts intended for development, modernization, production and maintenance of special-purpose equipment.

In 2018–2019 the company set up production of the primary cells:

- CR34615 (D) of lithium manganese dioxide system, with 3 V voltage,
- FRo₃ (AAA) of lithium iron disulfide system, with 1.5 V voltage.

The company has successfully conducted testing and trial operation of lithium-ion cylindrical rechargeable batteries ICR14/51 (size: 14500) and ЛИЦ-3 (size: 18650) in portable assistive devices, such as prostheses.

AO Energiya has carried out R&D work for development of cylindrical and prismatic high-current batteries for independent power supply of unmanned aerial vehicles. The company has designed the batteries of lithium iron phosphate system, providing high specific parameters. The field of application: as power supply of electric buses, various electric vehicles, in uninterruptible power supply units, energy storage systems.

AO Energiya has mapped out a clear strategy of development for the nearest years allowing the company to become even more prominent and serious business partner. •





General Director of AO Energiya V.M. Ivanov



KAF JSC. EVOLUTION OF QUALITY

KAF JSC is located in Shumerlya, Russia, and it is one of the leading Russian manufacturers of purpose-built trucks and vehicles. The enterprise annually produces over 2,500 units for law enforcement agencies and civil customers in Russia and neighboring countries. The company is recognized for its accurate and insightful implementation of innovative industrial solutions, continuous enhancement of quality and professional competences.

KAF JSC has traditionally been awarded high ratings by professionals at specialized international shows. Command center vehicles, field kitchens, passenger buses, medical trucks, specialized amenity vehicles have attracted avid interest of foreign partners.

Over 85 years of successful research and deployment of various specialized vehicle solutions for Russian and international customers underline KAF expertise in product reliability and its commitment to customer requirements.

Some examples of long-term cooperation in the field of civil products include close collaboration of KAF JSC with such large customers as Gazprom, Transneft and Russian Railways. The experience of cooperation with these partners includes all stages from design documentation development to mass production of custom vehicles and their servicing.

Cooperation with law enforcement agencies includes design, construction and manufacturing of specialized vehicles for transportation of suspected criminals for the Ministry of Interior of Russia and the Russian Federal Penitentiary Service; vehicles intended for support and transportation of the Russian Federal National Guard Service personnel; design of over 50 types of van bodies and 12 container body types adopted by the Russian Army; development and production of mobile command centers for the Ministry of Emergency Situations of Russia.

KAF vans, containers and vehicles are tested in the most extreme environments and certified for extended service life.

The passion for continuous evolution is the key KAF value. KAF specialists believe that constant reevaluation and improvement of its engineering, industrial and professional competences will ensure the highest level of quality of its products for years to come.



Over 60,000 m² of reconstructed production facilities in operation



Engineered and built to operate in the most extreme environments



Over 50 types of car trailers and semi-trailers



20 new modifications of repair cars and support vehicles



80 modifications of van bodies, 12 modifications of container bodies



Over 100 points of quality control inspection





ALWAYS AT A HEIGHT: EVACUATION, TRAVEL, CARGO DELIVERY

Development of construction technologies has allowed to build skyscrapers under various climatic conditions. The possibility to implement ambitious ideas of customers and architects has emerged. Buildings tend to grow higher and higher. It is exclusive, cost effective and feeds one's imagination. However, there is one serious problem, which can overscore all advantages of high-rise buildings, which is people evacuation from such buildings in case of emergencies (fires, explosions, failure of escape routes, etc.).

T.A. Mirzeabasov, Director General of ANTER LLC

To the present day, there is no developed structure allowing reliably evacuate people from high-rise buildings, in which the escape routes are cut off. Everyone remembers tragic events on September II, 200I, in New York (USA), when as a result of the terroristic act, thousands of people died. The major part of people couldn't survive at the failure of tower buildings due to evacuation impossibility. Thus, the search for the problem solution is still relevant.

To your attention presented is the project of multipurpose aircraft of aerostatic type with variable aerostatic flotation (airship). This aircraft can be used in different situations, particularly, as follows:

- evacuation vehicle, which can solve the most complex tasks on people evacuation from high-rise buildings (skyscrapers) in case of emergencies;
- passenger aircraft with a small capacity for transportation for small distances (up to 500 km);
- cargo aircraft for cargo transportation with weight up to 3 tons at altitudes up to 1 km. When docking several aircrafts into a single unit, sizable cargoes can be transported at long distances at small altitudes (recently, an American Company Amazon has patented airship as a mobile warehouse. Out project allows using the possibilities of airship more flexible for cargo transportation and delivery, particularly, to the high-rise buildings);
- unmanned platform for mobile communication networks for different purposes.

