

UDR

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SOME DETAILS ABOUT THE NEW
UKRAINIAN "VILKHA" PRECISION-
GUIDED MLRS MUNITION



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UKRAINE**

80K6T - 3D AIR-SEARCH RADAR TECHNOLOGY FROM UKRAINE



**REVIVING
ANDREBUILDING
THE UKRAINIAN NAVY**



**OPLLOT MBT:
CONQUERING NEW
FRONTIERS
THAI CONTRACT FULLY
COMPLETED**



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IN THE CONTEXT OF
THE MODERN BATTLE**

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DRAFT LAW ON “NATIONAL SECURITY OF UKRAINE” APPROVED IN A FIRST-READING VOTE BY PARLIAMENT

April 5, 2018, Ukrainian Parliament, the Verkhovna Rada, approved a Draft Law on “National Security of Ukraine” in a first reading vote, Ukrinform reported.

The draft legislation sets out the principles of state policy in relation to national security and defense, civilian control over the military forces, as well as strategies for defending the state’s security, in particular, cybersecurity.

The bill stipulates that the defense minister and his deputies are to be civilians, and there should be a clear delineation of responsibilities between the chief of the General Staff and the Commander-in-Chief of the Armed Forces of Ukraine.



The proposed legislation would be a key tool of the national security reform. It has been developed in close collaboration with NATO, EU and U.S. experts. The draft legislation, if enacted, would be a major step forward on the path to the implementation of NATO standards in Ukraine. It implements the intentions contained in strategic planning documents enacted during 2015-2016, most particularly the Strategic Defense Bulletin.

The legislation introduces the regulation of defense and security activities in accordance with standards of the European Union and NATO, making full use of their best practices. This applies first and foremost to improving the system of leadership

and command of the Armed Forces and other elements of the state security apparatus in order to enhance their ability to counter current threats.

Besides, the draft legislation would introduce an integrated system of strategic planning documents and decision-making mechanisms. It outlines the fundamental national security interests of Ukraine, including: ensuring state sovereignty and territorial integrity, integrating Ukraine into the European political, economic, and legal space, gaining membership in the European Union and NATO.



Ukraine has signed cooperation agreements on military technology with Kuwait and Qatar, the Ukrainian presidential press-service reported on March 18, 2018.

The signing ceremonies took place as part of Presidential visits to the two Gulf countries, by Ukrainian President, Petro Poroshenko.

In Qatar, an agreement on military technology cooperation was signed

UKRAINE REACHES COOPERATION AGREEMENTS ON MILITARY TECHNOLOGIES WITH KUWAIT, QATAR

between the Cabinet of Ministers of Ukraine and the Government of the State of Qatar, in a ceremony attended by President Petro Poroshenko.

The talks between President Poroshenko and Emir of the State of Kuwait, Sabah Al-Ahmad Al-Jaber Al-Sabah resulted in the signing of a series of bilateral documents, including a cooperation agreement on military technologies.

The agreements signed would set out a legal framework for cooperation between the countries in the defense sector, including logistics, military education and personnel training.

As part of the cooperation, the countries agreed on the mutual exchange of intelligence and other specialized information; as well as col-

laboration between their defense and industrial complexes; the supply of armaments and military equipment; maintenance, repair, overhaul, and modernization of military equipment.

Development and implementation of necessary programs, joint research, joint production, and sale of defense equipment through the use of technologies would be supported by a legal framework created by the cooperation.

UDR note: Kuwait takes interest in special-purpose modifications of the new Ukrainian Antonov An-178 short-range, medium-airlift (18t) aircraft. In October 2017, the An-178 made a demonstration flight over a desert in Kuwait, commissioned by the country’s Air Force.



SE SPETSTECHNOEXPORT INKED USD 19M WORTH OF CONTRACTS AT INDIA'S DEFEXPO

SE SpetsTechnoExport of the state-owned Ukroboronprom Defense Industries Group signed USD 19 million worth of contracts at DefExpo India 2018.

SpetsTechnoExport currently handles USD 500M worth of running contracts.

Also at DefExpo 2018, Spets-TechnoExport signed a cooperation agreement with the state-owned Indian company Bharat Electronics Limited regarding modernization and production localization of armored vehicle components in India.

The deal encompasses collaborations between Ukrainian and Indian defense industries in creating a new tank for India's Ministry of Defense, upgrading legacy Soviet radars and air defense systems, and collaborative R&D programs, especially on sonar and radar technologies.

Bharat Electronics Limited is one of the major arms contactors of the Indian Ministry of Defense.

UDR note: India is one of Ukraine's longstanding, important partners in military technology cooperation. The Indian Navy was the launch custom-

er of NPKG Zorya-Mashproekt's gas turbine engines for naval vessels. Gas turbines by Zorya-Mashproekt are operational on over 30 maritime platforms of the Indian Navy.

In 2009, Ukraine and India signed a USD 400M contract – one of the biggest in history of bilateral military technology cooperation – for overhaul and modernization of An-32 tactical transport aircrafts of the Indian Air Force. Besides, Ukraine has sold engines to equip helicopters used by the Indian Navy and Air Force.

UKRAINE DEVELOPS ITS FIRST INDIGENOUS HELICOPTER, THE NADIYA

On April 16, 2018, Ukraine's first indigenously developed helicopter, called MSB-2 Nadiya ("hope") took off for its maiden flight from Zaporizhzhia, Motor Sich reported via its press office.

Built entirely of Ukrainian sourced components, the Nadiya is twice cheaper while being more powerful and fuel efficient than its foreign competitors.

The first fully indigenous helicopter took almost ten years to develop. With its relatively low take-off weight it can carry up to 7 passengers, plus up to one tone of freight to a range of 1,000 kilometers.

Equipped with the Motor-Sich AI-450M-P engine and an advanced avi-

onics suite that is unique to it, the Nadiya is suitable for roles that include road traffic surveillance and oil/gas pipeline monitoring, and can then be modified for special purposes for use by emergency and disaster response services, state border security forces, air ambulance teams, and other public safety services.

The Nadiya helicopter has a production cost of \$1.5-\$2.0 million per unit, which is 2.5 times cheaper than any of same-class foreign competitors.

It will be put through a 12-month testing and evaluation process, with qualification expected in 2018, followed by the start of production in late this year.



SE ANTONOV TO BUILD AN-132 AIRCRAFT PRODUCTION FACILITY IN SAUDI ARABIA

SE Antonov, Ukraine's top leading aircraft manufacturer, is going to build an An-132 aircraft production facility in the Kingdom of Saudi Arabia (KSA), Prom.ua reported citing Antonov's press service.

Earlier in 2018, an official Ukrainian team visited the KSA to get first-hand look at the construction project.

The facility would be constructed as part of a science and technology development program for the city of Taif, Western Region, KSA. The program was officially announced open by King Salman ibn Abdul-Aziz Al Saud in October 2017.

The program encompasses the construction of industrial and university campuses, a residential quarter for 10,000 homes,

and an international airport. The Technology Park will be a collaboration with the King Abdulaziz Science and Technology Center – a key partner in the An-132 program. Apart from the An-132 production facility, the Park will include an airfield, a solar panel factory, and a solar thermal power station.

Taqnia Aeronautics and Antonov, assisted by Western experts, are currently working on a feasibility study for the An-132 factory construction project.

Construction is scheduled to begin in 2019 and to be completed nine months later so that production could start in 2021.



UKRAINE HOPEFUL TO BUILD A SPACEPORT IN AUSTRALIA, SEND ITS CYCLONE ROCKETS INTO ORBIT FROM CANADA

The State Space Agency of Ukraine (SSAU) wants to build a spaceport outside the Curtin air base in the Kimberley, Western Australia, pitching the idea as an answer to Australia's decades-old dream to host its own launch facility.

UNIAN reported this in March 2018, citing reports from The West Australian outlet.

Rockets could be blasting into orbit from Derby within five years if the State and Federal governments get behind an ambitious proposal from the Ukrainian government. The bid was first proposed to the State and Federal Governments in 2016.

Ukraine's Ambassador to Australia, Mykola Kulinich, told The West Australian that Ukraine has the technical expertise, supply chain and a long history in the global space

race to back its offer: "Ukraine could launch tomorrow morning if we had a site. We offer our people and our expertise if Australia has land for use".

The SSAU says it needs 5000sqkm to 7000sqkm of land on a commercial lease, preferably around the Curtin air base near Derby, to establish a spaceport. An initial study could be finished in a relatively short time frame, and for less than \$500,000.

Construction of launch pads, hangars and support facilities could be funded through private investment, as well as contributions from Australia's neighbours and allies. The SSAU proposal says the facility could become Asia's major launch site, servicing commercial launches for Australia's regional partners such as Japan, Singapore, South Korea and Indonesia.

On a parallel track, the SSAU is searching other opportunities for commercial use of Ukrainian-made space launch vehicles. It was reported by CBC News in March 2018 that Canada's Maritime Launch Services Ltd (MLS) in Halifax is looking to build a spaceport in Nova Scotia that could be used to shoot Ukrainian-built Cyclone 4 carrier rockets into space.

Maritime Launch Services Ltd., a Halifax-based company which is a joint venture of three American based firms, has set a goal to launch satellites into space by 2020. Construction could begin as soon as May 2018, and the site could eventually see up to eight launches per year. MLS previously outlined they would need \$155 million in initial capital to build it, then \$15 million per year to continue operations.

Previously, Ukraine was cooperating with Brazil on a binational project that could have seen Ukrainian-made Cyclone 4 rockets blasting off from the Alcantara Space Center. In 2015, the Brazilian party put the project on hold due to financial constraints, forcing Ukraine to look for other suitable locations in North America.

UKROBORONPROM LAUNCHES PRODUCTION OF ATLET ARMORED RECOVERY VEHICLE

The State-owned UkrOboronProm Defense Industries Group has launched full-rate production of the Atlet ("athlete") armored repair and recovery vehicle (ARRV), the Company reported via a press statement.

Developed by Morozov Machinery Design Bureau, Kharkiv, the Atlet ARRV is designed to provide field maintenance support for armor operations – in all battlefield environments, climates and weather conditions.

The Atlet vehicle is based on the chassis of the new Ukrainian Oplot main battle tank, and thus has all the advantages the platform provides in terms of maneuverability and armor protection.

It is fitted with a 25-t crane that is used for field replacement of damaged systems on tanks, including turrets and powerpacks.

The main mechanical winch is provided with 130 m of cable and has a traction force of 250 kN. It would be used for recovery of damaged, stuck, sunken and overturned vehicles.



The Atlet is able to tow damaged, faulty or uncontrolled vehicles at speeds up to 25 km/h. It is equipped with a turbocharged diesel engine developing 1,000 hp, allowing a max speed of 70 km/h.

A special cargo platform at the hull rear is used to transport spare engine, gearboxes, spare parts, cargo, additional fuel or other equipment with a total weight up to 1.5 t. The vehicle has a welding outfit for welding and cutting works in the field.

For self-defense against ground and slow, low-flying air threats, there is a 12.7-mm machine gun mounted on

the commander's hatch and controlled remotely from the commander's workstation. The machine-gun is provided with 450 rounds of ready-use ammunition, and is capable of ranges up to 2,000 m.

A production line for the Atlet ARRV has been launched at Ukroboroprom's Morozov Machinery Design Bureau, Kharkiv.

The Atlet already has a history of export sales. There were reports that two vehicles had been delivered to Thailand in December 2017, with two more expected for delivery in the second part of 2018.



DAHC ARTEM SUCCESSFULLY TEST-FIRES ITS NEW 152MM ARTILLERY ROUND

DAHC Artem of the UkrOboronProm Defense Industries Group has successfully test fired its new 152mm gun round.

As claimed by CEO of UkrOboronProm, Pavlo Bukin, the new munition, intended to be fired from Giatint, one of the longest-range gun systems in current existence, would be efficacious against enemy personnel, weapon emplacements and field fortifications. Its development and production is a collaboration between DAHC Artem and other UkrOboronProm's companies that are responsible for fusing, explosive and powder components.

The new munition, developed under a government funded program, is

awaiting to be subjected to a series of trials under the supervision of MoD, which, if succeed, may lead to qualification for production.

Test fires, held at a military proving ground outside Chernihiv, Northern Ukraine, validated the performance capabilities required for the new 152mm gun round.

UDR note: This is the first round for 152mm gun launchers to have been developed in Ukraine since independence. Ukrainian forces previously had to use legacy inventories left behind after the collapse of the USSR. With this new domestically produced capability in place, Ukraine will be able to reduce dramatically its reliance on imported supplies.



UKRAINE'S NAVY LOOKING TO ACQUIRE 30 NEW WARSHIPS BY 2020

The Ukrainian Navy is planning to acquire 30 new warships worth together UAH 10 billion by 2020 as envisioned by Ukraine's Armaments Development Program 2020.

Captain 1st Rank Andriy Ryzhenko, the Navy's deputy chief of staff for Euro-Atlantic integration, stated one time that Ukraine's Navy, despite the current budgetary pressures, is planning near-term procurement of small, fast, low-signature, well-armed boats and craft for various purposes, which would naturally fit into the Navy's 'mosquito fleet' concept.

For performing the tasks of defending Ukraine's coastal area the Navy headquarters developed a three-echelon structure for operational deployment of the future combat craft fleet.

"The first echelon will be comprised of missile boat platforms carrying long-range attack missiles, torpedo weapons, artillery guns, and EW systems. Their task will be to deter intrusions by the aggressor's ships (first and foremost to Ukraine's exclusive economic zone) and to conduct fire on its surface and subsurface combatants," Captain 1st Rank

Andriy Ryzhenko said. In the future, these tasks will be performed by Lan'-Class fast attack missile boats.

The second echelon will consist of multipurpose patrol and mine countermeasures platforms. Their task will be to patrol certain sea areas; to escort, protect and convoy ships, especially in maritime shipping route areas. This echelon will also include mine countermeasures platforms that will detect and neutralize mine threats and will provide anti-sabotage protection for harbor and port infrastructures. The U.S. Island-Class offshore patrol boats that are being considered for handover to Ukraine's Navy will likely fill this niche requirement, but other platforms for similar purposes need to be constructed as well, Mr Ryzhenko said.

The third echelon will include fast amphibious boat platforms, built locally or imported –highly mobile, low observable, and capable of speeds up to 50 kts. They will deliver marines and Special Forces to their objective destinations. Kuznya na Rybalskomy is now building Centaur-Class amphibious assault boats to meet the Navy's requirement.

UKRAINIAN NAVY TO BEGIN FIELDING TRONKA SONAR SYSTEMS IN 2018

UkrOboronProm Defense Industries Group's Hydroprylad Research and Development Institute of Sonar Technology in Kyiv has developed a sonar system designated Tronka, which is scheduled to become operational with the Ukrainian Navy in 2018.

This is according to a news report published on March 9 by Narodna Armiya (People's Army) outlet.

The Tronka is a mobile sonar system that is intended for monitoring underwater situation and detecting intrusions by frogmen and other un-

derwater saboteurs. Weighing 40 kg, it can be deployed in harbor waters or in waters nearby a naval guardship.

The Tronka would automatically search and track moving underwater objects. It is able to detect and determine the location of a silent diver (breath-hold or closed circuit scuba diver) at a range longer than 500 m and an open circuit scuba diver at about 900 m, and this would extend to 1,000 m if frogmen are deployed from small boats.

Sonar outputs will be documented by a mission software suite. The Tronka sonar is designed to operate at a depth of 50 m and to withstand rough waters up to Sea State 3.

Hydroprylad has also developed a sonar system called Olympus 3K. It has better performances than the Tronka, and adds a live data transmission capability. The Olympus 3K can

spot subsurface and surface objects at ranges up to 10 km, this being variable depending on hydrological acoustical conditions and the water depth it is deployed to. It can hear a submarine at a depth of 200 m, and has the ability to highly accurately identify and classify submarine targets, even in the presence of severe hydroacoustic noise generated by three or four warships or civilian ships passing nearby.





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ANTON MIKHENKO, UDR

Russia's aggressive actions in Ukraine and Syria, and its new increasingly assertive approach in relations with the Western European countries and the US have changed dramatically the security situation in the Euro-Atlantic area. The West responded by gradually and very slowly beginning to adapt to the new realities of the so called "hybrid" war unleashed by the

WORLD ON THE BRINK OF A GLOBAL CONFLICT

**Ukraine – the
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Kremlin. That being said, the situation has taken a turn for the worse, as evidenced by events in early 2018, for example, and this might have large and unpredictable consequences down the line.

