Global success
Russian High-Precision Weapons Holding

In February of this year, the High-Precision Weapons Holding (a part of the Rostec Corporation) was celebrated the 10th anniversary of its work on the global market. Years by years Holding plays an increasingly important role on the world arms market. The holding is the Russian largest developer and manufacturer of the most modern and innovative high-precision weapons. The importance and potential of the Russian holding increase worldwide as well: On a scale of the top 100 weapons manufacturers in the world, the Stockholm International Peace Research Institute (SIPRI) rates the 'High-Precision Weapons Holding' from Russia at 39.

Also every year Holding is increasing deliveries both to the Armed Forces of the Russian Federation and to the foreign market. According to an SIPRI expert, 'the Russian companies ride the ground-swell of boosts in military spending and arms export. Eleven companies from the top 100 list are Russian ones. Their income has increased by a total of 48.4%'. It also can be noted that the 'High-Precision Weapons Holding' belongs to the top 10 world’s defensive rankings by an overall production and supply increase rate.

The High-Precision Weapons Holding was founded in 2009. The holding consists of a number of largest leading defense enterprises that are well known on the world arms market. It is sufficient only to mention such brands as the Shipunov KBP Instrument Design Bureau, the Tula Arms Plant, The Tulatotchmash, the Nudelman Precision Engineering Design Bureau, the Kovrov Electromechanical Plant, the V.A.Degtyaryov Plant, the VNII 'Signal' and others. Most of them are national and international leaders in their segments.

The products of the holding’s companies are well known on all continents and much sought after on international arms markets. Interest in the products of the 'High-Precision Weapons Holding' grows due to the objective situation.

The exports of the holding are based on warfare systems well known on the international market such as Pantsir-S1, Palma, Kornet-E/EM, Konkurs, Metis-M1, Igla-S, Arkan, Verba, Shmel, Kapustnik, and others as well as on training systems, armored vehicles upgrade, and so on.

The holding’s products are well known and much sought after on the markets in the Middle East, the Gulf, Northern Africa, Latin America, India, Central and Southern Africa. The holding is constantly expanding the geography of its exports. This is due to product line extension, development of new models and upgrade of products in demand as well as well thought-out service policy.

The holding invests much into the development of promising designs of weapons and military equipment, enhances and augments its development and production potential, and invests in the development of models of tomorrow.

It is evident that the demand for high-precision weapons only increases around the world. They do not miss. They are mobile, fast, maintenance-friendly, reliable, and the most modern.

(See page 2)
Global success
Russian High-precision Weapons Holding

Khrizantema-S
The Best All-Weather Antitank Missile System

Anti-tank missile system ‘Khrizantema-S’ can change the tactics of armored warfare: a small group of combat vehicles anti-tank systems have the power to change the outcome of the battle. Only three cars are able to conduct actions against 14 tanks and damage a minimum of 60 percent of the equipment. This missile system can also fight with low-speed air targets, helicopters and aircraft. Russian ‘Khrizantema-S’ is the most powerful anti-tank missile system of distant action that the world has ever known.

Khrizantema-S’ is designed to provide a very important role in combat missions. Destruction of fielded and future main battle tanks, including those protected with explosive reactive armor (ERA), small-displacement surface vessels, low-flying aerial targets, fortifications, manpower, under cover and in the open in the day- and night-time, under easy and difficult weather conditions, in the presence of dust and smoke. The ‘Khrizantema-S’ ATGW self-propelled system fielded by the Russian Army since 2005 remains the only weapon system of this category in the world capable of defeating main battle tanks and other armoured combat vehicles when the threat is not optically seen. No company in the world was able to implement an mm-wave radar detection and system controlling and guiding the missile through any battlefield obstructions be it smoke, haze, rain or snow. The developmental work according to Russia’s MoD design specifications had been carried out from 2014 to improve performance of the system by enabling it to detect and recognize threats (including non-radiocontrast ones) and guide missiles in this environment as well as with the purpose of integrating the combat vehicle within the framework of an automated battlefield management system for antitank forces. AO NPK KBM was nominated the main contractor for the work.