Our company ANTER LLC (St. Petersburg) together with RuFiUs (Finland) has patent-



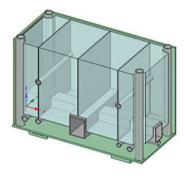
ed the design of aerostatic aircraft (airship) with variable aerostatic flotation in Finland, the Russian Federation, China, the USA, and Eurasian Union.

DESIGN OF THE PROPOSED PROJECT

The airship design is a hard thin-walled case. The case walls and all elements of its structure shall be made of composite materials. Case form is a rectangular block. The airship is operated by a pilot in the cabin or remotely by an operator from the ground control post. The airship has positive flotation when the pilot is aboard and in case that it has a full fuel tank. The power unit is of the hybrid type. Movement in the space is ensured by motors with impellers, which are located in channels passing through the hard case of the airship. Motors are provided with energy from storage batteries or super condensers (contactors), which are charged from the diesel generator.

Channels with impellers are installed in different plane surfaces:

- I. Horizontal plane surface (in the lower part of the aircraft, below the center of gravity):
 - one channel with impeller (along the long axis, in the center of the case) en-



sures aircraft movement in the longitudinal direction;

- two channels with impellers (in the direction perpendicular to the longitudinal axis along the case edges) ensure aircraft turning in the horizontal surface and its maneuvering perpendicular to the longitudinal axis;
- 2. Vertical plane surface four channels with impellers along the case edges, which ensure aircraft maneuvering vertically, keeping at altitude, support during flight with maximum load and aircraft down-come

Maximum lifting capacity of the aircraft is 3,000 kg. At such a load, the aircraft has negative flotation and is supported in the air with the vertical thrust vector. During adjustment of the thrust vector, the controlled descent can be performed without mooring crew involvement. After unloading the aircraft obtains positive flotation and can take off without thrust vector engines.

For docking (coupling) with the building surface and other aircrafts, the case is equipped with docking devices on both sides.

Cabin, which can be used for accommodating people or cargo, is located in the central part of the aircraft, perpendicular to the lon-



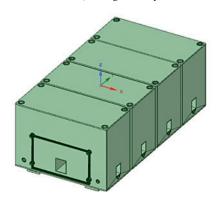
gitudinal axis. The remaining internal space of the case is occupied with cells made of gas-protecting clothe and filled with helium, ensuring buoyancy. The gas volume is sufficient for weight compensation of aircraft structure, units and assemblies, pilot and an additional load of about 200 kg.

USE OF AIRSHIP AS EVACUATION VEHICLE

For efficient operation, at least two aircraft will be required. Directly from the home station airships perform flight together: prior to flight they are connected with each other by docking devices and form a combined aircraft in the form of the unit made of several airships. Rescuers and equipment can be delivered to the emergency site from the home station by the combined aircraft.

Travel speed of the combined aircraft is 80 km/h maximum. As most cities, in which high-rise building are located, have maximum diameters within the ranges of 80 km at average, such travel speed will be sufficient for arrival to the emergency site as soon as possible. Moreover, traffic situation of big cities will not affect the rescuers. Lifting altitude of the aircraft is 1,000 m maximum. At such speed and distances, the aerodynamic form will not be of essential importance, and flat surfaces of the aircraft will ensure firm adherence of its wall to the building wall.

Upon arrival at the emergency site, the combined aircraft is divided into separate airships. One of them performs surveillance, flying around and searching for the most acceptable place for docking with the building. While docking, docking device is extended, fixing reliably the aircraft



and holding it, protecting from the influence of ascending air along the building. Thereafter, the aircraft is drawn up against the building wall with docking device and teams of rescue services get the possibility to make a passage in the external building wall. The crew of rescuers, which organizes evacuation, arrives with this airship with their equipment. They perform surveillance and start fire fighting actions. The first aircraft is used as a terminal to which other airships, arriving jointly for evacuation, can be docked.

USE OF AIRSHIP AS PASSENGER VEHICLE

For passenger transportation, single airships are used. Passenger capacity is 20 people maximum. Flying distance is 500 km maximum. For aircraft use as a passenger vehicle, passenger seats shall be installed in its cabin. Besides, the provision shall be made for the installation of a toilet with plumbing fixtures.



USE OF AIRSHIP AS CARGO VEHICLE

Use of airships for cargo transportations has its advantages:

- altitude up to 1000 m is almost not occupied (very small number of aircrafts is used at such altitudes for long distance flights);
- possibility to lay the routes without considering motor roads, almost by the straight line;
- possibility to use the airship in an unmanned mode, controlling it from special ground control posts, as the movement is performed along direct routes for long distances.

For long distance cargo transportations (as in a case of evacuation during rescue operations), several airships jointly docked into a single aircraft can be used efficiently. In order to improve aerodynamic properties, the first aircraft in the unit shall be equipped with light-weight aerodynamic shield (of inflatable type, if possible), and all other aircrafts shall be provided with additional wings of minor extension. Internal space

of the cabin and technical corridor can be used for cargo accommodation. One of the airships in the unit can be used as a tanker, and a fuel tank with fuel reserve for all airships can be arranged, that allows significantly increase the continuous flight distance for the unit of airships.