A pretty good and adequate comment on the current situation in the world in general and in the Euro-Atlantic area in particular was given by the February 2018 Munich Security Conference (MSC) Chair, Ambassador Wolfgang Ischinger: "The world

has gotten closer – too much close – to the brink of a significant conflict". Mr Ischinger pointed to ever-louder saber rattling between the US and North Korea, the growing rivalry between Saudi Arabia and Iran, war in Syria with Russia's interference, a growing →

threat from terrorism, and ongoing tensions between Russia and NATO in Europe, while other speakers highlighted the current military conflict in Ukraine instigated by the Russian Federation. As a matter of fact, the Ukrainian crisis has become the cornerstone issue of relations between the West and today's Russia. Speakers to the MSC effectively brushed off as misleading a perception that post Cold War Russia is seeking to become a responsible participant in a liberal international order. In truth, however, it turned out that the Kremlin hasn't sought this out at all but instead has pursued its own vision of how the world should be set up.

Moscow's failure to accept the changes that took place in Ukraine in 2014 led it to continue its aggressive stance toward Ukraine, which entailed the occupation of the Crimea and the war in Donbas. This evoked a tough response from civilized countries, aimed to bolster their own security defenses and to help Ukraine build up its national defense capacity, with assistance from international organizations, trusts and foundations, as well as through direct country-to-country collaborations; and visible changes began to take place within the EU and NATO.

NATO, as part of an effort to beef up its presence in the Baltic Sea region, increased its Baltic Air Patrol mission, stepped up the number of training exercises it conducted in that region, and set up small Allied headquarters in each of the Baltic Sea States. The United States, for its part, deployed its rotational forces of a Company size to each of Lithuania, Latvia, Estonia and Poland. Later, NATO deployed three rotational battalion-sized multinational forces to Estonia, Latvia, Lithuania, and a rotational Brigade to Poland.



At the end of 2017, 25 out of 28 NATO member states, agreed to launch PESCO

In Romania, a multinational NATO Brigade was set up and its headquarters reached full operational capability in late 2017. The Brigade would be made up of forces contributed by 10 NATO states, totaling 3,000-4,000 rotational troops.

An important milestone event took place in early 2018 when NATO Defense Ministers, at their meeting held on February 14-15 in Brussels, approved

plans to form two new alliance commands.

One will be a new joint force command for the Atlantic. It will be established to help protect sea lines of communication between North America and Europe. The other will be the Joint Support and Enabling Command (JSEC) focused on logistics and making sure NATO forces are capable of speeding to the battlefield in case of an incursion from Russia.

The need for the new support and logistics command emerged from the fact that the EU did not prepare the infrastructure for troop movements, but instead focused more on civilian infrastructure. More broadly, NATO is looking to invest heavily in infrastructure and mobility capabilities, including working on command and control links between the military and civilian institutions and better understanding of which roads, trains and bridges could support the weight of military vehicles crossing them.

Besides, NATO is looking to establish a free military transit zone modeled on the Schengen passport free travel area, which would allow NATO forces to move freely across the European theater. The military maneuvers carried out to date have underlined the problems with the



freedom of movement of the allied forces from across Europe to the Black Sea region. At present, the movement of troops in Europe must meet precise legal requirements that vary from state to state, and some countries require up to 45-day notice for NATO troops to pass their borders.

The US agreed to host the new Atlantic Command, while Germany has proposed to host JSEC, but final decisions may not come until the June 2018 ministerial event. This modernization of NATO's military posture is in response to the changing security environment globally.

NATO Defense Ministers also agreed to set up a new Cyber Operations Center at NATO's operational headquarters SHAPE near Mons, Belgium. Overall, the broad change in NATO's structure could see from 1,000 to 1,500 personnel added to the alliance headquarters staff.

On a parallel track, NATO's European allies have boosted their defense spending amid increased concerns about Russia aggression. In 2014, only three countries spent two percent of GDP or more on defense, and eight countries are expected to meet or exceed the two-percent guideline in 2018.

But this would not be enough. A research conducted by RAND Corporation, a US-based think-tank, has found that Russia is better prepared than NATO for ground operations on NATO's eastern flank. RAND estimates that here Russia has a 5.9 to 1 advantage in tanks, 4.6 to 1 in armored infantry vehicles, and 270 to 1 in rocket artillery.

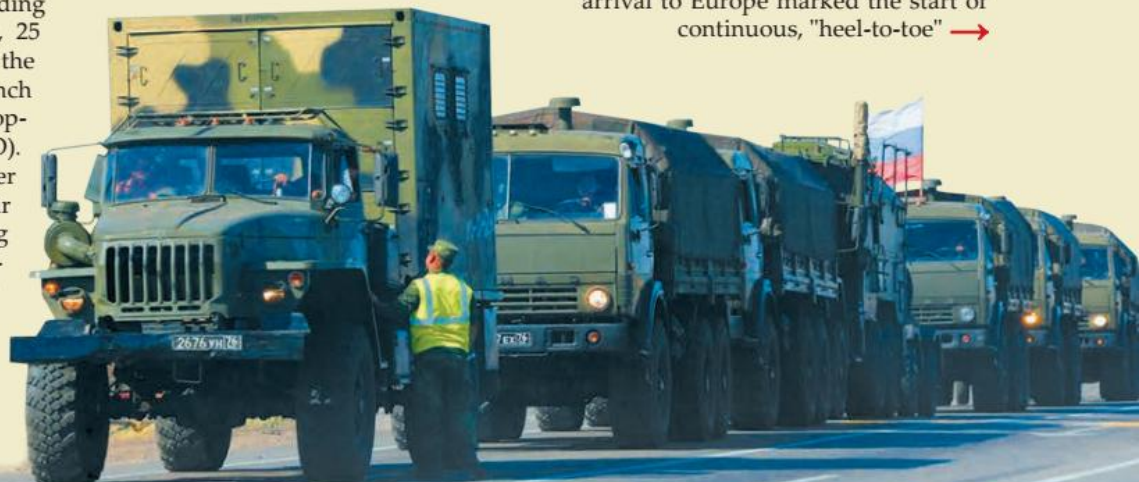
In addition to this, NATO is pursuing structural integration for its participating armed forces. Apart from deepening and expanding cooperation within NATO, 25 out of 28 member states, at the end of 2017, agreed to launch Permanent Structured Cooperation on Defense (PESCO). Through PESCO, Member States would increase their effectiveness in addressing security challenges and advancing towards further integrating and strengthening defence cooperation within the EU framework. PESCO was initiated



based on on Article 42.6 and Protocol 10 of the Treaty on European Union, introduced by the Treaty of Lisbon in 2009. The PESCO initiative had effectively remained on hold for a long time before it was revitalized amidst Russia's aggression in Ukraine and the Kremlin's attempts to destabilize Europe.

On 11 December 2017, 25 member states agreed on a declaration identifying the first 17 collaborative PESCO projects, ranging from the establishment of a European Medical Command, an EU Training Mission Competence Centre, Cyber Rapid Response Teams and Mutual Assistance in Cyber Security, to Military Disaster Relief and an upgrade of Maritime Surveillance.

In this context, a separate mention should be made of the USA and its changed approach to security issues in the current political reality. The United States, besides having taken a tough political stance on Russia which strongly encourages it to come back into the legal fold, has also taken a series of major steps to boost the capacities of its own force grouping in Europe and define in legal terms the security threats and challenges facing the USA. In view of Russia's aggressive stance, the United States has increased the number of its rotational force deployments in Eastern Europe. In February 2017, the 3rd Brigade Combat Team joined a persistent rotational present of American forces in the region. The Brigade's arrival to Europe marked the start of continuous, "heel-to-toe" →



rotations of U.S. armored brigades in Estonia, Latvia, Lithuania, Poland, Romania, Bulgaria and Hungary as part of Operation Atlantic Resolve.

In December 2017, the U.S. National Security Strategy was published, which calls China and Russia threats to the United States and highlights the "importance of values in foreign policy". Washington has opted for a "peace through strength"



strategy, as evidenced by President Trump's proposed slashing of funds for diplomacy and foreign aid while beefing up military spending.

To Ukraine, the US has become a key partner who not only exerts pressure on Russia, but also provides tangible assistance by supplying weapons. In December 2017, President Trump's Administration had announced it was allowing the export of Javelin anti-tank systems to Ukraine, at the total cost of USD 47 million, including 210 missiles and 35 launchers. Previously, the U.S. State Department approved a commercial license authorizing the export of Model M107A1 Sniper Rifles, ammunition, and associated parts and accessories to Ukraine, worth USD 41.5 million total. The US has, over the past four years, provided substantial amounts of military aid to Ukraine, including, inter alia, communications technolo-

The US has, over the past four years, provided substantial amounts of military aid to Ukraine, including communications technologies, UAVs, HMMWV, AN/TPQ-36, etc.

gies, UAVs, HMMWV light military trucks, AN/TPQ-36 counter-battery radars, and military clothing.

The Kremlin's stance, despite strong pressure being exerted on it by the West in response to Russia's aggression in Ukraine, remains unchanged and unpredictable. Instead of coming back into the legal fold, Moscow is acting to the contrary by making the situation even more tense.

President Putin, in the run up to his re-election, delivered his State of the Nation report to the Russian Parliament on March 1, 2018. Apart from political statements, a major part of his report was intended to highlight "new opportunities" arising for Russia's defense sector. Most of the "breakthrough" technologies mentioned in the report, however, were follow-on developments to legacy Soviet-era designs that existed in ones or twos and will be able to be brought to fruition years from now at the earliest (if, of course, the Russian budget will be able to absorb the expenditure, which is unlikely, given the current degradation of the Russian economy). More impor-

tantly, Putin effectively admitted in public that Russia possesses weapons system in violation of the Intermediate-Range Nuclear Forces (INF) Treaty (here we are talking above all about Russia's brand new "Avangard" missile and a nuclear-powered cruise missile). This has been much and long talked of by the Americans, but denied as "lies" by Moscow. But now this proved to be true. As a matter of fact, Russian actions have destroyed key elements of the post-Cold War security system in Europe.

Tensions in Russo-Western relations have been fueled further by the poisoning, on March 4, 2018, of a former Russian spy, Sergei Skripal and his daughter in London. The British finding strongly implies that the Skripals were poisoned by the "Novichok" nerve agent that had been developed in the USSR and now used in a foreign state. Russia has continually denied any involvement in the incident, but the UK is adamant that there is no alternative explanation other than that the attack was ordered by the Russian state, and it should be punished for that.

Another blow to these already fragile relations was dealt by a chemical weapons attack that targeted the Syrian town of Douma, in Eastern Ghouta on April 7, 2018. The attack was claimed to have been perpetrated by pro-government Syrian forces, and Russia who has troops in Syria propping up the government of President Bashar al-Assad bears responsibility as well. The attack left at least 70 civilians dead and scores more injured, according to the teams of Syrian medics who treated survivors. The US State Department warned that Russia would pay a price if there are new proven chemical





Russia blocks UN Security Council condemnation of Syria attack

attacks. French President Emmanuel Macron, for his part, said, "If chemical weapons are used on the ground and we know how to find out their provenance, France will launch strikes to destroy the chemical weapons stocks".

The Kremlin, in its trademark manner, strongly denied all the allegations. Russia's Permanent Representative to the UN, Vasily Nebenzya said that the alleged chemical attack on Douma was fabricated and the US had trained people to fabricate fake news on the use of chemical weapons in Syria in order to defame Damascus and Moscow.

On April 14, in what proved a largely uncontested attack, U.S., British and French forces unleashed 105 missiles on three Syrian chemical weapons facilities, leveling at least one building and setting back the country's chemical weapons program "for years". The Kremlin – who, in anticipation of the allied airstrikes, warned via its officials that it would "knock down all the missiles and their carriers" – effectively took no action, thus leaving Damascus vis-a-vis the threat of all-out defeat.

The bottom line is that tensions in relations between the West and the Russian Federation tend to mount. Some analysts fear this can even outgrow into a military confrontation, not only in Syria, but in Ukraine as well. After the recent airstrikes on Syria, a clear advantage is on the West's side, while Russia's posture has been weakened to a significant degree.

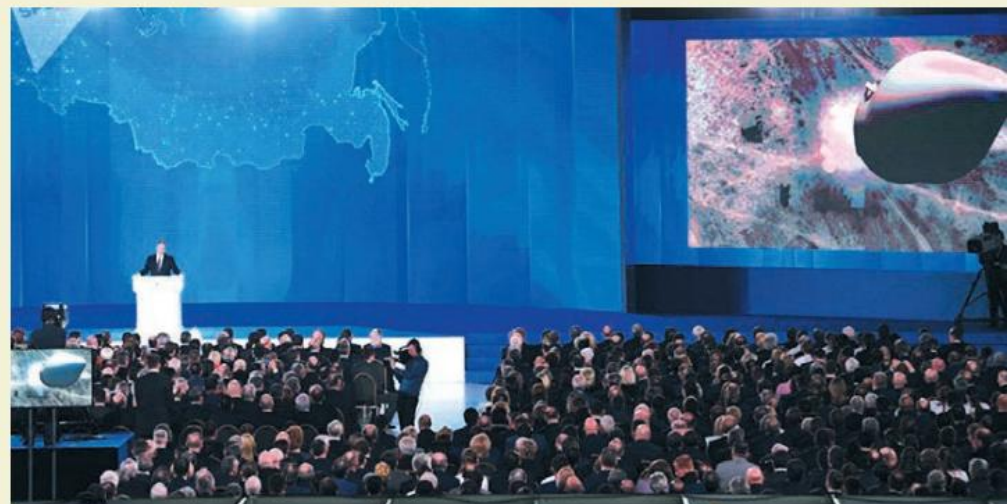
Against this backdrop, the Kremlin is looking to retaliate and can attack asymmetrically in any form or region of the world.

Other analysts disagree, and say that Russia, in the near and medium term, will most likely refrain from conventional offensive operations because of the poor state of its economy and the high cost of such measures, and will instead opt for the hybrid warfare techniques that it has already tested in Ukraine, Moldova and Georgia.

Amidst these events, Russian presidential aide Vladislav Surkov says that Russia has abandoned its centuries-long hopes of integrating with the West and is bracing for a new era of geopolitical isolation.

In an article for "Russia In Global Affairs" magazine released on April 9 and titled "The Solitude of a Half-Blood", Surkov wrote that "Russia's epic journey toward the West" is over, marking an end to its "repeated fruitless attempts to become a part of Western civilization" over four centuries, an era that followed a "400-year effort to become part of the East". So he advises that Russia should look for "ideologies of a third way, a third type of civilization, a third world, a Third Rome...".

Only time will tell what will follow this narrative, but what can be said with certainty now is that the world stands at the threshold of major changes that, regrettably, don't look too good. **UDR**



Instead of coming back into the legal fold, Moscow is acting to the contrary. Apart from political statements, a major part of President Putin's State of the Nation report to the Russian Parliament on March 1, 2018, focused on "new" Russian weapons developments

«WE ARE LOOKING TO DEVELOP COLLABORATIONS IN CERTAIN REGIONAL MARKETS»



Pavlo BUKIN, CEO of State Concern "Ukroboronprom"

In late February 2018, Ukroboronprom got a new CEO. Ukrainian President, Petro Poroshenko selected Pavlo Bukin – an extremely knowledgeable expert with ten years of expertise and experience in the international military technology cooperation business – to take charge of Ukroboronprom, replacing the dismissed CEO, Roman Romanov. The following is an interview with Pavlo Bukin, conducted by Defense Express on the Company's objectives and goals, and priorities with regard to military-technical cooperation development.

DE: What goals will you pursue with respect to reforming and restructuring Ukroboronprom and Ukraine's defense industrial sector as a whole?

Pavlo Bukin: Of course, these are the long talked of corporatization and clusterization of Ukraine's defense industries. It is necessary to prepare for the corporatization, to create the free-market tools and make them available for use by enterprises.