In addition to the radar channel, the initially fielded combat vehicle was outfitted with the second, laser-beam riding, control and guidance channel coupled with a daytime optical sight. The upgraded version replaced the daytime sight with a more advanced imaging infrared and television (IR/TV) sight featuring enhanced capabilities in terms of target detection and recognition ranges. The new sight ensures system operation in the night and in low-light-level conditions. The IR/TV sight comes complete with a laser range finder to ensure high precision at target ranging and automatic missile’s trajectory profiling. To increase the level of stealthiness in use of the laser beam-riding channel, the control system initially secures the missile’s trajectory above line of sight and descends the missile to the line of sight just near the target. Yet another essential novelty intended to improve combat efficiency of the ‘Khrizantema-S’ ATGW self-propelled system was introduction of an automated battlefield management equipment set (ABMES) for antitank forces. Thus upgraded 9P157 combat vehicle is provided with advanced communications means, a combined — inertial and satellite-based — navigation and orientation system, a terminal for receiving targeting data from the battery commander’s vehicle, their automatic processing, displaying tactical data on a digital map, receiving combat orders and instructions. The ABMES was developed by AO NPP T-123557, Moscow, Russian Federation.

The upgrade of the 9P157 combat vehicle entailed development of a new test equipment for the IR/TV sight (developed and manufactured by OAO Peleng JSC), a modified 1L52 radar control system (manufactured by PAO NPO Spectra public company, city of Tula); modification of 9M123 and 9M123F missiles (manufactured by FGUP FNPK PO Start) in terms of replacement of the former Ukrainian photodetector and installation of a more powerful warhead in the 9M123 missile, the 9V981 test equipment for 9P157 CV checks, the 9V945 test equipment developed and manufactured by Kalashnikov concern, city of Izhevsk) and 9V852 simulator (developed and manufactured by AO TSKB, city of Tula) for training CV operators.

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The Eurasian Air Show in Antalya, Turkey, the International Far Eastern Maritime Show in Vladivostok, ADAS 2018 in the Philippines and EDEX 2018 in Egypt were the International Far Eastern Maritime Show in Vladivostok, ADAS 2018 in the Philippines and EDEX 2018 in Egypt were

The ‘Khrizantema-S’ is most powerful antitank missile system of distant action that the world has ever known.

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Control of Artillery Fire

Artillery fire control automation is one of the principal business areas of All-Russian Scientific Research Institute Signal (VNI Signal, member of High-Precision Weapons Holding, Rostec Corporation). Application of Automated Fire Control Systems (AFCS) for self-propelled artillery guns (SPAG) and combat vehicles of multiple launch rocket systems (CV MLRS) drastically improves their performance, time of response and firing accuracy. The Mashina-M and Kapustnik-B Automated Fire Control Systems developed by the company for artillery units have gained an international reputation.

Realities of the modern world raise a demand for an alternative approach to the design of Control Automation Systems (CAS) for artillery units. There is a need to reduce system weight and size, enhance combat flexibility and maneuverability of command and control posts, standardize the systems components, simplify and shorten the training period for artillery unit executives, and to make the systems substantially more cost-efficient. At the same time, the combat characteristics of such systems must enable fulfillment of next to all artillery unit control tasks. This requirement has special relevance in design of the fire control systems for fire weapons that are not originally equipped with integrated automation equipment (mortar launchers, towed guns, CV MLRS).

VNI Signal extended the AFCS range by designing a portable CAES to control artillery and mortar units. The portable control automation equipment system for artillery units has been developed by VNI Signal JSC on the basis of the Strelets reconnaissance, command, control and communication system approved for delivery to the Armed Forces of the Russian Federation. As an improvement to the original system, VNI Signal JSC incorporated its inhouse software and mathware to meet the special application and computing needs of control of artillery units. Use of such systems will enable automatized control of artillery and mortar units not equipped with integrated automation equipment. In the meantime, the new systems are cost-efficient, low-maintenance and easy to master (the training time is short). The portable control automation equipment system for artillery units comprises individual standardized equipment sets for officers, equipment for communication, reconnaissance, navigation, meteorological and ballistic support.