USE OF AIRSHIP AS UNMANNED PLATFORM

For use of the airship as an unmanned platform for deployment of mobile networks with various purposes, solar cell panels shall be additionally arranged on the top surface of the case. At weight of equipment up to 300 kg, the airship will have insignificant positive flotation, that allows staying at a specified altitude for a long term. Fuel reserve will be used to hold the aircraft in the specified point at heavy wind load and in the absence of sunshine.

If you are interested in our project, we will appreciate if you assist us in its implementation. For this purpose, the following is required:

- manufacturing and preparation of the prototype for flight trials;
- selection of devices for aircraft control (avionics) considering its particular characteristics:
- performance of aircraft certification tests;
- development of ground infrastructure, which shall include the following: a) maintenance points (control for gas pressure in fabric cells, control of motor, generator, storage batteries, avionics and case condition, etc.);
- b) ground remote control posts;
- c) ground airship home stations.

We are sure that the proposed project has considerable prospects and possibilities, as it can help to solve many problems in different areas: starting with people evacuation from high places in case of emergency to the arrangement of passenger and cargo transportation. Moreover, the aircraft structure stands out with its simplicity and reliability that undoubtedly can be considered as an additional advantage.



ANTER LLC 198095, St. Petersburg, Mikhailovsky Lane, 4A, Let. B, office 3 Phone: +7 (812) 252-07-15;

+7 (812) 252-60-65 Mob. phone +7 (921) 315-07-85 E-mail: tim.mirzeabasov@yandex.ru

IRAN, RUSSIA AND CHINA COMPLETE ALL STAGES OF JOINT NAVAL DRILLS / IRNA NEWS AGENCY

Il the planned stages of the joint naval drills between Iran, Russia and China have been successfully completed, Iranian Navy Commander Rear Admiral Hossein Khanzadi told IRNA news agency.

"All different stages of tactical drills, planned for the first time by the navies of Iran, Russia and China, have been successfully completed," Khazandi said.

He added that "the joint drills of large Asian powers is not a separate event, but it defines a clear path for the region and the whole world in the framework of mutual cooperation."

He noted that "the epoch of the US, whose actions are aimed at sowing discord [in the region] is over, and Washington should leave the region as soon as possible."

Khazandi said that "there is no need for foreign powers to be present in the region, and Iran is ready to cooperate on this matter with neighboring countries."

The joint military drills between Russia, Iran and China codenamed "Marine Security Belt" kicked off in the Gulf of Oman and Indian Ocean on December 27, 2019.

Deputy Commander of the Iranian Navy Habibollah Sayyari said earlier that Iran, Russia and China "will find a way to hold joint drills in the future."



RUSSIA READY TO INCLUDE AVANGARD, SARMAT SYSTEMS IN NEW START AFTER ITS EXTENSION / CHANNEL ONE

ussia is prepared to include its Avangard and Sarmat missile systems in New START (Strategic Arms Reduction Treaty) when it is extended, Russian Foreign Minister Sergey Lavrov said in an interview with the Bolshaya Igra (Big Game) program on Russia's television Channel One.

"We told Americans [at a bilateral consultative commission set up under the New START] that we had presented our new systems, including hypersonic weapons. We consider that Avangard and Sarmat systems are covered by the treaty. We are ready to include these weapons and systems in the current New START (when it is extended)," Lavrov stressed.

"We have already presented Avangard to Americans and we will be ready to do the same with Sarmat at a certain stage," he noted.

However, other systems, which Russian President Vladimir Putin mentioned in his address to the Federal Assembly in March 2018, are not covered by the New START. "We said that on these systems and on new US advanced military systems we were ready to hold a separate parallel dialogue. It should be certainly held as part of a discussion on a whole range of issues, which influences strategic stability," Lavrov stressed.

According to Lavrov, a treaty cannot cover all issues existing in strategic security because new technologies are developed. ◆



RECEP TAYYIP ERDOGAN, PRESIDENT OF TURKEY

We do not go where we are not invited. Right now, there is an invitation that we will respond to. If God permits, as soon as the Parliament opens, as the first thing to do, we will present the deployment of troops to Libya resolution to our Parliament

RUSSIAN SERVICEMEN DELIVER HUMANITARIAN AID TO RESIDENTS OF AL-TABKI IN SYRIA'S NORTH / TASS

ussian servicemen have for the first time delivered humanitarian aid to residents of the Al-Tabki settlement in Syria's Raqqa province, which used to be the main stronghold of the Islamic State (IS) terrorist organization (banned in Russia).

The Russian Center for reconciliation of the conflicting sides in Syria told reporters that Russian servicemen had delivered around 1,000 food sets with a total weight of around 5 tons.