We are currently drawing up a paper outlining a clusterized/divisional structure of the Ukrainian defense industries, based on their specific areas of expertise. I hope it will soon be ready for submission for approval

by Ukroboronprom. But it will take time to make blood flow in the veins of this system. The industries will be consolidated administratively, and the Holding Company will delegate some of its powers, for example, the power to run the industries to top managers of industrial clusters. This is going to eliminate all the frustrating bottlenecks of bureaucratic red tape on the one hand, and on the other, will give a real meaning to company-to-company collaboration within the Holding Company. Overall, there will be five or so industrial clusters set up.

I am furthermore looking to build a clear-cut, transparent system of internal collaboration, a system involving public and private suppliers. In other words, I want on my table a certain simple and straightforward list of products with an easily visible chain of collaborations. This was never the case before, and we are working on this now.

Speaking broadly, my wish is to build a free-market system of relations and to eliminate the conditions for corruptive behavior among other things. My other goal is to change the pricing principles contained in state defense procurement and acquisition contracts.

DE: Ukroboronprom at one time announced a wide-ranging, progressive reform and restructuring program within a broader strategic objective of bringing Ukraine's Military up to NATO compliance by 2020. It also announced plans to win access to the NATO defense procurement system. Are there any objective assessments made of the progress achieved so far on Ukroboronprom's reform and restructuring program?

Pavlo Bukin: At the beginning of 2018, representatives of the Interagency Commission on the defense-industrial sector, Ministry of Economic Development and Commerce and private-sector contractors from the League of Ukrainian Defense Industries and me attended a working group meeting held in Brussels on the sidelines of the NATO-Ukraine Joint Working Group on Defense Reform. The alliance presented its vision report on the implementation status of Ukraine's defense-industrial sector reform. I would not call the report comprehensive, and I told this to my counterparts. There were some inconsistencies regarding juris-



The light multi-purpose An-132 airplane developed jointly by Ukraine and Saudi Arabia

diction over Ukroboronprom, as well as export orientation of Ukraine's armaments industry, which is affecting the overall picture.

Among other things, the Western partners set out their assessments on the pace of the defense industry reform. In particular, they assessed the reform implementation status at 30 percent, which I think is an adequate estimate. The mentioned failures and weaknesses, indeed, are slowing down progress to NATO compliance. Our partners well understand that this progress is constrained by budgetary realities. But we must move towards this end, and above all else achieve NATO compliance in areas where we face critical challenges in searching replacements for components currently sourced from imports.

The meeting also raised the question of cooperation with the

EU countries. I explained to our partners that there is the EU Code of Conduct on Arms Exports, which encourages Member states to be cautious

in making decisions on developing defense cooperation with countries waging armed conflicts. This is the reason why international partners are extremely cautious about arms sales to Ukraine. They are reluctant to sell, and do so, if at all, after investigating the balance of power and mulling about whether a sale of any specific type of weapon would change the current balance or would motivate any of the conflicting parties to take an offensive action. In consequence, decisions are slow in being made.

DE: Does Ukraine's current strategy of defense-technical cooperation on international arms markets take into due account wartime conditions, as well as the emerging tendencies and strategic defense priorities of the world's leading actors?

Pavlo Bukin: I am predicting a significant increase in Ukrainian defense exports to the global market, if we have in place a mechanism for entering into joint partnerships and international collaborations. Opportunities for this to happen are now constrained for us. With such a mechanism in place, the synergetic effect of the already well-established and promising collaborations will increase further. Now we are looking for opportunities to set up joint ventures in a number of regional marketplaces. A most conspicuous example thereof is Thailand who is negotiating possible local production of →



Ukrainian-designed BTR-3 and BTR-4 APC vehicles. In establishing the joint venture, the question will naturally arise as to how Ukroboronprom can partner in it and earn profits. There is no such mechanism in place now. I will therefore have to ensure it is there and embedded in relevant laws and regulations, most particularly the regulatory instruments that would enable us to solicit foreign investment in defense industrial projects. Particularly, I am talking about a draft law on "facilitating foreign investment in the defense industry", aimed at removing constraints and restrictions for foreign investment. Next is a draft law on "specific rules for transforming state-owned unitary commercial defense industry enterprises into share-holder companies". The two draft laws will be soon submitted to the Cabinet and then to Parliament for consideration and possible approval.

DE: Speaking broadly, is there in Ukraine an adequate regulatory framework for soliciting private (including foreign) investment in the defense industry?

Pavlo Bukin: The legal environment in this field is yet to be completed. Ukroboronprom has made first steps toward setting up a legal framework for soliciting investment in the aviation industry. First projects are there



Man portable CORSAAR missile system by SE SKDB Luch

already. One such is a collaboration with the Saudi Arabian technology venture TAQNIA to create a light multi-purpose airplane, the An-132, with an airworthy demonstrator already completed. We want to make same tools available for use by other clusters within Ukroboronprom, and will soon put forward a package of proposals to this effect. Slowly, we begin to discuss key aspects of this initiative in order to make the way open. However, I well appreciate that another important factor for investment is economic conditions, meaning those enterprises wherein we would solicit investment should be healthy ones and attractive to investors in terms of predictability

of profit, sales, recoupment and return on investment.

DE: Which areas of military technology cooperation do you think are most promising in terms of meeting the needs of the Military and in the context of recent decisions made by the US and Canada, among other countries, to step up cooperation in military technology with Ukraine?

Pavlo Bukin: As regards Canada, we are expecting that the Ministry of Defense would make a formal list of weaponry and equipment we need from Canada so we could arrange for the procurements to take place.

As far as the US is concerned, we are impatient for the arrival of the first delivery of Javelin ATGMs. First, this a highly effective and easy-to-use weapon. Ease of use is one distinguishing advantage of American technologies; even a not very skilled user can be quickly trained to handle them. Training in the use of the equipment that we make is more time consuming and usually requires an experienced instructor. On the other hand, the provision of Javelin missiles would signal to all NATO partners that it's safe to sell lethal weapons to Ukraine, and we are looking forward to these deliveries. The United States itself is making no secret that lethal arms sales to Ukraine did take place already – bought either directly from manufacturers or by authorized dealers.

The USA is our key partner here, and we do hope that this collaboration would give a green-light signal to NATO and EU sales as well.



P.Bukin and members of a Thai Army team inspecting a BTR-4 APC

DE: What is the strategy employed by Ukraine with regard to the extent of foreign presence in the domestic arms market, considering the challenges of proxy warfare and the potentialities of the military technology cooperation mechanism?

Pavlo Bukin: A mechanism, the most important one that, I think, should be employed to regulate military-technical cooperation development in this new context is the mechanism of offset contracting. It gives us the ability to acquire competences, obtain technologies and know-how, regardless of the impact of the market component, i.e. a product's success in the domestic marketplace. Such a mechanism has yet to be worked out. In Ukraine, there is a provision obliging executive authorities to use defense offsets where imported procurements exceed at least EUR 5 million. A commission on offsets has been set up at the Ministry of Economic Development and Commerce. Yet, this issue has remained poorly elaborated to date. There must be specific mechanisms, specific criteria established. I do hope that such a mechanism will be launched soon. Regarding the presence of foreign companies in the domestic marketplace, the most important criterion that we set for foreign partners is production localization in Ukraine. This is a complex issue, which, again, involves aspects such as the amount of our domestic market, the state budget capacity, procurement stability, and operational deployment of the systems to be procured. That is: if someone comes to this marketplace, we want that a certain part of the production – not the entire production process but at least some part of it – to be localized here in this country, and that our citizens to be trained and working, putting this all in place.

DE: What share could foreign suppliers take in technical modernization [of Ukraine's Military], considering the defense budgetary limitations among other things?

Pavlo Bukin: As far as the proportion and the importance of imported procurements are concerned, it is unlikely that there will be a rigid limit imposed on the level of such procurements, but I am feeling that this

proportion will not be lower than 30 per cent. In many segments, we have very good products, but very often lack modern production lines, and still have very poor knowledge of the global market of system integrators. Exhibitions are more about marketing rather than advertizing what is truly the best and edge-cutting. NATO governments are more focused on their respective domestic markets, the same as in Russia where the focus is on the government defense procurement contract. They are dealing with the volumes that are incommen-

render assistance to the Ministry of Defense among others in arranging for transfer of competences where we are requested to do so. During years of war we have learned lots of lessons and thoroughly studied the needs of the armed services, required weapons performance characteristics of the weapons, and, also, the customers. This implies we have an adequate selection system in place, backed up by adequately trained employees. At initial stages, all security sector organizations, most notably the Ministry of Defense, will certainly encounter difficulties, given the diversified nature of for-




surate [with Ukraine's]. We therefore need integration. If we are saying that Ukraine made a deliberate choice in favor of collective security, we must become integrated into their knowledge systems.

DE: There are regulations being developed that would give many government agencies, including the Ministry of Defense, a free hand in procuring weapons directly from foreign markets. What do you think of such an initiative?

Pavlo Bukin: We wholeheartedly agree with the proposed legislation that would empower the defense and security sector to procure weapons and military equipment directly from foreign sources, and we will do the tasks set before us. Moreover, we will

eign procurement, and fewer difficulties will be encountered by the Security Service (SBU), the Interior Ministry, and the State Border Guard Service.

It is indeed more convenient for the security sector to purchase directly from foreign suppliers. But to be able to conduct an effective dialogue and to be an adequate customer one needs to have tools, have human resources that will have to be hired. More issues will arise later, which will force the Ministry of Defense to undertake reforms and restructuring. 

Interviewed by
Anton MIKHENKO

DETERRENT WEAPON



SOME DETAILS ABOUT THE NEW UKRAINIAN "VILKHA" PRECISION-GUIDED MLRS MUNITION

Serhiy ZGHURETS

Defense Express

On April 25, 2018, the new Ukrainian Vilkha Multiple Launch Rocket System (MLRS) – a fully domestic technology designed and built for Ukraine's armed services under the Government Defense Procurement Contract – was successfully test-fired at a test and training facility outside Kherson, southern Ukraine. The Vilkha hit all its designated targets and thus reached another major milestone of its official trials and qualification program.

A PROMISING RESULT

The test launches, watched by a large audience of Ukrainian government officials and defense attaches of foreign embassies, were conducted to the 54 km range permitted by the boundaries of the testing range and target areas. The Vilkha MLRS rocket can reach a maximum range of 70

km, as evidenced by successful test launches conducted from other locations.

With the successful completion of the field test firing phase of the government trials and qualification program for the Vilkha, "the task set to the domestic defense industries and R&D institutions has been by and large fulfilled", as stated by a high ranking government official. Ukrainian President Petro Poroshenko, who attended the event, said that the long-anticipated precision missile attack capability provided by the Vilkha would improve significantly the operational effectiveness of Ukraine's Military.

The Vilkha MLRS is effectively a new system offering high-precision attack capability, which uses munitions similar in size and caliber to the Smerch MLRS.

The Vilkha MLRS Project is a collaboration of about a dozen and a half domestic companies who have contributed herein their proprietary technology solutions. First of all, this is the State Enterprise SE KB Luch R&D Company – prime contractor of the Project. Other key participants are the

Pavlohrad Chemical Plant who developed and produced a new rocket propellant; the Artem Holding Company who is responsible for production of the rocket airframe; and the Orizon Navigation, who is responsible for the GNSS navigation equipment.

As said by Oleh Korostelev, CEO and Designer General at SE KB Luch, "We have created a new precision attack weapon that is so far capable of the same ranges of 20 to 70 km as the Smerch MLRS, and we have launched a production line for the new rocket, all on our own, as we are now doing everything on our own. We are responsible for the rocket engine frame and nozzle system, tail group, warhead, fuse safety and arming device, guidance system, GNSS receiver, jet vanes, and fusers".

PRECISE ATTACK CAPABILITY

The Vilkha, when compared to the Soviet-designed Smerch MLRS technology, is by an order of magnitude more precise, President Poroshenko has claimed. "Let me give you just one figure: the Vilkha rocket is 10-fold more accurate and, accordingly,



The test launches were watched by Ukrainian government officials and defense attaches of foreign embassies



10-fold more effective than the legacy MLRS weapons that the Soviet Union used", Poroshenko said immediately after completion of the test launch session.

The Vilkha munition can deliver its warhead to a range of 70 km with a CEP of 30 m or less, and can achieve accuracies that approach zero meter CEP, as evidenced on many occasions by the results of earlier test launches.

How has this been achieved? The method of guidance used for MLRS rockets suggests that a rocket-propelled munition or a rocket should be put on a stabilized course at the initial phase of its flight, but trajectory corrections might be required at the terminal phase of flight. This is typically done with a pulse engine, which is needed to bring the rocket on the desired course while it is still boosting. The 8-m long rocket leaves the launcher tube at a speed as low as 30 m/s, which effectively precludes the possibility of aerodynamic guidance. This is where only jet force of a pulse engine can make the rocket keep on the desired path. After leaving the launcher tube, the rocket has its trajectory stabilized by means of 90 tiny expendable pulsejet motors arranged in several spiral lines around the guidance and control unit. Each pulse occurs in a millisecond, while a processor would do the calculations needed to control the orientation of the rocket while in flight.

The rocket is free flying unguided while in mid-course, and flight path control is again taken over by Vilkha's guidance and control system in the ter-

terminal phase of flight. Once the rocket begins to descend, fore-body canards are extended. These are controlled by the rocket's guidance system using inputs from GPS and installed inertial navigation sensors. Here the guidance function is performed using the conventional proportional guidance technique. The munition needs to be guided until impact.

Apart from its high accuracy, the Vilkha is advantageous over the Smerch MLRS in that, in the terminal phase of flight, multiple Vilkha rockets launched in a single salvo can be dispersed and guided independently of each other and toward different targets. Each rocket would defeat its designated target of known location preloaded into its "brain". That's what makes it high-precision and "smart"

to a degree. Twelve rockets launched simultaneously at a certain common angle would disperse within a ~1.5 km radius. The rockets can be fired individually or in ripples of two to 12. So, it can be argued that the Vilkha is a highly effective precision tactical weapon that could be useful in multiple combat scenarios.

Designed with a shoot-and-scoot capability, the Vilkha system would take 30 minutes to go from transport to ready-to-fire configuration, loading/re-loading included, and it can be transported when fully loaded (but reloading would typically take place a few kilometers away from the firing position to avoid counter-battery fire). The GPS and targeting data downloading operations would be performed while at the firing position. →



BM-30 Smerch MLRS

An innovative solution proposed by Luch is to introduce an automatic launch system allowing a significantly shorter time for inputting target-specific ballistic and targeting data into each rocket and for pre-launch preparations.

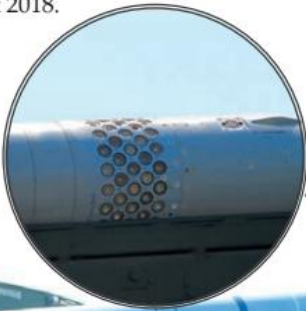
The aiming in azimuth and elevation has been made much easier as well. The operator would aim and elevate launcher tubes using guidance displayed on a small, rugged screen. This eliminates the need for target bearing and similar weapon sighting techniques employed by the Smerch (although these are reserved as a back-up sighting option).

Reduced time of stay at a firing position enabled by the introduction of an automatic launch capability would improve the system's survivability. A full salvo of 12 rockets takes 48 seconds, and the stowing time is 3-4 minutes.

The Vilkha MLR weighs ~800 kg, of which ~500 kg consists of engine, ~250 kg of warhead, and ~70 kg of guidance and control kit. It is able to fly at 3.4M speed at the terminal phase of flight.

PERSPECTIVES

The official trials and qualification program for the Vilkha MLRS is due for completion on July 30, with Approval for Service Use expected in August 2018.



The method of guidance used for this MLRS suggests that a rocket-propelled munition should be put on a stabilized course at the initial phase of its flight. This is done with a pulse engine, which is needed to bring and keep the rocket on the desired path



Deputy Ukrainian Defense Minister, General Ihor Pavlovsky stated that timely and due delivery of the Vilkha MLRS is of extremely high importance to the Ukrainian Military, as this would allow it to pursue two parallel approaches to technical modernization its Missile forces through the fielding of the newly developed Vilkha MLR systems on the one hand, and on the other, the upgrading of the already operational MLRS Smerch with new Vilkha guidance and control kits in order to achieve significant improvements in terms of the accuracy of guidance and terminal effectiveness.