The portable CAES improves combat performance of artillery, mortar and MLRS units through:

- system cost reduction without effect on the basic combat characteristics, significant standardization of equipment sets for officers;
- use of portable systems to control all kinds of artillery units;
- compatibility with a wide range of communication, reconnaissance, navigation, meteorological and ballistic support equipment, both domestically produced and imported;
- simplified process and shortened time of battery/battery officers basic training;
- rapid combat deployment of the equipment sets;
- uninterrupted control of the units even if any of control system components fails to operate;
- substantial reduction of time for preparation and performance of firing tasks;
- simplified maintenance and repair of the systems in both stationary and field conditions.

Vehicle of Three Elements: Land, Water and Air

The guided missile is a part of the anti-tank missile complex Kostr 821 M 9K111M which is intended to engage modern vehicles equipped with the mounted reactive armor, fortified fire emplacements, both moving or stationary surface and afflato targets, low flying helicopters at any time and weather conditions. The 9M115M missile is launched from a portable launching unit 9P133M-1. Main technical characteristics of the guided missile are indicated in the table.

9mm special assault rifle AS

The 9mm special assault rifle (index 6P50) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs. The assault rifle AK is designed to shoot a special 9-mm cartridge (SP6) and is intended for a noiseless and flameless shooting at a distance of 400 m. The assault rifle AR is intended to engage the enemy manpower wearing fragmentation bulletproof vests as well as the non- armored vehicles at a distance of 200 m. The design features of the assault rifle are: a magazine (quick ejector mechanism); a metal folding buttstock reduces the overall dimensions during carrying and allows to deliver aimed fire with a folded or non-folded stock; secret carrying is allowed due to the absence of projections on the assault rifle surface; assault rifle dimensions are the same as a submachine gun but the firing range and hitting effect of the assault rifle are considerably better; the safety presence assures a safe treatment of any of control items fails to operate; the assault rifle features a large number of standards and interfaces, including the national and international, which ensures the possibility of using components of the other military equipment to modernize and expand the existing reconnaissance, command and combat support systems. The combination of dart and bullet-type flying projectiles make the weapon adjustable in a wide range of military missions.

Tulsy Oruzheinik Zavod

Anti-tank guided missile 9M113M

The guided missile is a part of the anti-tank missile complex Kostr 821 M 9K111M which is intended to engage modern vehicles equipped with the mounted reactive armor, fortified fire emplacements, both moving or stationary surface and afflato targets, low flying helicopters at any time and weather conditions. The 9M115M missile is launched from a portable launching unit 9P133M-1. Main technical characteristics of the guided missile are indicated in the table.

9mm Special Sniper Rifle VSS

The 9mm Special sniper rifle VSS (index 6P29-1) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs. The rifle VSS is designed to shoot a special 9-mm sniper cartridge (SP5) and is intended for a noiseless and flameless shooting at a distance of 400 m. The main type of assault rifle shooting is automatic. A cartridge feeding is provided out of a detachable double-column sector magazine. The cartridges located in a chain-board order. The magazines are interchangeable. The rifle is equipped with a sniper optical sight.

9mm small-size assault rifle AM

The 9mm small-size assault rifle AM (index 6R5) is an automatic firearm, its automatic operation is based on the work of the energy of powder gases which leak out of the barrel bore to the gas chamber, barrel bore locking is provided with the bolt turning round its longitudinal axis at 6 locking lugs. The assault rifle AM is designed to shoot a special 9-mm cartridge (SP6) and is intended for a noiseless and flameless shooting at a distance of 400 m. The assault rifle AM is intended to engage the enemy manpower wearing fragmentation bulletproof vests as well as the non- armored vehicles at a distance of 200 m. The design features of the assault rifle are: a magazine (quick ejector mechanism); a metal folding buttstock reduces the overall dimensions during carrying and allows to deliver aimed fire with a folded or non-folded stock; secret carrying is allowed due to the absence of projections on the assault rifle surface; assault rifle dimensions are the same as a submachine gun but the firing range and hitting effect of the assault rifle are considerably better; the safety presence assures a safe treatment of any of control items fails to operate; the assault rifle features a large number of standards and interfaces, including the national and international, which ensures the possibility of using components of the other military equipment to modernize and expand the existing reconnaissance, command and combat support systems. The combination of dart and bullet-type flying projectiles make the weapon adjustable in a wide range of military missions.
Throughout its history KBP Instrument Design Bureau has been developing small-arms and gun armament as well as guided weapons for Land Forces, Air Forces and Navy. A large scope R&D work in respect of armament structure and its efficiency has been carried out. All that provided for development in 1980s the unique weapon system for the new IFV. In 1987 the new BMP-3 IFV was put in service with the Soviet Army. Exactly the original armament package of the BMP-3: BM-21 Grad, AT-11 Tochka, 2A72 autocannon (76-mm machine-gun integrated in a single module and an automated fire control system) developed for BMP-3 by KBP Instrument Design Bureau (Tula city) has become the hallmark in the world market and nowadays it is in service with many Armies worldwide.