Before the war, around 100,000 people lived in Al-Tabka. Now the settlement has a population of only 45,000 people. The town was seriously damaged in air strikes by the international coalition. At the same time, dozens of terrorists still hide in the town.

"Before the war, we lived well, we had everything. We grew wheat and earned good money. When the war started, people went bankrupt, equipment was destroyed, and now we have nothing left," a local resident Hsin Khalaf Ali said.

Since the start of the settlement process, Russian servicemen have carried out over 2,000 humanitarian operations in Syria, delivering almost 4,000 tons of food to people in need. ◆



US CONSIDERS SENDING SEVERAL THOUSAND MORE TROOPS TO MIDEAST / ASSOCIATED PRESS

he Pentagon is considering sending several thousand additional troops to the Middle East to help deter Iranian aggression, amid reports of escalating violence in Iran and continued meddling by Tehran in Iraq, Syria and other parts of the region.

John Rood, defense undersecretary for policy, told senators on December 5 that Defense Secretary Mark Esper "intends to make changes" to the number of troops deployed in the region. Other officials said options under consideration could send between 5,000 and 7,000 troops to the Middle East, but they all stressed that there have been no final decisions yet. The officials spoke on condition of anonymity to discuss internal deliberations.

The troop deliberations follow several decisions since spring 2019 to beef up the US presence in the Middle East because of a series of maritime attacks and bombings in Saudi Arabia that the US and others have blamed on Iran.

President Donald Trump has approved those increases, even though he also routinely insists that he is pulling US troops out of the Middle East and withdrawing from what he calls "endless wars" against extremists. In October, Trump told his supporters that despite the sacrificing of US lives in Iraq and other parts of the Middle East, the region is less safe and stable today. "The single greatest mistake our country made in its history," he said, "was going into the quicksand of the Middle East."

Asked about a possible troop increase, Trump told reporters: "We'll announce whether we will or not. Certainly there might be a threat. And if there is a threat, it will be met very strongly. But we will be announcing what we may be doing – may or may not be doing."

Later, Trump's national security adviser Robert O'Brien said the president was open to sending more troops to the Middle East. "If the troops are needed to deter Iran, we have the capacity to move them into the region − although I don't think that's happening right now," O'Brien said on Fox News Channel's "Special Report with Bret Baier." ◆





RUSSIAN, TURKISH MILITARY BEGIN SECOND JOINT PATROL IN NORTH-EASTERN SYRIA / TASS

ussia's Defense Ministry has confirmed that a second joint patrol mission by Russian military police and Turkey's border guard service has begun in another border area several kilometers north of Kobani in Syria.

Earlier, the NTV channel said Russian and Turkish military personnel had begun a second joint patrol east of the Euphrates, north-eastern Syria, and showed the joint military convoy on the route.

"Starting from 12:20 of November 5, 2019, a second joint patrol of the Russian military police and Turkish border guard service has begun a mission in another border area several kilometers north of Kobani," the Russian Defense Ministry said.

According to the Russian military, the joint patrol will follow a new route west and east of the customs checkpoint Ailishar along the Syrian-Turkish border. The route more than 160 kilometers long will go through Bandar Khan and Shiuh Faukani.

"The military will patrol the route on armored vehicles Tigr of the Russian military police and Kirpi armored vehicles of the Turkish border guard service. The patrol on the route will consist of eight vehicles and 50 military troops from both countries," the Russian Defense Ministry said. An unmanned aerial vehicle Orlan-10 will monitor the convoy's movement.

On October 22, 2019, Russian President Vladimir Putin and his Turkish counterpart Recep Tayyip Erdogan met in Sochi to agree on a memorandum on joint operations to control the situation in north-eastern Syria. Under the arrangement, Russian military police and Syrian border guards on the noon of October 23 were moved into areas bordering on Turkey's 30-kilometer wide security zone. The Kurds, as it was announced, had completed the pullback of their forces by October 29. On November 1, the Russian and Turkish military carried out the first joint patrol east of the Euphrates.



TURKEY TO ALLOCATE \$17 MILLION TO GEORGIA FOR MILITARY REFORM

GEORGIAN DEFENSE MINISTRY

eorgian Defense Minister Irakli Garibashvili signed an agreement with his Turkish counterpart Hulusi Akar for Turkey to allocate 100 million lira (around \$17 million) to Georgia to carry out a reform in the military logistics sphere during Garibashvili's official visit to Turkey, the Georgian Defense Ministry's press service reported.

"Defense Minister of Georgia Irakli Garibashvili and Defense Minister of the Republic of Turkey Hulusi Akar signed an agreement on military and financial cooperation between Georgian and Turkish governments. The treaty on logistics support envisages allocation of 100 million lira by Turkey to the Georgian Defense Ministry," the statement reads.