A new, modified version of the Vilkha rocket has been developed and will soon be ready to perform test launches to a range of 120 km. This longer-range capability has been achieved through reducing the weight of the warhead from 250 to 170 kg,

matched with a higher engine thrust, without compromising the accuracy performance achieved in the 250-kg warhead original. The improved rocket will be able to reach low drag altitude around 30-40 km, allowing longer ranges to be achieved.

Besides, the Government requires that the currently used wheeled MLRS vehicles of non-Ukrainian origin be replaced with domestically manufactured platforms, and the same applies to the 300 mm launcher tubes for Vilkha rockets.

The high-precision Vilkha MLRS has been designed to possess a significant export potential, and this explains why a most spectacular test launch session was made open for attendance by the defense attaches from a number of foreign embassies.

Regarding the State-owned Ukrobrom defense industries holding company and the Ministry of Defense, the Vilkha is a good example of their ability to produce a new, high-tech weapon technology within an extremely tight timeframe. Only two years passed between first launches of full-size mock-up rockets in March 2016 and test salvo launches in April 2018. This is a great achievement indeed, given the complexity of the technological challenges being addressed. So it is urgent now that the high-precision Vilkha tactical MLRS, after it succeeds through the government trials and qualification process, be immediately put into full-rate production, because it is going to become a key component to Ukraine's future enhanced "missile shield and sword" capability. 



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Thai Contract for the Oplot MBTs Now Completed!



The state-owned defense industries group Ukr-oboronprom, in late March 2018, announced that it completed a contract to supply 49 Oplot-T MBTs worth about USD 250M to Thailand. The final batch of Oplot-T tanks have been shipped out to the Customer country following successful completion of the required tests and checks.

It was back in 2011 when Ukraine signed the contract to export the most recent and advanced product of its armored vehicles industry – the Oplot-T main battle tank – to the Royal Army of Thailand. The contract was originally scheduled for completion by the end of 2014, but only five vehicles out of 49 contracted were actually delivered by this deadline. Work on the contract was continued for several years over its deadline, plagued by numerous delays and disruptions caused by the economic crisis in Ukraine worsened by Russia's annexation of Crimea and incursion into Donbas.

After the outbreak of hostilities in eastern Ukraine in 2014, the Oplot MBT contract was put on hold, with the completion deadline delayed

several times. After a long pause, the contract was continued in the summer of 2015 when the next five vehicles were shipped out to Thailand, followed by ten vehicles and five vehicles delivered in May 2016 and in mid-November 2016 respectively. Receipt and acceptance inspection of the final batch of five tanks was completed on March 26, 2018.

The difficulties Ukroboronprom had with the Thai contract were exploited by its competitors to stage a variety of information campaigns that were so successful as to make Thailand consider terminating the contract altogether. But despite all

the hardships along the way, the contract has been completed to the full extent.

Pavlo Bukin, CEO of Ukroboronprom said while commenting on completion of the contract: "The contract was being carried out despite unfair competition and military aggression by Russia. We are grateful to our strategic Thai partners for their wise understanding of the difficulties faced by Ukraine and for their confidence that Ukraine is able to overcome the deliberate hurdles erected in the way of our relations".

Thanks to the Thai contract, Ukraine has earned hard currency



and provided its factories with a full workload, Mr Bukin said.

"Now that the export contract with Thailand has been completed, Ukroboronprom is set to manufacture tanks to meet the requirement of Ukraine's armed forces", he said, and added that the Oplot tank will need some upgrades based on lessons from Ukrainian armored vehicle operations on the Donbas frontline, especially as it concerns advanced digital equipment such as integrated sighting and fire control systems.

In an interview aired by Radio Liberty on Feb 23, 2018, Viktor Muzhenko, Chief of General Staff said that a number of Oplot tanks, upgraded and updated, are expected for delivery to Ukraine's military as early as by year's end.

The Oplot might be of interest to potential export customers due to its well-balanced integration of firepower, armor protection and mobility performance, and, most importantly, this all at an affordable cost.

The Oplot, formally commissioned in Ukrainian service in 2009, represents a modern main battle tank design developed by Morozov Machinery Design Bureau, Kharkiv, and produced by Malyshev Plant, Kharkiv, both incorporated with the Ukroboronprom state-owned defense industries holding company.

The Oplot is a heavily upgraded version of the T-80UD MBT, offering significant enhancements in terms of the vehicle's firepower (accomplished by way of upgrading armaments and fire control capabilities), battlefield/strategic mobility (engine and transmission system) and protection level (reduced vulnerability to RPG-type attacks). The Oplot is actually a new design featuring significant differences from the T-80UD original, especially in terms of armor protection, configuration of the vehicle's hull and turret, fire control and driving systems, situational awareness, engine and gear box system etc. The new fire control system gives the commander and the gunner of the Oplot MBT a more effective, longer-range target acquisition capability for both day and night missions. The tank commander has been given a new panoramic observation and sighting capability, while the gunner obtained a new aiming and targeting system. The panoramic sighting system would provide enhanced situational awareness to the commander and enable him to override the gunner and lay and fire the main cannon using his duplicate controls.

COMMAND AND CONTROL

The Oplot tank is currently the only fielded weapon system in Ukraine that is equipped with a command and control information management system (IMS) interfaced with the tactical C4 network. The TIUS-NM navigation support system supports data communication with armored units up to the battalion level. Its range of functionality includes the following: computing the current coordinates and directional angle of the host vehicle on the move, using the SN-370003 radio-navigation equipment NAVSTAR/GLONASS; gathering of information about the subordinate tanks' location; route setting (up to 10 routes) by setting up to 50 waypoints for each route; receive/transmit of commands with coordinates of point of destination; providing the information for the driver about the value and direction of the tank angle of turn to the point of destination; input and storage of data on authentication codes and many other things.

A LOOK THROUGH THE ARMOR

Ukraine developed and was producing two main battle tanks, the T-34 and the T-64 that were considered revolutionary new at their own time. The T-84UD MBT and its follow-on upgrade in the guise of the state-of-the-art Oplot MBT (which is now wholly produced in Ukraine) is one of the most outstanding achievements of Ukraine's armored vehicle industry and the domestic school of thought on main battle tanks.



SELF-PROTECTION

The Oplot MBT is equipped with the Duplet explosive reactive armor (ERA) system developed by BSCT Microtech, Kiev. The Duplet provides a 100 percent probability of success against all of the currently existing antitank weapons attacking from common course firing angles.

FIREPOWER

The 'Oplot' MBT is outfitted with a most advanced fire control system (FCS) incorporating the PNK-6 panoramic sighting system that provides enhanced capabilities in terms of the detection, identification and engagement of targets both by day and by night. The guided missile system Komбат is used for engagement of armored targets out to 5,000 meters, while standard tank rounds are employed against targets at distances up to 2,500 meters away. Gun firing range is set at 4,000 meters (at least 2,800 meters in all conditions of vehicle operation) for APFDS rounds and 10,000 meters (at least 2,600 meters in all conditions of vehicle operation) for HEAT/HE-FRAG rounds.


TACTICAL MOBILITY


The Oplot is powered by a 1,200hp diesel engine developed by Kharkiv Engine Design Bureau. The vehicle is unique among all of the currently existing counterparts by the ability to cross 1.9m deep water obstacles without preparation, while preparation time for crossing river-line obstacles of up to 5m deep does not exceed 20 minutes.

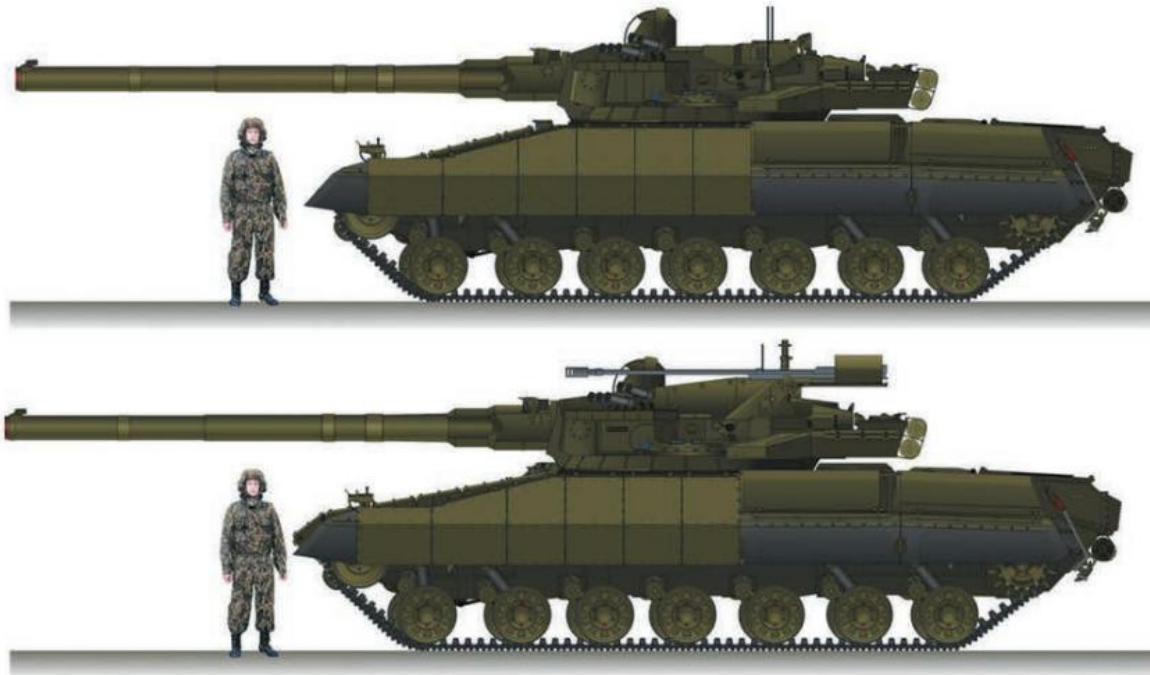
The tank's protection system underwent a massive upgrade. The overall survivability of the T-84 has been improved by adding an optronic countermeasures system consisting of three key subsystems: the laser threat warner (to give warning of impending laser-guided attacks), the infrared jammers and the smoke/aerosol screen laying system. For improved survivability on the battlefield, an indigenously-designed, integral explosive reactive armor package was provided for the turret and the hull sides.

The engine and transmission system of the Oplot tank has had its thermal signature reduced by 20 percent compared to the original T-84 tank due to the use of heat insulation devices mounted on its top deck.

The Oplot features an automated gear shifting in place of a manual gear selector, which, coupled with new driver's steering controls (the driver now steers the vehicle with a steering T-bar rather than tillers), resulted in a 2-2.5-fold reduction in the load on the driver during lengthy rides, and allowed a 5 percent improvement in the vehicle's speed performance.

The Oplot MBT, as claimed by its designers, outperforms its international counterparts such as Abrams, Leopard or T-90, in the level of protection, the amount of firepower and maneuverability performance. 

The Oplot MBT, as claimed by its designers, outperforms its international counterparts such as Abrams, Leopard or T-90, in the level of protection, the amount of firepower and maneuverability performance. 



UKRAINIAN RESPONSE TO THE RUSSIAN "ARMATA" TANK

Serhiy ZGHURETS

Defense Express

Ukraine has just completed deliveries of BM Oplot main battle tanks – currently the most technologically advanced and sophisticated product of its armored vehicles industry – to Thailand. Another breakthrough technology, little known of and developed in 1988-2001 in Kharkiv, is Object 477A "Nota"/Note MBT.

The "Nota" MBT was designed with a 152 mm cannon that can be replaced with a NATO standard cannon firing new 140 mm rounds. Specifically for the Nota MBT application, a new autoloader system has been developed, consisting of a 10

rounds autoloader in the tank's firing compartment and two ammo racks, each housing 12 rounds stored along hull sides.

The Nota MBT features enhanced and improved armor protection of the turret and the front and sides of the hull, and front roller tracks protected with armor. Titanium is used in modular armor of the vehicle's hull and turret.

Armor protection on the "Nota" vehicle has been made modular to allow it to be kept battle worthy by simply replacing a damaged armor module.

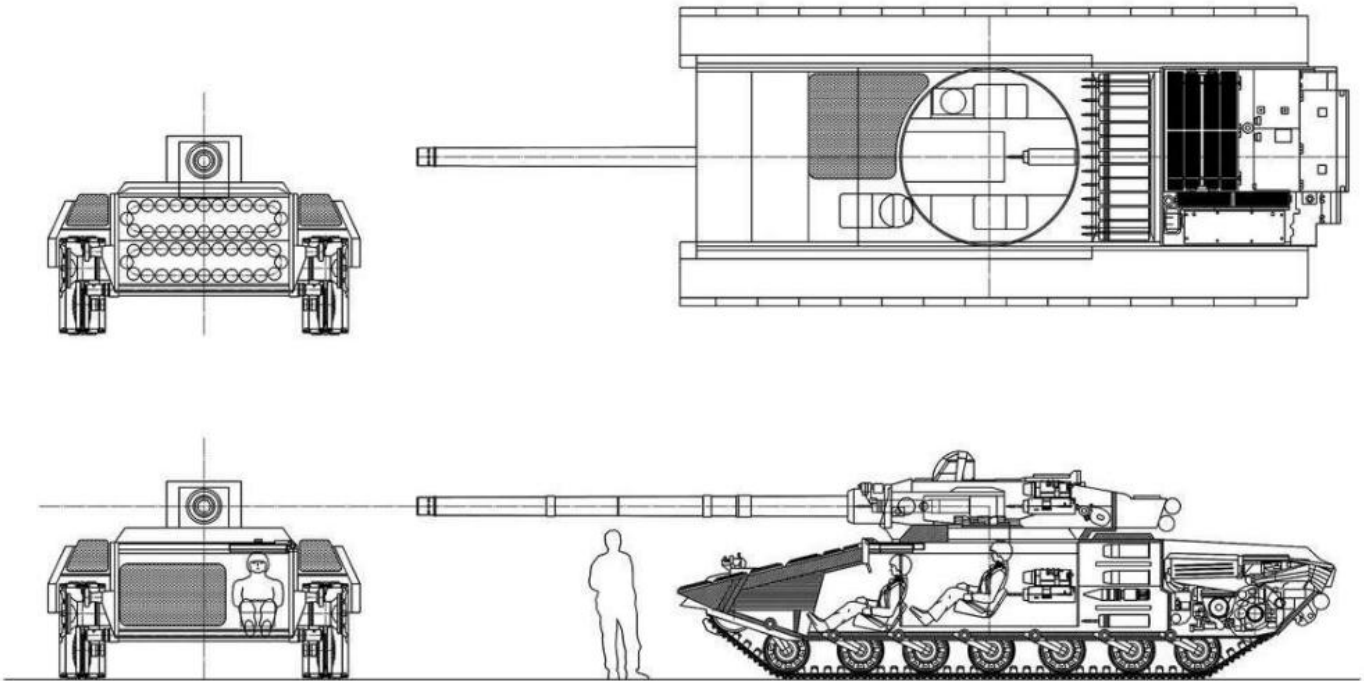
The tank was designed with a highly protected environment for the crew and with features that are now standard for modern tanks: from command and control battle management system and integrated sighting system to sensors of various kinds, satellite navigation, automatic digital system for secure intra vehicle communication,

friendly identification, and up to the capabilities allowing a fully robotized tank to be developed from it.

Implementing all these capabilities with current hardware technology, in an MBT with already available blueprints, engineering drawings and manuals, certainly looks a tempting idea. The Oplot incorporates just a fraction of the capabilities that were planned for the 477A Nota design.

The projected, next-generation Ukrainian tank "Nota", with all the capabilities planned for the 477A MBT implemented to the full extent, would be without rival worldwide.

Ukraine's senior military leadership assess the prospect of further developing the new indigenous tank thus: "It is appropriate to continue with programs in "Nota" MBT R&D in order to create an advanced main battle tank of the next generation. Given that the Object 477 was being devel-



oped back in the 1990s, most systems and subassemblies in the vehicle need to be modernized and updated with current hardware components. Reviving the "Nota" MBT program, however, requires substantial cash and time investment that is unlikely to materialize in the present context. It is therefore proposed to develop and build a tank with removable weapons systems

based on the Oplot MBT platform, leveraging the outputs from Nota R&D". A mock-up "Nota" vehicle was to be demonstrated at Ukraine's 2017 Independence Day military display in Kyiv. Had the most secretly developed tank been showed off for the first time rolling through the Khreshchatyk Street it would certainly have caused a far greater sensation than when the

Russian "Armata" tank was displayed on Moscow's Red Square in May 2017. This plan, however, had to be abandoned at the last minute. Nevertheless, "Nota" offers welcome opportunities for restructuring national industries, developing R&D schools of thought, and promoting this new MBT technology on potential markets. **UDR**





A NEW LEVEL OF

ANTI-IED PROTECTION

The counter radio-controlled improvised explosive device (RCIED) electronic warfare (CREW) jamming system Oberih ("guardian"), developed by Novator State Enterprise of the Ukroboronprom state-owned defense industries holding company, provides vehicles with a higher level of protection against IEDs and remotely controlled mines compared to the original Garant-M technology from which it is derived.