The significant enhancement power foreseen in the course of the design of BMP-3 combat vehicle was implemented by KBP during the development of BAKHCHA-U combat module.

BAKHCHA-U combat module is designed for the engagement stationary and on the move of the wide range of targets: tanks, lightly-armoured vehicles, ATGWs, sheltered and unsheltered manoeuvre, air threats including helicopter and low-flying aircraft-type targets. During the designing of the combat module R&D work was carried out in the following critical directions:

• enhancement of firing range and power of guided and unguided projectiles;
• providing efficient operation by day and night in adverse weather conditions and conditions of smoke interference;
• automation of combat operation, decreasing the exertion of the crew in the battle;
• enhancement of detection capabilities of the crew due to modification of the surveillance and sighting system;
• providing for efficient repelling of the assault of helicopter- and low-flying aircraft-type air threats, as well as efficient engagement of drones.

Providing autonomous combat operation in the whole range of combat situations and separate stages of the battle – during fire preparation before attack, assault, repelling the counter-attack, including firing from enclosed positions.

Enhancement of the armament system performance parameters.

The set tasks were solved under the conditions of severe restrictions, since it was critical not to increase the weight and size specifications of the vehicles.

Weaponry composition of BMD-4 airborne assault vehicle.

• Armament: 100-mm 2A70 gun-launcher, 30-mm 2A72 autocannon, 7,62-mm PKTM machine-gun installed in one module; Unified automated round-the-clock fire control system integrated with guided weaponry, comprising:

• Combined day and night gunner’s sight with independent two-plane two-dimensional stabilization of the field of view with visual, IR, range-finding channels and a missile guidance channel;

• Panoramic commander’s sight with independent two-plane two-dimensional stabilization of the field of view with IR and range-finding channels;

• New weaponry stabilizer with increased aiming speed and accuracy;

• Digital ballistic computer with system of sensors;

• Control unit;

• TV/IR-autotracker;

• Electric automatics system;

• Ammo load: 464 pcs of 30-mm APDS, AP tracer, HEF incinerating projectiles, 2000 pcs of 7,62-mm rounds, single autocannon for HEF and guided projectiles contains 4 pcs of 100-mm guided missiles SUBLIZ-3 ‘Arkan’, 34 100-mm HEF rounds SUDOPH-1 with high-power HEF projectiles of enhanced firing range.

The new armament system is an integrated combat module. The solution of the set tasks with the implementation of new design solutions has enabled to create the module design of the armament system: the armament can be used as one integrated system in ‘BAKHCHA-U’ combat module for equipping light-ly-armoured combat vehicles BMP-5, BMD-5, BMD-4, 8RT-90, or as separate units.

In ‘BAKHCHA-U’ combat module the following technical solutions have been implemented regarding the FCS, guided and artillery weaponry:

Fire control system

Due to the introduction of the head mirror unit into the sight the range-finding, IR, visual channel and guidance channel were united in one module and highly-precise two-plane stabilization of the LOS was introduced.

Highly-precise two-plane stabilization of the head mirror enables to detect the target at distant ranges on the move and to reliably track the target automatically or manually.

The range-finding channel of the sight is integrated with the range-finding in one module enables to measure the range to the target with frequency 4-5 Hz, which it enhances the efficiency of engagement land, and, especially, aerial targets.

The angle of divergence of the range-finding channel has been decreased by two times and the integrated design of the unit provides for the misalignment value between the optical axes of the range-finding and visual channel not exceeding 0.1 rad throughout its whole lifespan without the implementation of any adjustment assets, which provides for accurate range-finding and jamming-proof operation of the range-finder.