Garibashvili left for Turkey on December 24. He has already had one-to-one talks with Akar as well as negotiations in expanded format. The sides discussed issues of cooperation in military education, implementation of the Substantial NATO-Georgia Package (SNGP) that was granted to Tbilisi at the 2014 Wales Summit, as well as important aspects of the trilateral military partnership between Azerbaijan, Georgia, and Turkey. As part of the official visit, the Georgian delegation laid flowers at the tomb of first Turkish President Mustafa Kemal Ataturk and visited a museum dedicated to him.

NEWS



IRAN'S MISSILE SHIELD

Developing own missile capabilities has been the main priority over many years as part of Iranian defense strategy aimed at containing the USA and its regional allies. Sanctions of the UN Security Council remaining in force against Iran until autumn 2020 and banning supplies of many ordinary armaments including combat airplanes and helicopters have finally consolidated this situation.

Text by Yuri Lyamin

s Iran's AF fleet is quite old and its large-scale modernization is now impossible due to sanctions, it is only missiles that give Iran its only real possibility to launch powerful strikes on military bases and strategically important facilities of potential enemies in the event of war. Iranian missile forces are organizationally part of Airspace Forces under the Iranian Revolutionary Guard Corps (IRGC).

Iran's missile programs can be broken down into three main groups – ballistic missiles with liquid rocket engine, solid-fuelled ballistic missiles and ground-based winged cruise missiles. Large-caliber rocket artillery and anti-ship missile programs are related to the above-mentioned programs, but they need to be discussed separately.

BALLISTIC MISSILES WITH LIQUID ROCKET ENGINE

Iran was interested in acquiring ballistic missiles already under the rule of Shah in the 1970s, however, the attempt to purchase them from the US failed and ongoing cooperation with Israel in the "surface-to-surface" missile project was soon stopped due to the revolution in 1979.

Thus, the Iranian missile forces were established during the years of Iran-Iraq war and the first systems of this kind obtained by Iran were Soviet tactical systems Elbrus that were purchased in a small number from Libya. Then as the war progressed the purchasing of a copy of this system from DPRK called Khvason-5 started.

The production of these missiles with a range of up to 300 km was set up in Iran



MOHAMMAD ALI JAFARI,
GENERAL,
COMMANDER-IN-CHIEF
OF THE IRANIAN
REVOLUTIONARY GUARD
CORPS (IRGC)
(JUNE 2018)

•••••

We possess scientific and technical capabilities to increase our missile range, but this is not our policy, as most strategic targets of our enemies are within a radius of 2 thousand kilometers.

This range is sufficient to defend the Islamic Republic





SERGEY RYABKOV. **DEPUTY MINISTER** OF FOREIGN AFFAIRS OF RUSSIA (FEBRUARY 2019)

By developing its missile program Iran exercises the sovereign right to self-defense... Regarding requests of Western countries to Iran to liquidate its missile program, it seems to be an intended attempt to weaken Iran and create new levers of pressure on the country. I am sure that regardless of these hostile efforts Iran will continue to take all measures needed to strengthen its security







BMSR Qiam-1 (up) BMSR Shahab-2

with South Korea's help right after the war under the name of Shahab-1. Then a modified version with increased range up to 500 km went into production under the name of Shahab-2. These missiles are considered to be outdated, they have low precision, however, certain amount of them has remained in service until now. There are upgraded missiles Shahab-2 with modified head part, but it is unknown how many missiles underwent this modification.

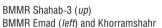
A further development of this line in the 2000s was a ballistic missile with shorter range, which was named Qiam-1, this missile was first presented in August 2010. This missile had a jettisonable warhead, new light weight fuel tanks and aluminum alloy body. Its navigation and control system was improved as well, which made it possible to dispose of tail aerodynamic stabilizers.

Due to these measures and with a slight increase in total weight up to 6,155 kg the maximum range of Qiam-1 has reached 800 km. The jettisonable nose up to 750 kg in weight makes it a very difficult target for missile defense systems because the burned-out rocket stage turns itself into a big false target. However, the precision of Oiam-I is still not very high, because after having detached from the rocket the flight of its nose cone cannot be corrected on the final path.

Iranian engineers continued to improve the precision and the result of their efforts was a new upgraded version of Qiam missile, which in addition has received a new nose cone. The new nose cone is provided with aerodynamic rudders to control flight on the final path, which should greatly enhance its precision. This modernized missile was first showcased in 2018.











BAHRAM QASEMI, PRESS SECRETARY OF THE MINISTRY OF FOREIGN AFFAIRS OF IRAN (JANUARY 2019)

Iran's missile capability is part of legitimate defense power and ensures national security, which is based on the doctrine of containment

Iranian liquid fuel medium range ballistic missiles (MRBM) from the family started with Shahab-3 missile have taken the same road from increasing range to enhancing precision. As before, Iran purchased the MRBM production technology from the DPRK, where these missiles were put in service under the name of Kvason-7, although they are better known under the name of Nodon, which was given to them in the West.