Oleksiy LEVKOV

exclusively for Defense Express

The Oberih CREW system generates jamming frequencies within a range from 20 to 4,000 MHz. To prevent IEDs from being detonated by mobile phone, lower band frequencies are used, and spectral density has been tightened to achieve an increased power per unit frequency interval. The total jamming power has been improved to reach 800 Watts.

The device can operate in temperatures ranging from -40°C to +40°C.

"Specifically for the Oberih system, we are developing a mounting


bracket for attachment to various platforms", an executive at Novator told Defense Express in an interview.

The vehicle-mounted Garant-M system was successfully used by a Ukrainian peacekeeping force deployed in an armed conflict zone. The use of the system helped it to thwart a few remotely-controlled mine explosions that potentially could damage a vehicle convoy passing by. The mines did explode, but well beyond the envelope of the device mounted on a vehicle. The Garant-M proved its capability to effectively neutralize RCIEDs from distances of 75 to 100 meters depending on the type of threat.

Novator has leveraged the expertise it gained with Garant-M into developing its Oberih CREW product. "The Ukrainian military are interest-

ed in this new technology; they will test and evaluate the Oberih system in order to have it qualified for service use", an engineer who developed the product said.

The Oberih system, like its Garant-M original, was manufactured at a factory in Donetsk prior to the Russian incursion into Donbas. Its primary purpose is to jam all transmissions coming to hostile electronic facilities, radios (fixed, vehicle-carried or man-portable), and cellphones, and to protect combat vehicles moving alone or in convoys by preventing the activation of improvised explosive devices, mines, bombs and other remotely controlled threats. The Oberih system accomplishes its primary mission by transmitting jamming signals within a broad band to counter a range of frequency diverse threats.

The system consists of four jammers, each equipped with a high-performance, broad-band antenna covering its designated area in a horizontal plane. The system is powered via built-in 24V power supply or, optionally, 220V mains adapter. 



SE 'MALYSHEV PLANT'

BM "OPLLOT"

MAIN BATTLE TANK



The up-to-date Ukrainian BM OPLLOT tank is intended for effective day and night combat use under adverse environmental, climatic and weather conditions including those under high temperatures of the surrounding air and high dust loading. The Tank has following features: the multifuel engine, the transmission with extended speed range and complex system of movement control, the autonomous power unit for power supply when the vehicle is parked, the unique explosive reactive armour protection against tandem HEAT and APFSDS projectiles, the effective complex system of detection and optical-electronic suppression of the enemy's guidance and sighting devices, the up-to-date sighting and observation complex with thermal imager, the digital ballistic computer and navigational support system, the capability of targets destruction by missiles at the range of up to 5 km without entering the dangerous area.



Main gun caliber, mm	125
Combat weight, t	51
Crew, members	3
Engine power, hp	1200
Power-to-weight ratio, hp/t	23,5
Specific ground pressure, kgf/cm ²	0,97
Temperature mode, °C	- 40 ... + 55
Length, with gun, mm	9720
Width, without reactive armor, mm	3400
Width, with reactive armor, mm	4176
Height with commander's sight, mm	2800
Speed, km/h	Up to 70
Reverse speed, km/h	Up to 31,3
Cruising range, km/h	Up to 500

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 tel. +38 (057) 737-69-89 / +38 (057) 784-40-34



TANK ENGINE PRODUCTS BY MALYSHEV PLANT



A Ukrainian Army's T-84 tank platoon competing in Strong Europe Tank Challenge 2018

S E Malyshev Factory is a long-standing Ukrainian producer of diesel engines for armored military vehicles. All their physical characteristics and performance parameters taken collectively, these products are without equal in the global engine industry.

In the engine domain, Malyshev Plant is a specialist in production of the TD-series of high-speed two-stroke diesel engines with opposite-moving pistons for use on tanks and armored vehicles. These are 3/5/6TD-series engines developing from 280 to 1.500 hp. Engines of the herein mentioned series make the core of powerplant systems in modern main battle tanks produced by Malyshev Plant: the T-80UD equipped with the 6TD-1 engine, T-84 (6TD-2), and BM OPLOT MBT (6TD-2). The three-cylinder, 280-600 hp 3TD diesel has been developed for light tracked and wheeled vehicle applications (armored personnel carriers and infantry fighting vehicles).

The 6TD-2 is the most popular engine among all TD-series engines pro-

duced by Malyshev Plant. It has no competitors among the best international brands in terms of the ratio between performance and fuel efficiency on the one hand, and weight and size on the other. Its design incorporates some unconventional layout solutions that are not found in most of international analogues. It constitutes a fully aluminum block tightened with anchor bolts. The spring located between the high-pressure compressor ($P_a = 3.65$) and the turbine leads out through the fuel injection camshaft. The aluminum piston is protected with high temperature resistant pads

that can withstand operating temperatures as high as 960 degrees Celsius (as in case with the adiabatic piston).

The used arrangement does not have the disadvantages of four-stroke diesel engines; it does not make use of high heat-stressed components such as the cylinder head, gas joint and exhaust valves that are all low resistant to high loads at high engine speeds. These advantages become especially valuable where the engine operates at high speeds and at temperatures ex-



The 6TD-2 is the most popular engine among all TD-series engines produced by Malyshev Plant

ceeding +55°C, as is evidenced by long-term experience of using diesel-powered vehicles in military operations in hot climates.

The exclusion of the need for using intermediate air cooling at high charging pressure enables a substantial reduction in the amount of heat transferred to water and oil, which translates into a considerably smaller size of the tank cooling system. Owing to the low total heat transfer and increased gas consumption it was possible to create a compact ejector cooling system using the energy of exhaust gases. Such a system is automatically adaptive to ambient temperatures, has a simple design and no moving parts. With this ejector cooling system, exhaust gas temperature is reduced to 250°C by mixing them with large quantity of air, with resulting benefits in terms of environmental impacts and the tank thermal signature reduced to negligible levels.

The engine design defines to a great degree the space and layout requirements for a powerplant compartment in a tank. Malyshev Plant engine, with its cylinders oriented horizontally, is only 581 mm high, which makes it the lowest-height tank diesel engine currently available on the worldwide market. With its compact size and low profile, the engine has been designed such as to allow it to be arranged coaxially with the caterpillar transmission gear in the tank engine compartment (allowing two-way power take-off from the crankshaft to power the caterpillar transmission). This greatly simplifies the power train and reduces the space requirement for a 1,200 hp engine to 3.01 cubic meters compared to 6-9 cubic meters required by non-Ukrainian analogues. The engine low height, translated into a smaller, lower profile engine compartment in a tank, therefore makes it into a low-profile, reduced weight, low-observable tank.

The engine design does not make use of components requiring adjustments, for example, of valve clearance or belt tension among others. There are some routine, operating-time-related maintenance procedures such as preventive filter replacement, oil centrifugal filter cleaning, or filter replacement as required. The design also offers competitive advantages in terms of multi-fuel capability, environmental impacts reduced by mitigation meas-



6TD-2 inside Oplot MBT engine compartment

ures to ensure low smoke operation, as well as reliability, durability and maintainability.

A two-stroke diesel provides 70 % more power than a four-stroke analogue of a similar capacity. All these advantages taken together allow the engine to attain 0.88 hp/kg -- the highest power to weight ratio achieved by any of existing tank diesel engines so far.

The 6TD design possesses a huge potential for power increase. The development of a 1.500 hp modification has been got underway. The Malyshev Plant diesel engine designs are protected by more than 100 patents and cop-

yright on inventions, skills and knowledge. Engines in the 1.500 hp class have a potentially large market. Malyshev Plant has a separate, highly specialized production line for the tank diesel engines. It encompasses the full range of operations from workpiece production to end product assembly, using components that are almost all produced domestically in Ukraine. Malyshev Plant diesels feature a high degree of parts commonality, enabling a rapid shift to new modifications as required, while the availability of a common MRO base helps reduce significantly the cost of MRO operations. 

BASIC SPECIFICATIONS OF THE 6TD FAMILY OF TANK DIESEL ENGINES

	6TD-1	6TD-2	6TD-3
Output, kW(hp)	735 (1,000)	882 (1,200)	(1,400)
Number of cylinders	6	6	6
Displacement, l	16.3	16.3	16.3
Crankshaft rotation rate, min ⁻¹	2,800	2,600	2,850
Specific fuel consumption, g/kW (h/hp h)	214.8 (158)	217.7 (160)	(160)
Length, mm	1,602	1,602	1,698
Width, mm	955	955	955
Height, mm	581	581	581
Weight, kg	1,180	1,180	1,210

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KOMBAT | GUIDED MISSILE ROUND



KONUS | GUIDED MISSILE ROUND



FALARICK 105 | 105 MM GUIDED MISSILE ROUND



STUGNA | GUIDED MISSILE ROUND



FALARICK 90 | 90 MM GUIDED MISSILE ROUND



KORSAR | MAN-PORTABLE ATG MISSILE AND LAUNCHER



Type of carrier platform —
Missile mass —
Missile diameter —
Missile length —

DEVELOPER OF ANTI-TANK SYSTEMS IN UKRAINE



7,5 km



800 mm

5 km



800 mm

5 km



750 mm

5 km



700 mm

5 km



550 mm

5 km



550 mm

4 km



550 mm

2,5 km



550 mm

Armor penetration capability



Light portable missile system Corsar



Man-portable rocket grenade launcher



Man-portable ATGW system Skif

80K6T – 3D RADAR FROM UKRAINE

Capabilities of Iskra's New Radar Product



State Enterprise “Scientific and Production Complex “Iskra” of the Ukroboronprom state-owned defense industries group, is pursuing the development of an advanced digital Active Phased Array Radar (APAR) solution the Company already implemented in its brand new 80K6T radar technology that was seen exhibited for the first time at Arms & Security 2017, Kyiv, in October.

The 80K6T – a three-dimensional, 360-degree Ground Controlled Interception (GCI) air defense search radar – provides a broad range of target detection and location finding capabilities, and is able to function effectively even in the presence of substantial

environmental and electronic counter-measures influences.

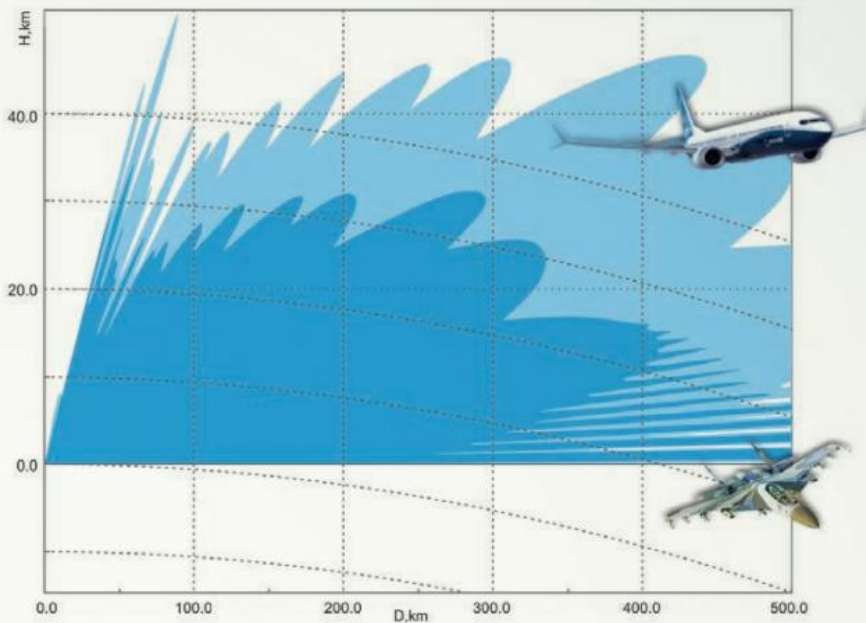
The product integrates technology solutions for high resolution detection and tracking of aerial threats of various kinds. Being a digital active phased array radar, the 80K6T enables targets to be detected and tracked with ultra-high resolution while simultaneously providing a three-dimensional measurement solution for

range, azimuth and elevation in an integrated package. It is able to detect aerial threats out to ≤500 km in range and ≥40 km in altitude, and track up to 500 targets simultaneously.

The antenna rotates at the rate of 12 rpm, thus enabling target data updates in every five seconds, while the radar's 70-degree elevation capability enables early detection of tactical/tactical-and-theater range missile attacks. The technology furthermore uses advanced radar output processing algorithms for effective detection of low-RCS targets as well as highly maneuverable cruise missiles while flying on extremely low-altitude trajectories.

The 80K6T radar technology is compatible with all of the SAM capabilities currently in service with Ukraine's Armed Forces, and it is suitable for use also during Air Force operations.





BASIC TECHNICAL DATA:

Operating frequency range	S
Maximum radar operation limits:	
in range, km	500
in azimuth, deg	360
in elevation, deg	0...70
in altitude, km	40
Scanning interval, s	5, 10, 20
Target detection range, RCS=3m ² (at P=0,8 F=10-6):	
at flight altitude 10...30km	350
Transmitter type	Solid State
Transmitter peak power, kW	30
Antenna type	DAPAR
Number of beams	16
Clutter suppression, more, dB	50
Jamming cancelling, more, dB	20
Track throughput, more than	300
IFF equipment	built-in
Number of transport units	2

To ensure high tactical mobility, the 80K6T radar is carried on two light vehicle platforms, accommodating operator workstations and power supply units, and radar control equipment respectively. It moves

from stowed to ready configuration in 10-15 minutes.

For strategic mobility, the 80K6T is designed to be air transportable with light military transport aircraft. **UDR**



This is courtesy of S&PC "ISKRA"



Serhiy CHEPEL, CEO, Radio Satcom Group, exclusive representative of Harris - Communication Systems in Ukraine»



UKRAINIAN HARRIS FREQUENCY

UKRAINE IS MAKING EXTENSIVE USE OF ADVANCED WESTERN TECHNOLOGIES TO BUILD UP ITS NATIONAL DEFENSE CAPABILITY

Ukkraine is currently becoming a testing ground for evaluating advanced military technology solutions in real-world combat scenarios. One example is secure, digital, tactical communications systems by Harris that have been procured and funded by U.S. foreign military assistance initiatives and now employed broadly by Ukraine's armed services. In an interview conducted by Defense Express, Serhiy CHEPEL, CEO, private Radio Satcom Group, an exclusive representative of Harris - Communication Systems in Ukraine, discusses, among other things, the Company's

products and their successful applications for the needs of the Ukrainian Military.

DE: What specific types of Harris radios have been, and still continue to be, delivered to Ukraine's defense and security users?

Serhiy Chepel: A full range of HF, VHF and UHF radios have been and continue to be delivered. These include tactical radios for handheld and manpack applications, and vehicular systems designed for use on armored fighting vehicles, tanks, command and staff vehicles as well as fixed installations. The radios come packaged with accessories like antenna sets, installa-

tion kits, power supplies, voltage converters, and intercoms.

First shipments were made of Falcon II radios of various capacities. These are highly reliable and sought-after radios that have, for many years, been tested and proven in combat. The Falcon II is the most widely fielded radio in the US armed services, with about 50,000 HF radios alone deployed to date.

First shipments of Falcon II tactical radios were made under the U.S. Foreign Military Funding (FMF) programs to equip Ukraine's 95th Independent Airborne Brigade, as well as the Navy. In 2015, the Ukrainian Government funded a \$10 million procurement of the more affordable,



low-end Falcon II MPR 9600 model, with no new procurements of Falcon II radios made ever since.

After the start of Russian military incursion into Ukraine, more current and capable Falcon III tactical radios of various capacities and for various applications began to be procured in substantial numbers under US foreign military assistance programs.