Better specifications of the visual channel and lesser LOS stabilizing errors have enhanced the accuracy of target tracking, especially of those moving.

The issue of limited capabilities of the commander regarding target search and identification and taking over for the gunner was resolved by introduction of the panoramic commander’s sight with two-plane independent stabilization of the FOV into the FCS. This has enabled the commander to search and detection of ground and aerial targets on the move at elevation angles of up to 60 degrees, with maximal angular velocity of the LOS increased up to 26 degrees per second, providing for the increase of the amount of targets detected by the combat vehicle by 2.5 times, increase the accuracy of the target designation to the gunner by 10 times, providing for accurate target designation by the electronic channel, not only in the traversable channel, but also in elevation channel, to completely take over for the gunner and to engage aerial targets in automatic mode.

The FCS provides for complete taking over of the system for all arms by the commander by day and at night, including guided weapons using the thermal image of the target, shaped by the IR channel of the gunner’s sight, on the commander’s screen.

• Autotracker united with the IR channel of the gunner and TV channel of the commander enables to increase the firing efficiency due to high precision (0.05-0.1 Russian mils) of aerial and ground targets tracking, as well as to rule out the influence of the psycho-physical state of the operator and his skills on the firing results.

The tracking precision became a technical specification not depending on the qualification of the operator and stress conditions in the combat environment. Autotracker provides for enhancement of accuracy of target tracking when compared to manual tracking.

The new armament system of BMD-4 new 183BM3 digital ballistic computer automatically generates accurate firing settings, enabling to program or reprogram almost endless number of ballistic. Significant increase of the automation accuracy with all types of projectiles is provided due to original firing algorithm, which optimally takes into account all the factors of firing: range to the target (either taken by the rangefinder or fed manually), speed and direction of target, vehicle and target movement, wind speed, temperature and air pressure, taking care of the time period when the projectile muzzle velocity from normal value, target elevation, roll and pitch angles, projectile angle of impact.

• Efficient range of firing with 30-mm projectile of the autocannons increased from 1100-1400 m to 1800-2000 m.

• Significant increase of the AD firing efficiency of BMD-4: the kill probability of typical helicopter-type and low-flying aircraft-type targets increases drastically and approach approaches the value of such specifications of SHORAD ADMS with significant decrease of the ammunition load spent on a single engagement. Thus the AD capabilities of the IFV are added without additional expenditures, making the IFV a versatile weapon.

• The control of the FCS specifications is carried out by means of built-in test system.

Armament

The new BMP-3 and round HEF 100-mm 30-rounds GM were designed, which, as compared to a standard round, provided the following:

• Engagement of ERA-protected targets;
• Increase of armour penetration from 350 up to 750 mm;
• Increase of firing range from 4000 up to 5500 m;

The fighting compartment ensures firing from a stationary position, on the move, afloat, by day and night under all weather conditions, including smoke interference. The AD equipment systems were introduced.

In order to expand artillery capabilities of a fighting compartment the new 100-mm HEF round with enhanced fragmentation action was designed and taken into service with the Russian Federation Armed Forces. The new round, as against a standard shell, provided the following:

• Firing range increase from 4000 up to 7000 m;

• Enlarged fragmentation effect area up to 560 m² (by two times) at impact burst and up to more than 600 m² – with proximity action;

• Precision ballistics due to increase of muzzle velocity stability and projectile weight stability: projectile weight variation is within one weight zero mark (BMP’s projectile has 9 weight zero marks).

Installation of the new Bakhcha-U fighting compartment boosts fire power as compared to standard fighting module and preserves weight-and-size properties of vehicles and their propulsion performance: speed of movement on the ground and water, cruising range, buoyancy reserve.

A CV with FC becomes high-efficient multi-mission mean fulfilling tasks assigned not only to an IFV, but to light tanks, artillery, an ATGW and an AAG. The BMD-4-M1 (BMD-2) has successfully passed firing trials. It can be mounted on other carriers with corresponding dimensions and carrying capacity and was taken into service with the Russian Federation Armed Forces as a self-contained weapon.

In conclusion, the new 100-mm Bakhcha-U fighting compartment enables BMD-4 to outperform standard BMD-3 in combat efficiency by 3-4 times.