After a number of tests, the Shahab-3 missile was put in service in the first half of 2000s and its range reached 1,300 km. However, both range and precision of the missiles equipped with jettisonable nose left a great deal to be desired, therefore the work on optimization and design of new versions continued. As a result of these works during the 2000s first an improved version of Shahab-3 and then a new missile under the name of Ghadr with an increased range came to light.

The modified versions of Shahab-3 and Ghadr make up the majority of Iranian MRBM, in this case, it is known that the latter has at least three versions. The first one, Ghadr-1 with a range of up to 1,800 km came to light in 2007, but it seems that it was not widely deployed. Soon enough there were two other versions of this missile (Ghadr-F and Ghadr-H) with a range of 1,950 and 1,650 km, which since then

were possible to watch on video coverage from training launches and parades.

Having reached the needed range Iran focused on further increasing precision of their medium range ballistic missiles. To achieve this a new missile under the name of Emad was developed on the basis of Ghadr missiles, this missile came with a new jettisonable nose and aerodynamic rudders. It was first showcased and tested in 2015 and as General Dehghan, Iran Minister of Defense said at that time, the Emad missile has become the first Iranian missile with such an operating range, which could be controlled up to the moment it hits a target and had capability of hitting target with more precision. The declared range of Emad missile with a 750-kg nose cone is 1,650 km with missile weight equal to 17,500 kg.

Since 2016, Iran has been testing the Khorramshahr MRBM, which is a new generation of Iranian liquid fuel ballistic missiles. A new liquid rocket engine and transition to more efficient fuel have made it possible to greatly increase the capabilities as compared with the previous generation missiles. With declared range of 2,000 km and weight of 19,500 kg it carries a jettisonable nose weighing 1,500 kg, or it potentially can carry a fractionated warhead. Early in 2019, at an exhibition in Teheran there were shown a poster with Khorramshahr-2, fea-

turing a new jettisonable nose, and video footage of its successful trial launch.

SOLID-FUELLED BALLISTIC MISSILES

Iran has got its own way in dealing with its solid-fuelled ballistic missile development and manufacture program, which roots from the first tactical unguided missiles developed during the Iran-Iraq war.

Their design was probably initiated by purchasing tactical missiles B610 (CSS-8) based on the air defense missiles of HQ-2 system from China at the end of the 1980s – beginning of the 1990s. Most likely, Iran has then received their production technologies and the missiles were given Iranian name Tondar 69.

Although these modified air defense missiles with a solid propellant booster and a liquid cruise engine were not the best for the role of tactical missiles, however, Iran came to appreciate this idea and the obtained technologies of guided and relatively light-weight tactical missiles.

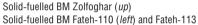
The work started in Iran earlier in the 2000s produced the first Iranian solid-fuelled guided tactical missile under the name of Fateh-IIO. And very few could imagine that it would lay foundation for a whole new family of missiles.













Initially the missile range was just 200 km and its precision was very moderate, however, the missile stayed guided until the very end. The missile's precision and range have been improved and increased gradually with further development of Iranian industry. After the last modification, the Fateh-110 missiles have a range of about 300 km and warhead weight of 448 kg.

Besides, special versions were designed on the basis of this missile over the last years to hit standalone special targets such as large ships, radars etc. In order to make it possible to hit these objects the standard inertial guidance system has been supplemented with various target-seeking heads (TSH), which should guide a missile precisely at the needed target on the final path.

For example, anti-ship version Khalij Fars features allegedly an infrared TSH, another anti-ship version under the name of Hormuz-2 has an active radar TSH and the Hormuz-I missile is equipped with a TSH, which is guided onto a powerful radiation source. The last one in this row is the Fateh Mobin, which was first showcased in 2018 and was declared to have had a new advanced "smart" guidance head for high-precision hitting both water and surface targets.

However, Iran has not stopped at developing special Fateh-110 version. Success achieved in designing and mastering lighter and more reliable materials, improved navigation systems, solid-fuelled engines made it possible to increase significantly the missile range due to some increase in their size.

In 2015, the Fateh-313 missile was introduced with a range of 500 km, but it served only as an intermediate stage before developing the Zolfoghar with a range of 700 km. Preceding missiles of this family hit a whole target retaining controllability on the final approach path, but this new missile has received a guided jettisonable nose and, in addition, composite materials are used to manufacture the missile body.

These and other changes made it possible to have a relatively moderate increase in the missile's dimensions. Diameter of the Zolfaghar missile increased as compared with the Fateh-110 from 610 to 680 mm, its length - from 8.8 to 10.3 m and weight from 3,320 to 4,620 kg respectively. In this case, the warhead weight increased as well from 448 to 579 kg.