These are all pretty expensive, highly capable, multipurpose, third generation tactical radio systems that are fully interoperable with Falcon II and other existing tactical radios used by NATO forces, and they have just begun to be fielded by armed services of the US and NATO countries. They are designed with a wide range of capabilities for high-speed data and voice transmissions, pseudorandom operational frequency readjustment, generation of highly secure wireless IP-networks, to name just a few. Such flexibility is supporting a wider range of capabilities, including reliable secure communication through radio networks of different sizes, saving channel resource, and ensuring uninterrupted data and voice communications in noisy and heavy ECM environments.

DE: Apart from HF/VHF and multi-band radios, Harris is also offering intercom systems to Ukrainian consumers. Would you elaborate on them, please?

Serhiy Chepel: The vehicle intercom system by Harris is universally applicable to a wide variety of combat platforms – armored fighting and command and staff vehicles of all kinds, as well as communication equipment rooms and field communication centers. The Intercom system comes in two versions, supporting two and four radios.

The system provides networking for a variety of radio networks: HF, VHF, terrestrial communication channels, etc. The Intercom is comprised of a

switch unit and its associated Networking Intercom System (NIS) speaker units. The switch unit is responsible for networking communication channels and providing direct voice connectivity between the squad leader and any of the connected speakers. Each NIS speaker, using a tangent control board, can connect either to another speaker within the NIS network, or to the master radio where the system configuration allows so. It is possible to switch between different networks, regardless of the brand or operating bandwidth of the radio used, be it Harris, Motorola or Aselsan.

The NIS has an embedded SIP server, which essentially makes the connected radios into IP phones. Besides, intercoms can be connected in cascades, thus allowing the number of connected radios to be increased as needed. Further to this, the NIS can be connected to an Ethernet network to support IP data communication between all and any of the connected radios.

DE: Which of its foreign military aid programs is the US Administration currently employing for Ukraine?

Serhiy Chepel: These days, there is only one US aid program employed – the Ukraine Security Assistance Initiative, under which the US has appropriated USD →



Examples of Harris radios fielded in Ukraine



Harris Falcon III tactical radios

350 million in military assistance funding for Ukraine. Communication is conducted directly with members of the military radio community, who make know what they need, then receive the required capabilities.

DE: Four years into the Ukraine-Russia conflict, what is the amount, in value and in number, of the Harris radios provided for Ukraine's defense and security sector under the US foreign military aid programs?

Serhiy Chepel: Although not classified, this information is not advertised either. The defense and security sector received some USD 30 million and USD 80 million worth of Harris radios in 2016 and in 2017 respectively. For 2018 we are anticipating a similar or even higher amount, but it's still too early to talk about this now. US Government decisions regarding the amount and content of military-technical assistance are hinged mainly on the military and political realities obtaining at the time the decisions are made. At least let us be optimistic about it until it happens.

DE: How does the American party appraise its work with Ukrainian partners?

Serhiy Chepel: The key criterion for evaluating cooperation is effective utilization of the equipment and technologies received, as stated by representatives of the U.S. Army European Command during two working meetings with officers of the Main Directorate of Communications, Ukraine's General Staff, at the NATO Liaison Office, Kyiv, in 2017.

The Americans evaluate that the communication equipment they pro-

vide is utilized effectively. The military radio community and we believe this is an adequate and well-deserved appraisal. The Harris HF radio has effectively become the standard radio for Ukraine's armed services, and we are confidently expecting that it will soon replace the legacy inventory, not only the Army's but the other armed services' too. There has been intensive work underway to modernize selected units and formations with HF/VHF radios that are unique worldwide in terms of some of their performance capabilities. These technologies are enablers for next-generation combat management systems that dispense with voice communication and enable effective application of software and hardware solutions for reconnaissance and intelligence gathering, artillery fire control, greater engagement of digital maps, etc. Ukraine's Armed Forces, State Border Guard Service and National Guard



Element of Harris Intercom system

are currently gaining experience with these new capabilities.

Owing to well-coordinated efforts by defense and security agencies in Ukraine, there has been a sufficiently high efficiency level in utilizing the military and technical assistance granted by the US Government. As a result, we currently have several running programs aimed to acquire tactical communication products by Harris, under US-funded contracts.

DE: The last question is to what extent are Harris radios resilient to electronic countermeasures, particularly those used by Russia-backed insurgents in the Donbas Theater?

Serhiy Chepel: It should be explained that Harris radios have been especially designed to operate in heavy ECM environments. So our equipment operates faultlessly, providing secure communications, this despite the fact that Russian EW systems are technologically sophisticated systems, and they have been employed massively by the intervention forces.

It is difficult even for the most technologically advanced EW system to detect and jam a frequency agile, VHF radio, for example, which operates in a wide bandwidth range and is capable of frequency hopping at 1,000 hops per second. Besides, the use of special techniques and methods in operating the radio at very low duty cycles makes its detection and jamming complicated further. Regarding the possibility of interception, decryption of communication would be impossible at all within an affordable time. **UDR**

Interviewed by **Anton MIKHENKO** and **Serhiy ZGHURETS**

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60-MM MORTAR



IN THE CONTEXT OF THE CURRENT BATTLEFIELD CHALLENGES



DENIS PONOMARENKO,
exclusively for UDR

In modern warfare and conflict situations, lower echelon infantry cannot always rely on fire support from artillery units. This is where 60 mm mortars can come in handy for both defensive and offensive support, and they should be attached to each infantry unit of Company size. This type of weapon, owing to the advantages it offers, has been increasingly used on the battlefield these days.

Many armed forces, however, don't have 60-mm mortars in their weapons inventories, and this is not right. This weapon can indeed become a force multiplier for a tactical unit by providing it with the capability to conduct accurate indirect fire to short ranges. Maneuverability, agility

and light weight are the advantages the 60-mm mortar can provide to make a small combat unit ready for action in all kinds of battlefield situations and scenarios.

For a mortar squad to be effective, it is important to establish adequate communication and coordination between infantry units and mortar-gun crews, mortar platoon commanders and the mortar spotter who would direct mortar fire onto targets using intelligence from forward observers. It is also important to train a few soldiers from each infantry platoon to observe and identify targets, adjust fire and expertly handle mapping and terrain data, and this training should be handled preferably by expert artillery and mortar gunners. This would eliminate the need to attach intelligence squads to infantry platoons and thus would save human resources of artillery observation units. The aim should be to ensure a synergy

between mortar-gun crews, platoon commanders and mortar spotters to ensure that enemy targets are dealt with quickly and to best effect.

There is, however, one unfavorable circumstance that needs to be handled. Unfortunately, as the battle progresses and its intensity increases, unit commanders, at the tactical level, cannot see how they can employ 60-mm mortars carried by the Infantry Company. They perhaps fail to understand that the key mission for these mortars is to provide fire support to a unit in battle and to ensure a saving of combat resources during sporadic exchanges of gunfire.

FROM THEORY TO PRACTICE

USA. During the Vietnam War, the US Army found out that 81-mm M29 mortar units were not maneuverable enough on the battlefield, because the weapon they carried was too heavy,

had relatively short range and almost always required to be used from fixed emplacements. This led it to be replaced by the lighter weight 60-mm M-19 mortar.

The M-19 itself was replaced by the longer-range Watervliet Arsenal M224 series mortar that was developed in 1970 and commissioned by the US Army in 1978.

For maximum operational efficiency, a crew of three or four is recommended for this weapon, including the mortar-gun crew leader, gunner, assistant gunner, and ammunition man. The M224 is designed to be transported in Platoon's vehicles in order to lighten the mortar crew's load and to ensure that the weapon and its ammunition remain intact while in transit. In the battlefield conditions where transport is unavailable, the mortar would be dismounted and carried to the firing position by its crew.

The M224 mortar can fire a variety of ammunition types, including standard practice and training rounds, smoke and illumination projectiles, and high-explosive munitions.

The M224 mortar saw service in the Gulf War, Afghanistan and Iraq. A total of 2,300 units were produced over its production lifespan.

In 2012, an improved M224A1 version began to be fielded by the US Army and Marines Corps. This mortar is sufficiently stable to be fired without a bipod, and the fuzing for the mortar ammunition provides time-commanded air burst and impact fuzing options.

AUSTRIA. Hirtenberger Defense Systems (HDS) is a leading developer, manufacturer and supplier of mortars for mounted infantry and commando units. The HDS M6C-210 mortar system was specifically designed for commando forces operating in challenging terrains (mountains, jungles, deserts as well as urban environments). A compact, highly mobile, easy-maintenance and easy-handling weapon system, the M6C-210 mortar is fitted out with a dual-mode sight enabling it to be fired from a horizontal position. Operated by a crew of one or two, it can fire all of the most widely used 60mm mortar rounds. The M6C-210 had won renown for



60-mm M60 Camertone mortar system developed by Zavod Mayak

its service during the war in Afghanistan. It is operational with the armed forces of Austria, Italy, Switzerland, Bulgaria, Chile, and Greece.

ISRAEL. The Soltam company is producing the 60-mm mortar system C08, which comes in two versions, the Standard and Commando. The two

differ from each other by way of the mass, barrel length, type of the sight used, and the number of personnel required to operate them. The Standard variant uses an image intensification sight, while the Commando employs an iron sight. The Commando weighs 17 kg ready to fire, and can →



The HDS 60mm Commando Mortar M6C

deliver 1.54 kg rounds out to 2,500 m. The crew is set at 2-3 persons for the Standard and 1-2 persons for the Commando.

Different physical and performance characteristics of the two mortar systems imply they have different combat capabilities (maneuverability and the amount of firepower delivered) and are applied differently to various battlefield situations. Besides, the Standard mortar is suitable for integration onto the Merkava MK4 tank. The 60-mm mortar systems produced by Soltam are ranked by experts to be the best of their kind.

RUSSIAN FEDERATION. In 1981, a team of engineers led by V. Korolev, S. Zuyev and N. Ivanov developed a silenced mortar featuring a 365-mm barrel, a 340-mm diameter baseplate, and a ball-type attachment assembly for the barrel. The weapon doesn't require a sight to be aimed onto a target, and can be traversed and elevated using the assembly attaching the barrel to the baseplate. The mortar fires muzzle-loaded rounds developed specifically for this application.

A highly mobile weapon, it is capable of shoot-and-scoot tactics. Its specifications have been kept under wraps, but it may be fairly presumed that they are much the same as those found with foreign-developed counterparts.

UKRAINE. Zavod Mayak PJSC, Kyiv, has developed its 60-mm M60 Camertone mortar system in response to the needs of the Ukrainian government forces deployed down range in the Donbas conflict area. A light, highly



M224 60mm Lightweight Company Mortar System

mobile and maneuverable weapon, the M60 was showed off for the first time during a display at the Kyiv Polytechnic Institute in March 2016.

The M60 Camertone mortar was developed specifically for Paratroop and Infantry use. The weapon is intended to be fired against enemy personnel and vehicles sheltered in trenches and behind shields. In its version optimized for infantry use, it weighs 19 kg, has an effective range of 3,700 m and a maximum range of 5,500 m. The version for Paratroop use has an effective range of 1,000 m, and a maximum rate of fire of 25 rpm.

It employs the EMS-1 electronic sight developed domestically by Precision Artillery Systems. The sight helps the gunner do his work faster and with greater accuracy. The M60 requires a crew of one or two personnel to be operated. Specifically for this application, a new 60-mm HE round with a 30-m kill radius has been developed.

The M60 Camertone mortar, when compared to other weapons of its class, is considered by experts to be superior in range and rate of fire, as well as in terms of the human resources required for its operation.

Ukraine's Military did not have in its inventory anything similar to the 60-mm Camertone mortar at the time the weapon was being developed. In December 2017, it was formally accepted for use by Special Operations Forces and later subjected to user evaluation in the Donbas conflict area.

The 60-mm mortar is one of the most effective, minimum essential weapon system that would be able to suppress hostile fire should the Russia-back insurgent forces resort to provocative or offensive actions in defiance of the Minsk accords. The provision of M60 Camertone mortars for Ukrainian tactical units deployed down range would be a force multiplier and would enhance their ability to face up to the enemy. **UDR**

PARAMETRIC COMPARISON OF 60-MM MORTAR SYSTEMS

Country of origin	USA	Austria	Israel	Russia	Ukraine
Mortar	M224A1	M6C-210	C08 Commando	Silenced mortar	M60 Camertone
Max range	3,500 m	1,600 m	2,550 m	–	5,500 m
Barrel length	1,020 mm	815 mm	890 mm	365 mm	–
Rate of fire	20 rpm	20 rpm	25 rpm	–	25 rpm
Mass	19 kg	5.1 kg	16.3 kg	20 kg	19 kg
Crew	3-4	1-2	1-2	2	1-2

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PROTECTION FROM INVISIBLE THREATS

TECHNOLOGY SOLUTIONS FROM "SPARING-VIST CENTER" COMPANY - ECOTEST TRADEMARK

The thirty-year experience in the development and manufacture of radiation measurement & monitoring technologies has enabled "Sparing-Vist Center" to expand its international customer portfolio to include over 80 country markets worldwide. Having been certified to compliance with NATO standards, ECOTEST products are now exported to military customers in some of the NATO countries. These are just few facts from history of private R&D and Production company "Sparing-Vist Center" (Ukraine, Lviv).

The Company offers a full line of comprehensive solutions including personal, hand-held, transportable devices as well as fixed systems designed to solve diverse measurement

problems. The majority of ECOTEST products have been certified and have been accepted for service use by Ukraine's Armed Forces as well as Armed Forces of other countries worldwide.

"Sparing-Vist Center" offers its brand-new product – Multipurpose Dosimeter-Radiometer MKS-UM – to potential customers both in and outside of Ukraine. The MKS-UM is designed for field use to detect, localize and measure radiation exposure.

Designed based on the proven MKS-U technology, which proved its worth with its ability to operate effectively in harsh desert-type climates in Kuwait and Iraq where it was used by Ukraine's NBC forces deployed there as part of UN-sponsored peace support missions – the MKS-UM offers reduced weight and size, making it



DRG-T – Radiation Survey Device



New Generation survey meter for replacement of SVG2 – MKS-UM. Multipurpose Dosimeter-Radiometer MKS-UM is a full-range radiation survey device designed to work in harsh conditions

more comfortable to operate. It has the capabilities for detecting and measuring gamma, beta, and alpha emission levels. The availability of an integrated GPS/GLONASS navigator enables the user to log and store obtained measurement data output in a geographically referenced database.


The device is compliant with international standards MIL-STD-810G & MIL-STD-461F as well as international standards IEC 60846 & IEC 60325.

The MKS-UM has a lithium-ion battery. Measurement outputs are displayed on-screen along with the given

margin of measurement error. With an analogue display of radiation dose rates it's easier to localize position of radiation emission sources.

With its IP67 enclosure rated body and protective rubber case, the MKS-UM is suitable to be operated in harsh climates, under atmospheric precipitation, and in environments with high dust loadings.

It can measure gamma emission rates within the full range from background level to radiation alert level.

The delivery kit of MKS-UM may be completed upon customer's request. 



- Private R&D and Production Company "Sparing-Vist Center" is a well-known developer and manufacturer of radiation measurement instruments of ECOTEST trademark.

- Over 200 highly-qualified and experienced specialists in the field of radio engineering

- Full line of comprehensive solutions including personal, hand-held, transportable devices as well as fixed systems designed to solve diverse measurement problems. The majority of our products have been certified and included in the State Register for Measuring Instruments of Ukraine and other countries of the world.

- Export to more than 80 countries.

- Participation in international technical assistance programs since 2002, including the program on equipping the Second Line of Defense, gave us considerable experience as well as opportunity to confirm our longstanding reputation as a reliable partner.

- "ECOTEST" TM products are used by: Ministry of Defense of Ukraine, State Emergency Service of Ukraine, State Border Guard Service of Ukraine, Ministry of Ecology and Natural Resources of Ukraine, Security Service of Ukraine, Ministry of Internal Affairs of Ukraine, Ministry of Health, State Guard Service of Ukraine, the Border Service of Republic of Kazakhstan and the Border Service of Republic of Uzbekistan.