However, the work has not stopped at that and the Dezful missile was presented with declared range of 1,000 km early in 2019. There is very little information about these missiles, however, the missile's dimensions increased again.

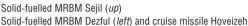
Thus, the missile family designed on the basis of Fateh-110 make the most mobile and up-to-date stock of the Iranian missile capabilities related to tactical missiles and small-range missiles.

It should be noted that Iran still has the old unguided tactical missiles left, however, any effect can be only achieved if they are launched in big quantities and at the same time to hit large-area targets. That is why over the last years Iran started a comprehensive modernization program for its unguided missiles Zelzal turning them into guided ones by adding navigation and control systems with aerodynamic rudders etc.

Iranian solid-fuelled MRBM are represented by double-stage missiles Sejil-1 and Sejil-2, which, according to the declared data, have a range of 2,000 km with warhead weight of 500 kg and the missile itself equal to 23,623 kg. However, the status of this program is questionable as after series of tests conducted by Iranians in 2008-2011 there has been no information on trial or training launches of these missiles over the last years. However, the Sejil missiles are still demonstrated during parades, therefore there are different implications in this regard. One can only guess when there is no exact information.













Cruise missile Soumar (*up*) Solid-fuelled MRBM Sejil

GROUND-BASED WINGED CRUISE MISSILES

Design history of the Iranian ground-based winged cruise missiles for hitting surface targets dates back to the early 2000s. It was when the six airborne cruise missiles X-55 were smuggled into China and Iran as a result of a big scandal with Ukraine.

The initial level of the Iranian defense industry did not allow making a replica of this X-55, but years went past and the Iranian industry continued to develop. As a result, in 2015 the new Soumar missile was showcased, it looked very much like the X-55 missile but equipped with a ground launch booster.

However, it has become known lately that the Soumar missile's range is only 700 km, that is why the Iranians continued their works and presented a new version of the missile with declared range of up to 1,300 km in 2019. The reworked version of this missile was named Hoveizeh.

As far as it can be estimated, at the moment these Iranian missiles are still under tests.

As a basis for designing launch units both for ballistic and winged cruise missiles in most cases Iran does not use special chassis but uses semi-trailers or ordinary civil trucks. This may reduce their crossing capacity but this also decreases costs and increases camouflaging possibilities for these launchers.

In addition, Iran has built underground missile bases intended for missile storage and disguised deployment of self-propelled units through a network of underground tunnels and for launching ballistic missiles off special launch units located underground.

As a conclusion, it worth noting that the maximum range of Iranian missiles is limited to 2,000 km by the Iranian Supreme Leader's decision. It is connected with the following political and practical circumstances. According to the technologies available for the Khorramshahr MRBM Iran is potentially capable of developing a missile with a range of 3,000 km or greater. With this range the Iranian missiles can reach and hit even Germany and Italy. However, this will not give Iran any critical military advantages over the USA, however this can seriously complicate relations with the European Union.

The range of 2,000 km is sufficient to have a possibility even from the deep mainland of Iran to hit both potential regional enemies such as Saudi Arabia and Israel and American military bases located in the region. That is why over the last years Teheran has not been working on an increase in range but have been focusing on making it possible to strike at targets in the region in case of any aggression against the country. Thus, Iran strives to maintain at least some balance of powers and ensure its security under sanctions. •







THE XIIIth
SPECIAL OPERATIONS FORCES
EXHIBITION & CONFERENCE

Conference: March 30th, 2020

Exhibition: March 31st - April 2nd, 2020







ARMY 2020 FORUM

The VI International Military-Technical Forum «Army» will take place from August 23 to 29, 2020, at the «Patriot» Exhibition and Convention center. The Defense Minister of the Russian Federation, Army General Sergey Shoygu announced this event on November 13, 2019 at a meeting of the Forum Organizing Committee.





A distinguishing feature of the Forum this year is that it will be held simultaneously with the International Army Games. For the first time, its activities will kick off on a Sunday. On August 23, there will be the formal opening of the Army 2020 Forum at the "Patriot" Expo and the VI International Army Games will start. The joint holding of these two large events will make it possible to expand the Forum's geography, involve additionally representatives of the foreign defense departments, help arrange more meetings and talks between foreign colleagues and executives of Russian authorities and industrial companies.

There will be also changes to the aviation cluster at Kubinka airfield. The show room of the Russian aviation equipment will be expanded and enhanced to a significant degree. Negotiations are in progress with foreign companies so that they demonstrate the latest models of unmanned aerial vehicles (UAV). Also, there are ongoing efforts to invite foreign aerobatic teams to participate in the Forum airshow program.

In 2020, the Army Forum will be held for seven days instead of six as it used to be. On August 23, it is planned to hold a joint opening ceremony for the Army 2020 and the Army Games. On August 24 through 26, the Forum will be open for specialists and delegations, and on August 27 through 29, the exposition will be open to public. The exhibition program will include separate demonstrations of upto-date and advanced export-oriented samples of weaponry as well as military and special equipment. The Forum will close on August 29, while the International Army Games will last until September 5, 2020.

More than 2,500 companies are already invited to participate in the Forum. Cooperation with foreign partners has been established and over 130 foreign official delegations are expected to participate in this international event. ◆

For participation in "ARMY-2020": https://www.rusarmyexpo.com/



LLC "PROF TRANSLATING" IS A SPECIALIZED TRANSLATION COMPANY RENDERING SERVICES ON TRANSLATION OF TECHNICAL DOCUMENTATION TO / FROM MORE THAN 50 FOREIGN LANGUAGES. THE COMPANY PROVIDES TRANSLATION OF DOCUMENTS PRESENTED IN ELECTRONIC AND PAPER FORMAT, AS WELL AS VIDEO AND AUDIO MATERIALS, DRAWINGS MADE WITH THE USE OF

ADDITIONAL SERVICES RENDERED BY THE COMPANY ARE AS FOLLOWS

Scanning, text retyping, makeup, prepress, etc.

Absolute confidentiality of translated information is guaranteed

As well as assignment of an interpreter for negotiations or business events both on the territory of the Russian Federation and abroad

We are looking forward to do translation for our customers with impeccable thoroughness as far as strict adherence to terminology and deadline is concerned.



OOO "Prof Translating"

51, lit. J, Magnitogorskaya Str. St. Petersburg, Russia, 195027 Tel. / Fax +7 (812) 325-55-30 E-mail: info@proftranslating.com

THE 'NEW DEFENSE ORDER. STRATEGY' MAGAZINE IS DISTRIBUTED AT THE FOLLOWING SHOWS AND EVENTS IN 2020

UMEX 2020	UAE, Abu-Dhabi	February 23–25, 2020
IADE 2020	Tunisia, Djerba	March 4–8, 2020
DIMDEX 2020	Katar, Doha	March 16–18, 2020
DSA 2020	Malaysia, Langkawi	April 20–23, 2020
ST PETERSBURG TECH FAIR	Russia, Saint-Petersburg	March 18–20, 2020
ARMHITECH 2020	Armenia, Yerevan	March 26–28, 2020
EXPOELECTRONICA 2020	Russia, Moscow, CrokusExpo	April 14–16, 2020
RUSSIAN WEEK OF HIGH TECHNOLOGIES	Russia, Moscow, Expocentre	April 21–24, 2020
NAVITEKH	Russia, Moscow, Expocentre	April 21–24, 2020
EURASIA AIRSHOW 2020	Turkey, Antalia	April 22–26, 2020
HELIRUSSIA 2020	Russia, Moscow, CrokusExpo	May 21–23, 2020
SIMBF 2020	Sevastopol, Crimea	May 27–28, 2020
KADEX 2020	Kazakhstan, Nur-Sultan	May 28–31, 2020
EUROSATORY 2020	France, Paris	June 8–12, 2020
AKTO 2020	Russia, Kazan	July 23–25, 2020
ARMY 2020	Russia, Moscow oblast, Kubinka	August 23–29, 2020
GIDROAVIASALON	Russia, Gelendzhic	September, 2020
CHIPEXPO 2020	Russia, Moscow, Expocentre	September 15–17, 2020
ADAS 2020	Philippines, Manila	September 23–25, 2020
INTERPOLITEX-2020	Moscow, VDNH Expo	October 20–23, 2020
INDO DEFENCE 2020	Indonesia, Dzakarta	November 4–7, 2020
SFITEX 2020	Saint-Petersburg, ExpoForum	November 12–14, 2020
EDEX 2020	Egypt, Cairo	December 7–10, 2020
A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Additions and/or changes in the itinerary are possible.

HOW TO SUBSCRIBE?

1

On our site.

Please go to "Subscription": http://en.dfnc.ru/subscribe/

2

Through the office.

Please send us a letter stating that you wish to subscribe. **E-mail: avg@dfnc.ru**



THE **NEW** DEFENCE ORDER STRATEGY

- COMMUNICATION PLATFORM FOR DEFENCE INDUSTRY
- EXPERT-LEVEL INFORMATION SOURCE FOR MILITARY-INDUSTRIAL COMPLEX
- · ANALYSIS OF GLOBAL SECURITY, MILITARY-TECHNICAL COOPERATION, AND STRATEGY & TECHNOLOGY

WE CONSULTING CONSULTING EVENTS **MAGAZINE**



e-mail: avg@dfnc.ru

WWW.DFNC.RU







ROSOBORONEXPORT

27 Stromynka str., 107076, Moscow, Russian Federation

Phone: +7 (495) 534 61 83 Fax: +7 (495) 534 61 53 E-mail: roe@roe.ru more info at

ROE.RU/ENG/