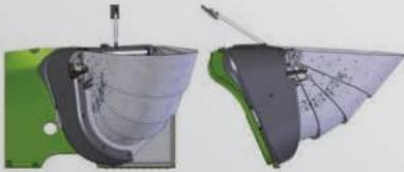


Personal Gamma Radiation Dosimeter DKG-21M



INSPECPROM LLC'S PRODUCTS HAVE BEEN SOLD WITH SUCCESS ON UKRAINE'S DOMESTIC MARKET. THE COMPANY FOCUSES ON THE DEVELOPMENT AND PRODUCTION OF DEFENSE-RELATED PRODUCTS.

IR SUPPRESSING SYSTEM ADROS ASH-01V



Inspecprom, assisted by NPF Adron, has developed the IR suppressing system (IRSS) Adros ASH-01V and got it accepted for service by Ukraine's Armed Forces. The ASH-01V IRSS will be used to reduce the heat signature of TV3-117 engines equipped in Mi-8 and Mi-24 helicopters and their modifications in order to

enhance survivability against infrared guided missile threats.

The desired level of IR signature suppression is achieved by using a multi-circuit ejector, shielding the hot engine from view, shielding the exhaust from view by an insulating cowl, and by applying special high emissivity coating to the engine exhausts for reducing the IR signature.

Aerodynamic losses and exhaust losses associated with the Adros ASH-01V IRSS have been reduced by reconfiguring (extension/retraction) and optimizing the geometry of the exhaust duct assembly.

KEY SPECIFICATIONS

Property	Variable-geometry multi-circuit ejector
IR suppression in the 3-5 μm band	4-5
Free turbine shaft power loss	≤ 2-3%
Mass	≤ 130 кг

HELICOPTER GROUND SUPPORT EQUIPMENT (Mi-8, Mi-24, Mi-2 helicopters)

• **Towbar** will be used for towing a helicopter to parking positions, on paved and unpaved strips.

KEY SPECIFICATIONS



Length	4060 mm
Max admissible towing force	4000±200 kg
Mass	30,2 kg



Length	4480 mm
Max admissible towing force	4000±200 kg
Mass	51 kg

• **Hydraulically** operated jack system will be used for lifting a helicopter in mounting/dismounting or charging landing gear shock struts and in helicopter rigging, as well as other helicopter lifting works. There are four options of hydraulic jacks offered for Mi-8/24 series of helicopters.

KEY SPECIFICATIONS

Hydraulic jack for Mi-8/24 helicopters

Jacking capacity	5000 kg
Min height	550 mm
Max height	1440 mm
Hydraulic stroke	690 mm
Elevating screw stroke	200 mm
Operating hydraulic pressure	130kg/cm ²
Type of power fluid used	AMG-10
Usable fluid volume	5,5 l
Mass overall	38 kg



MOUNTING PLATFORM

The platform is designed to carry KUV-26-50 chaff/flare dispenser of Mi-8 and Mi-24 helicopters. Installed on the tail boom hardpoints, it is fixed using a strap system.



AIR AMBULANCE EQUIPMENT for the Mi-8 Helicopter



Stretcher attachment hardware



Leg attachment hardware

The Mi-8 helicopter can be reconfigured into Air Ambulance role for transport of stretcher patients.

In this configuration, the helicopter's cargo bay will be equipped with 12 standard-size stretchers with **dismountable legs** secured to the floor and hinged together with straps and belts. Two carrying handles on one side of the stretcher are fixed to dismountable legs arranged along a wall of the cargo bay and secured to the floor and ceiling, while as many handles on the other will be inserted through detachable, nylon-6 ribbon loop members and, again, secured to the floor and ceiling.

BLADE ELEMENT

This blade element will be used to beef up performance of rotor blades and other aero structures.



In between starboard fuselage stations, there is a small **medical table** next to a movable doctor's stool.

Doctor's stool

In cases where there is a mix of stretcher and sitting patients, a certain number of stretchers can be replaced with temporary seats as required.



FAST ROPE INSERTION AND EXTRACTION SYSTEM "KANAT-1"



The Fast Rope Insertion and Extraction System "Kanat-1" is designed for fast roping and extraction of fully-armed and equipped Commando troops from and to the Mi-8MT (MTV) helicopter. Two soldiers, each weighing up to 140 kg with all his gear can slide down one and the same rope simultaneously, with the helicopter hovering above the ground at a height equivalent to or shorter than the rope length.

With cargo bay doors dismantled, the Kanat-1 allows for simultaneous descent on two ropes.

With the fast extraction rope hoisted in the helicopter's center of gravity, the Kanat-1 allows for up to six personnel to be extracted simultaneously, with helicopter hovering above the ground at a height shorter than the rope length. Extraction is allowable when the helicopter is flying no faster than 70 km/h and no higher than 100 meters over the surface.

KEY SPECIFICATIONS

Kanat-1 FRIES

Limit load, kg	≥600
Mass overall, kg	≤72
- with 18.3m rope	≤84
- with 24m rope	
Rope system	
Length, m	
- with 18.3m rope	18,3
- with 24m rope	24
Mass, kg	≤44
Mass of rope, kg	
- with 18.3m rope	20
- with 24m rope	26

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BETWEEN SKY AND EARTH

A BRIEF OVERVIEW OF SOME RADIONIX PRODUCTS

SERHIY ZGHURETS,
Defense Express

Since its foundation in 2006, Radionix LTD has been focused on the development of new solutions for upgrading and updating the avionic equipment used on the MiG and Su-series fighter aircraft. Assisted by its international partners, Radionix has developed an upgrade package for the gun-laying radars equipping the Su-27, Su-30, and MiG-29 fighters. The proposed upgrade would provide a 30 percent improvement in the radar's range and detection performances, and would also improve the probability of success performance of its key subsystems. These solutions later formed the basis of a program aimed to upgrade Ukraine's Air Force MiG-29 and Su-27 fleets.

TO DECEIVE AND DEFEND

During the ongoing Donbas Anti-Terrorist Operation (ATO), Ukrainian government forces used their frontline and army aircraft capabilities against Russia-backed separatist



and terrorist forces. Many of these aircraft were lost to enemy fire conducted with Russian-supplied weapons systems such as the Igla and Verba MANPADS, and most advanced



Pantsir SAM and anti-aircraft artillery systems. A significant potential threat to Ukraine's aircraft comes also from the Buk-M1 and Buk-M2 self-propelled medium-range SAM systems that Russia has deployed in numbers in the Crimean Peninsula and locations adjacent to Ukraine's border.

In 2012, Radionix offered Ukraine's Air Force its airborne pod-mounted self-defense jammer designated Omut-K that is intended to protect aircraft from radar-guided AAM and SAM threats. This was later redesigned to produce a more advanced, extended functionality version, the Omut-KM. Its range of capabilities includes interception and analysis of incoming signals from hostile electronic systems; decision-making on adequate countermeasure responses; and spoof jamming of hostile SAM radars and radar-guided missiles operating within its frequency range.

The Omut-KM airborne jammer has the following key specifications: Main frequency range: 5 to 12 GHz; optional frequency range: 12 to 18 GHz; number of frequencies that can be jammed simultaneously: 20; output at P-1 dB: ≥ 20 W; mass of the pod: 71 kg; dimensions of the pod: 2400 x 370 x 260 mm.



In 2012, Radionix offered Ukraine's Air Force its airborne pod-mounted self-defense jammer designated Omut-K

The Omut-25KM variant has been developed specifically for use on the Su-25 fighter aircraft. Structurally, the Omut-25KM consists of two pods mounted on underwing hardpoints of the SU-25, each responsible for guarding its assigned hemisphere (fore or aft). One prototype sample of the equipment has been delivered for full-scale development testing to Azerbaijan's Armed Forces.

Besides the development of airborne countermeasures self-protection complex, the Radionix company also produced the System of radio electronic protection from anti-radar missiles with passive radio technical guidance, which provides protection from anti-radar missiles of different types. The range of defended area from anti-radar missiles is not less than 100...150 m from radar.

Also Radionix is developing an innovative airborne X-band radar system which it named Esmeralda. The system is being developed with flexible, open-architecture design, exploiting the building-block concept that enables it to be integrated both with SAM weapons and MiG-29 and Su-27 aircraft or other suitable platforms, both currently existing and prospective.

The building-block concept employed for this design enables individual components and modules (such as array assemblies, for example) to be

swapped in and out as needed, and the system as a whole to be easily re-configured to suit specific mission requirements. As at this date, Esmeralda radar is at the prototype development stage.

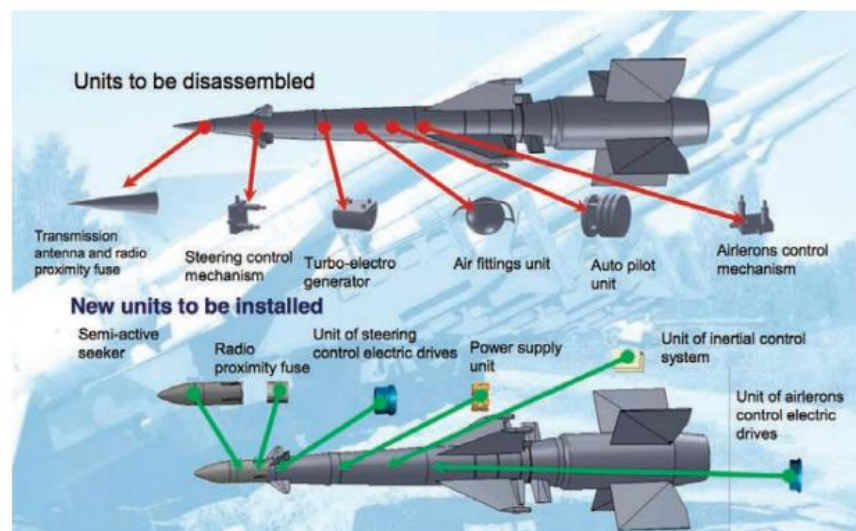
NEW GOALS

Radionix has branched out into a promising technology business such as the development of missile guidance equipment. Among the Company's latest developments in this domain are two innovative radar guidance units to be known as Onyx (active) and Topaz

(passive), which it developed in collaboration with domestic stakeholders.

These are the active radar guidance units. It must be appreciated that current-generation airborne electronic warfare systems have learnt too well how to deal with frequencies up to 18 GHz (this, inter alia, encompasses the frequency range exploited by the RVV-AE, R-77 and other AAM weapons designed by Russia). This has made some of the missile guidance technology engineers opt for the frequency range of 27 GHz to 37 GHz. So Radionix has developed its active radar guidance unit that relies precisely on this millimeter-wave frequency range. These units are designed such as to suit application for both SAM and AAM roles. The two units are designed and built with 60-65 percent electronic parts commonality.

Also Radionix has developed an upgrade package for the S-125M «Pechora» SAM System, and is already implementing it to order from an export customer. Packaged into the upgrade are all the key components and subsystems of the S-125M Pechora, including the UVN radar post, high-frequency receiving devices, target sight channel transmitter, missile command transmitters, TV/optical sighting equipment; 5P73 launcher system; 5V27D missile; and a new booster motor replacing the 5C45. Upgrade package for 5V27D missile includes a Customer-selectable semi-active/active seeker head and a fully redesigned missile guidance electronics set. 



Upgrade package for the S-125M «Pechora» SAM System



PLANT 410 CIVIL AVIATION: ON THE PATH TO SUSTAINED DEVELOPMENT



Viktor GANKEVYCH,
CEO of Plant 410 CA

The State Enterprise Plant 410 Civil Aviation provides Aviation maintenance, repair and overhaul (MRO) services to markets both in and outside Ukraine. To date, the Company has overhauled about 7,000 airplanes and 40,000 aircraft engines for customers in over 50 countries worldwide. Plant 410 CA is a powerful and reliable partner. In an interview with *Defense Express*, CEO of Plant 410 CA Viktor GANKEVYCH has outlined the current situation in the enterprise and unveiled its plans for the future.

DE: Plant 410 CA is well known on the market as a provider of MRO services for a diversified range of aircraft types and related systems, first of all the Antonov-series airplanes, as well as domestically manufactured aero-engines. Has the Company retained its specialization

as an aviation MRO provider? What new lines of business are emerging at the Company?

Viktor Gankevych: The State Enterprise "Plant 410 Civil Aviation" is a powerful aircraft MRO company with a globally unique expertise, which, over its 70 years in business, has proven its impeccable reputation as a provider of high quality MRO for the Antonov-series airplanes. Apart from its current lines of business, the Company has been bringing innovative, international-standard technology solutions into its aircraft MRO business; it is expanding into new MRO markets, especially for current-generation equipment of brands such as Boeing and Robinson.

In 2017, Plant 410 CA signed a MoU of cooperation with the world's leading American corporation Rockwell Collins, which allow to improve and expand the capacity of its aviation MRO business and create within the Company a European-standard service center for modern types of

aircraft and related equipment. We are open to various forms of cooperation, and are looking to take market leadership in the field of aircraft MRO.

DE: How did Plant 410 CA perform last year?

In 2017, Plant 410 CA fulfilled all its obligations under domestic and export contracts. Owing to the reforms put in place our Company finished the year with positive returns and besides that, continued with salary and wage increases for its employee staff.

DE: How is collaboration with domestic partners going? What kinds of projects are being pursued for civilian and military customers? What is on your Company's order book at present?

Being a state-owned company within the Ukroboronprom Defense Industries Group, Plant 410 CA is carrying out priority works for Ukraine's

defense-industrial sector, within the amount set by the Government Defense Procurement Contract. We have to handle a range of challenges imposed by time, especially with regard to looking for alternatives to replace Russian-sourced components. Working in a team with our strategic partner, the State Enterprise Antonov, we are gradually replacing these with alternatives offered by Ukrainian suppliers and worldwide leading aircraft manufacturers.

DE: Plant 410 CA has recently completed a contract, one of the biggest in the past decade, for the modernization of Indian Air Force's AN-32 tactical transport aircraft. What's the feedback from the Indian Customer? Has cooperation with India continued?

The Company has completed the overhaul and modernization of [40] An-32 airplanes (the Air Force's remaining 64 examples modernized in India – editor's note). Apart from having been overhauled, the airplanes have been comprehensively modernized to give them new and improved capabilities, and there is no negative feedback coming from operators of the airplanes regarding the quality of the work done. Plant 410 CA currently continues with its obligations regarding delivery of products required for upgrading the airplanes in the Republic of India. Considering high importance of cooperation with Indian partners, we continue to pursue a stronger presence in this regional marketplace.

DE: How is cooperation with other international partners growing? Which projects hold a promise of success and which have already been underway?

We are proud that the State Enterprise "Plant 410 CA" enjoys sustained external economic relations and cooperates effectively with aircraft MRO customers in a dozen countries around the world, most notably in Asia, but we are also developing relations with EU countries, among them Hungary. Especially noteworthy is

effective cooperation in aircraft overhaul and life extension for the defense and public safety customers of the Republic of Kazakhstan, conducted in 2017 in partnership with Ukroboronprom and Ukrspecexport, as well as overhaul and modernization of airplanes for the Bangladesh Air Force.

DE: In your opinion, what is the level of competition in the global aircraft MRO market? Can we compete successfully in this market?

In this market there is continuous competition in terms of product quality, diversity of the services provided, and convenience and reliability of service provision. So, we can see from the preceding comments that, with investment and modernization of enterprises, including staff and employee training, we would be able to reach a qualitatively new level of service provision; we have all the tools at hand needed for this strategy to succeed.

DE: What plans has the Company for future development?

This year, the Company is celebrating its 70th year in business, and it's a great opportunity to revisit our history and to think about plans for the future to enable further growth and development. The enterprise will pursue further cooperation with Ukraine's Air Force, the intensification of relations

with international partners, and the search for new, potentially successful business opportunities. In particular, the enterprise already has successful cooperation with Ukraine's leading air carriers and, on a parallel track, is setting up communication with foreign-country airlines operating from Kyiv I. Sikorsky In-

GENERAL INFORMATION

The State Enterprise "Plant 410 CA" has well developed industrial infrastructure, highly qualified employee staff, and modern production assets. This gives it the ability to provide a diversified range of services that include:

- overhaul repairs of An-24, An-26, An-30, and An-32 aircraft;
- life extension overhaul of Antonov-series airplanes;
- full range of maintenance for An-24, An-26, An 30, An-32, An-72, and An-74 airplanes;
- aircraft health monitoring and maintenance as required of An-74 airplanes;
- aircraft health monitoring and routine maintenance servicing of An-72 airplanes;
- re-equipment/re-configuration of An-26 and An 30 airplanes for cargo, passenger, and mixed cargo/passenger transport, and for executive/VIP travel;
- modernization of An-24, An-26, and An-30 airplanes for international flights (with installation of additional special equipment), in compliance with Customer requirements and design documents for a specific type of Antonov aircraft (including upgrade of avionics systems);
- modernization of An-32 airplanes with up to a 40-year life extension and replacement of avionics systems;
- upgrade of MI-8T helicopters to the MI-8MSB configuration by re-engining with Motor-Sich TV3-117VMA-SBM1V.



ternational Airport (f.k.a. Zhulyany Airport) regarding MRO of airplanes. The Company has advantageous location, sharing a runway with Sikorsky Airport. So, we invite air carriers and aircraft manufacturers to mutually beneficial cooperation. Our Company's time-proven motto has remained as it always was: We give a new lease of life to aircraft! 



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SPECTATOR-M UAV

SYSTEM CAPABILITIES AND APPLICATIONS

Vadym KUSHNIKOV for UDR

The use of low-payload unmanned aerial vehicles (UAVs) has been growing in importance and intensity over the recent years.

UAVs provide benefits in terms of life saving (zero risk to aircrews), extremely shallow learning curve for new users, stealth of operation, as well as low cost of operation and maintenance. UAV technologies hold a great potential for handling complex, diversified combat missions in a variety of battlefield and tactical scenarios.

Mini UAVs have been extensively deployed in conflicts of various intensities across the globe, where they proved to be especially effective in battlefield surveillance and reconnaissance roles. A wide variety of gimbaled and mission-independent payloads available for these platforms would expand their functionalities to include most particularly electronic warfare and signal intelligence. Besides, they can be configured for air-to-ground attack roles, but the choice of weapons payloads is limited by the

weight and size constraints inherent with these small factor UAVs.

The most commonly used payload packages for these platforms are optimized for conducting surveillance and reconnaissance for company-sized battlefield units; gathering battlefield intelligence; spotting artillery fire; sur-

veying oil and gas pipelines; monitoring border areas and the likes.

Spectator-M is a representative of this category of small-factor UAVs. It was cooperatively developed in 2014 by Politeko Aero, Kyiv, and the National Technical University "Kyiv Polytechnic Institute" to meet the re-





Spectator-M UAV Ground Control Station

quirement of the Ukrainian military's special operations forces, and has been commercially produced by Ukroboronprom Holding Company's Korolev Meridian JSC, Kyiv.

In 2014 at Honchariv test and training facility outside Chernihiv, Northern Ukraine, the Spectator-M UAV had its capabilities tested when on a flight. It proved its capabilities to search and find targets on the ground and to calculate their position coordinates; capture imagery for reconnaissance purposes, day and night and in all weathers; perform autotracking of targets; capture master images of objects, and to feed live footage to the command center. The tests proved that the Spectator-M is able to fly missions in sub-zero temperatures and to operate in low-light conditions.

The Spectator-M is a hand-launched, T-tail high-wing monoplane (parasol) constructed mainly of composite materials. For propulsion, the vehicle uses a low acoustic signature electric motor with a two-bladed propeller. In its standard configuration, the vehicle is fitted

with a video camera with an embedded digital storage. To meet specific customer needs, it can optionally be equipped with a still camera, a thermal imaging camera, and an exposure dose rate meter.



The Spectator-M is a hand-launched, T-tail high-wing monoplane (parasol) constructed mainly of composite materials



The UAV comes complete with a ground control station, batteries, an antenna and a transport backpack.

The mini UAV "Spectator-M" is operational with the State Border Guard Service, with 11 systems in service so far. These are employed for monitoring national borders, especially between Ukraine and Slovakia, Hungary and Romania. The Ministry of Defense has also showed interest, but has not gone farther than to accept the Spectator-M into service for the duration of the contingency period.

User feedback suggests that the vehicle conforms to its declared performance, especially in terms of flying speed and maneuverability, and the practicality of use. However, there have been some complaints about poor quality and insufficient resolution of the video camera payload. To eliminate these drawbacks, Ukroboronprom is planning further enhancements to the Spectator-M UAV technology to make it more apt for the missions assigned to it. **UDR**

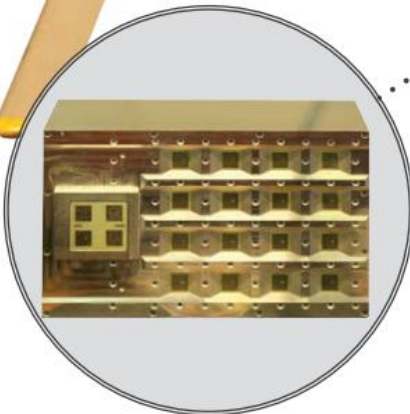
SPECTATOR-M KEY SPECIFICATIONS

Length, mm	1,295
Wingspan, mm	3,000
Maximum take-off weight, kg	5.5
Payload weight, kg	1.5
Airspeed, km/h	40 to 120
Air endurance, h	2
Max operational altitude, km	2
Max operational radius, km	30

VIGILANT GUARD



NPF Adron and Skynet Ltd have jointly developed an airborne Missile Approach Warning System to be known as RSP-1U Strazh



automatically trigger the chaff/flare dispenser to decoy the missile away from its target.

The RCS-1U comprises an S-band digital array radar sensor developed by Arsenal Factory, Kyiv. The radar is able to detect a 0.02 sqm RCS missile at ranges up to 2 km and can search 60 degrees in azimuth and 90+ degrees in elevation.

To maximize the probability of success, elements of the system would be mounted on the skin of a host aircraft in such a way as to create a full 360-degree radar envelope around it.

The RSP-1U product development has reached LRIP stage, to be followed by factory-level tests and official qualification trials.

As at this date, the RSP-1U has been successfully tested against the Iгла MANPAD missiles.

The Strazh is the most recent addition to Adron's family of airborne self-protection system products that include the Adros KUV 26-50 Airborne Countermeasures Dispenser System, the Adros KT-01/02 Electronic Warfare system, and the Adros ASH-01 exhaust infrared suppression device, which are all series produced for Ukraine's military customers. **UDR**

The R&D and Production Company "Adron" and Skynet Ltd are continuing their joint development of the RSP-1U "Strazh" (Ukrainian for "guard") airborne Missile Approach Warning System (MAWS).

The purpose of the RSP-1U "Strazh" development is to provide rotary- and fixed-wing aircraft with a self-defense against short-range, low-RCS missile attacks. The system would detect infrared signature of an incoming guided missile, alert the pilot, and

SKYNET Ltd. СИСТЕМА ПОПЕРЕДЖЕННЯ ПРО РАКЕТНУ АТАКУ РСП-01У "СТРАЖ"

Призначення: - виявлення факту атаки ЛА керованими ракетами;
 - оповіщення екіпажу про факт та напрямок ракетної атаки;
 - автоматичне приведення у дію системи викиду хибних цілей

РАДІОКАЦІЙНИЙ ДАТЧИК РД-01У

Основні характеристики

Діапазон робочих частот - "С"
 Зона миттєвого поля зору: за азимутом = 60°
 за кутом місця > 90°
 Максимальна дальність виявлення ракети (ЕПР 0,02 м² Рлт=10°) - до 2 км
 Інтервал дистанції видачі виконавчого сигналу на КУВ/АВ - 1200...400 м

For marine propulsion

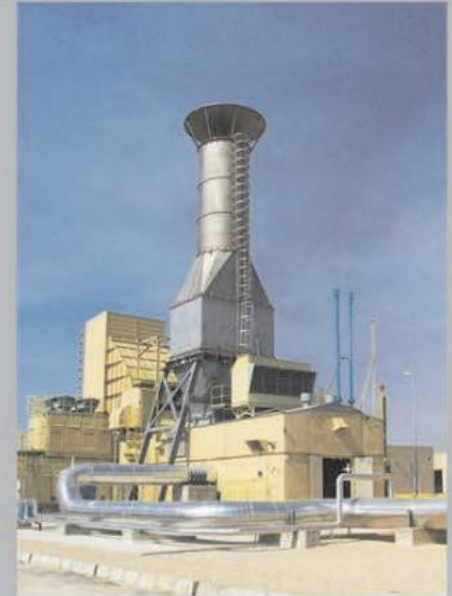


60 MW

45 MW

25 MW

For gas industry



16 MW

10 MW

6 MW

5 MW

3 MW

2,5 MW

For power generation



UKRAINIAN GAS TURBINES



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REVIVING AND REBUILDING THE UKRAINIAN NAVY

UKRAINE'S NAVY HAS BEEN TAKING PRACTICAL STEPS TO REVIVE ITS FLEET, WITH THE GREATEST POSSIBLE RELIANCE ON DOMESTIC RESOURCES AND CAPABILITIES

Oleksiy SERDUIK for UDR

As a result of the Russian annexation of the Crimean peninsula, the Ukrainian Navy has lost a lion's share of its maritime platforms. As a result, the fleet currently operates very few combatants, including its flagship frigate "Hetman Sahaidachny", with a limited number of support vessels. In this context, the country has to regenerate its naval capability almost all on its own, using domestic technological developments that could be of interest to potential export customers as well.



The Navy has developed a three-echelon structure for operational deployment of its future combat craft fleet, which takes account of the present context, the Navy's current operational status and the domestic industrial capacities. The three echelons will be deployed in (1) Ukraine's coastal areas (out to 12 nm offshore), (2) littoral areas (200 nm offshore), and (3) blue waters outside the Black Sea.

Some practical steps to revive the national naval capacity have already been made, with a key focus placed on building the so "mosquito" fleet.

To date, the Navy has been augmented with six Gyrurza-M class armored gunboats (four of which are now going through the testing and qualification process), and 12 more are due for delivery by 2020.

Beyond that, the Navy is expecting the delivery of the lead missile boat of the Project 58260 Lan' (Ukrainian for 'fallow deer') series, due in 2019. Lan' class boats will become the core attack element of the Navy's "mosquito" fleet. At least three Lan' series boats are planned for procurement, and two Centaur class amphibious assault craft are due to be finished and commissioned by the fleet in mid-2018.

The Navy is in dialogue with the United States for two Island-Class offshore patrol boats, which are planned to be reconfigured for underwater anti-sabotage and mine-countermeasure roles, and an investigation is being conducted into the possibility of procuring from foreign markets mine-hunter vessels, ultra-small submarines and other classes of ships.

The Navy is also expecting to continue construction of the Project 58350 flag-ship corvette Volodymyr



To date, the Navy has been augmented with six Gyrurza-M class armored gunboats, and 12 more are due for delivery by 2020

Velykyy, as ordered by the Cabinet of Ministers in November 2017. Most of the naval systems, armaments and equipments for the ship will be sourced from foreign suppliers.

The new ships for the Navy (except the Island-Class speedboats) are all developed by the State Research & Design Shipbuilding Center (SRDSC), Mykolayiv, and most of them will be built at the shipyard Kuznya na Rybalskomu, Kyiv.

The 54-ton Gyrurza-M Class armored gunboat was developed as a follow-on to the Project 58150 "Gyrurza" technology by SRDSC.

The range of missions for the Gyrurza-M could include security patrolling of littoral waters; river and lake policing; fighting small hostile ships; protection of off-shore infrastructures; support for sea-to-land and border guard operations; support for maritime safety; and reconnaissance and logistics support.

The armaments package for the Gyrurza-M includes two combat modules BM-5M.01 Katran-M supplied by Mykolayiv Machinery and Repair Plant. The BM-5M.01 Katran-M is a naval counterpart of the BM-3

Storm combat module that was originally designed for armored fighting vehicle applica-

tions. Each "Katran-M" module accommodates a 30-mm ZTM1 rapid firing gun, a coaxial KT 7.62mm machine gun, and two Barrier ATGM launchers, and a MANPAD system is additionally provided to defend against aerial attacks. Control of the weapons is performed with an EO fire control system.

Navigation is provided with the Kvant-Radiolocation Delta-M radar system. Other equipments include the small-to-medium caliber gun EO fire control system Sarmat and a laser warning sensor kit.

The Lan'-class fast attack boat has a top speed of 32 knots. It is equipped to perform surveillance of coastal areas and to fight hostile amphibious landing ships and corvettes. It has a range of 2,000 nm at 14 knots, which gives it the ability to conduct short-range tactical reconnaissance at sea, and to provide escort support for both civilian shipping and naval operations.

The main armaments, which will be sourced domestically and from imports, include 4x2 Neptune ship-to-ship missiles (currently under development), 57/76mm and 30/35mm cannons, and off-board countermeasures. It will be outfitted with different radar systems to deal with diverse frequency threats, and a combat information management system.

Seven Lan'-class boats, re-designed locally as TT-400TP Class, are operational with Vietnam People's Navy, of which four are fully-fledged missile →



Ukrainian Navy is expecting the delivery of the lead missile boat of the Project 58260 Lan' series. It will become the core attack element of the Navy's "mosquito" fleet.



The speedboat Centaur is designed for handling complex high-risk missions in littoral sea areas and river waters that involve Marine landing support and direct engagements with the enemy.

boats, while the other three are armed with 25mm 2M-3M cannons only.

The new armored Marine assault speedboat Centaur is designed for handling complex high-risk missions in littoral sea areas and river waters that involve Marine landing support and direct engagements with the enemy. Developed by SRDSC as an addition to its lineup of armored boats for international customers, the Centaur Class boats are now also built for defense and security organizations in Ukraine. If compared to the Gyurza/Gyurza-M Class armored boats, the Centaur has extended functionality for special missions. Combat craft in this category are currently needed desperately by the Navy for use in the Black and Azov Sea areas, as well as in major rivers.

Specifically for the Centaur, SRDSC developed a propulsion system with a Caterpillar diesel.

The Centaur can accommodate a full platoon-size unit, which is 32 Marines furnished with a full complement of small arms. This compares favorably with international counter-

parts, which usually have room for no more than 20 personnel. Troop dismount is possible either via the

upper deck or the landing ramp, which is accessible by internal passages under protection of steel armor.

Centaur is armed with an integrated machine-gun and grenade launcher module. To suppress enemy resistance during Marine landing operations the boat would be additionally equipped with a MLR weapon. This mobile MLR system could be assembled from COTS components chambered for the air-launched S-8 unguided rocket, which is also suitable for launch from helicopters like Mi-8, Mi-17, Mi-24 and Ka-29. There is also a system allowing fire to be conducted in single, two round or three round burst modes.

The SRDSC has a number of other projects of potential interest to the Ukrainian Navy. One such is the Corvette "Gaiduk-M". Designed and equipped specifically for operation in inland seas, it is built with the use of stealth technology to reduce radar signature, and is well equipped with everything necessary for its missions.

The 1,200-ton Gaiduk-M is designed to perform a broad range of combat missions. It is armed to en-

gage surface, submarine, aerial and shore-based threats, with armaments that include 2x4 antiship MM40 Block 3 cruise missiles, 8x1 Mica VL vertical launch air defense missiles, a 76mm OTO Melara cannon, an Oerlikon 35mm Millennium cannon, 2 x 12.7 mm machine guns and 2 x twin 324-mm torpedo tubes, with room also provided for 2 x RBU-type antisubmarine rocket launchers. The ship has a hangar and flight deck for a single helicopter not heavier than 8,000 kg.

The threat detection and surveillance assets include a SMART-S Mk2 three dimensional, multi-beam naval search radar and an OTH search radar.

AAW weapons control is enabled through the use of STING EO weapon control system and the TACTICOS Combat Management System. Electronic warfare suite is comprised of a radar jammer and console, and a countermeasure system against laser-guided missiles. Other systems include a bearing gyro compass, a counter-sabotage sonar, a navigation radar and an integrated bridge system. Lean manning (52 crew) is achieved courtesy of extensive automation.

The Ukrainian Navy, despite the current challenges facing it, is growing steadily, although not as fast as would be right in the present threat environment. Nonetheless, the process is definitely under way, and Ukraine's Navy will, sooner or later, become strong enough as to be able to protect Ukraine's economic and security interests in the Black and Azov Sea regions. **UDR**



Corvette «Gaiduk-M» is designed and equipped specifically for operation in inland seas. It is built with the use of stealth technology to reduce radar signature, and is well equipped with everything necessary for its missions.

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