The unified combat module of BMD-4 and BMD-2 was successfully passed firing trials. It can be mounted on other carriers with corresponding dimensions and carrying capacity and was taken into service with the Russian Federation Armed Forces as a self-contained weapon.
The specified systems have passed a number of trials at shore positions as well as comprehensive ship tests. At present, the systems are mass produced and used on a number of ships in Russian Navy as well as exported abroad.

High efficiency of killing anti-ship missiles is ensured owing to the following peculiarities of the systems:

- modular design (1 command module and up to 6 fighting modules depending on the ship type) allows flexible arrangement of its protection;
- combination within a single turret mount of missile and artillery weapons and a radar-optical weapon control system all ensures an increase of firing accuracy due to elimination of errors related to deformations of the ship’s hull when the weapons and weapon control system are installed at different places aboard a ship as well as elimination of restricted destruction of anti-skip missiles by firing missiles at them at different ranges, and under close – range as well as under armorment. Successive fire at a target with two missiles decreases on the most advanced systems of Russian Navy.

From Kashtan and Kashtan-M – to Pantsir-ME

The Pantsir-ME, Kashtan-M (code name Pantsir-M) and Kashtan-M (code name Pantsir-M) systems.

Basic line of modernization:

- use of a command module with its own 3D search radar (SR), which allowed for decrease of final targeting time by 2 times;
- expansion of engagement volume in range and in altitude of SAM;
- capability of salvo firing at high threat targets by two SAMs allows for destruction of high-threat targets with 0.96-0.99 probability;
- use of a thermal-imaging system along with a TV-optical system of target tracking allows for increase of system application range;
- use of the artillery weapon based on the GSh-6-30KD AA automatic guns with increased muzzle velocity up to 960 m/s for the HEF round and up to 1100 m/s for the APDS round enhances firing accuracy and target kill probability owing to reduction of the minimum passimissile safe kill range of the missile. The aforesaid is ensured owing to detonation of the anti-ship missile warhead when fired by the APDS round. Reduction of the anti-ship missile minimum killable safe distance up to 300 m allows the artillery system with the 10000 rds/min rate of fire engage in the automatic mode up to 5 – 7 anti-ship missiles (before ammunition is expended) that approach from the same direction at 3 – 4 sec intervals (e.g. the Goalker system can fire targets at over 6 sec intervals);
- reduction of the response time owing to the increase of speeds and accelerations of the missile-guns mount laying;
- improvement of the system reliability by 2 to 3 times as well as enhancement of the operating specifications of the system components through reduction of number of control posts input, and use of modern hardware components.

The results of the modernization:

- the killing potential of the Kashtan-M system per time unit increased by 4 – 5 times as compared to the Kashtan system; the killing potential of the Pantsir-ME system increased by 2.5 – 3 times as compared to the Kashtan-M system;
- use of the target tracking radar with the phased-array antenna and the SAM with 20 km range within the Pantsir-ME system ensuring firing capability of 4000 t (code name Pantsir-M) and Kashtan-M (code name Pantsir-M) systems.

Russian modern tanks, including those going for export, have that disputable advantage over other countries’ tanks of having guided weapons system. Thanks to it, the effective range of fire of the T-90S, T-72B, T-72S, and T-80U tanks equaled the aimed fire range of 5,000 m. The guided weapons system fire SUBK2O, SUBK14F1, SUBK12F1, and SUBK20F1 missiles armed with tandem shaped and fragmentation warheads. All of them are produced at the Detyyarov Plant in Kovrov. Prior to the start of trials, the system passed a number of tests conducted effort with GosNIImash (State Scientific and Research Institute of Machine-Building, Dzerzhinsk, Nizhny Novgorod Region) developed the SUBK20F1 project to carry the 5M919M1 high power HE missile. Its significant increase in damaging effects is accounted for by the fact that the 9M119M has a modular warhead of an HE unit at the bottom and additional fragmentation unit in front, both arranged along the axis of the missile. Large-yield explosive warheads in the warhead made the charge 2.5 – 3 times superior to any existing warheads at the time. The项目3000 has dropped from 5,000 m to 5,350 m, it still corresponds to the range of starting a fire combat on a flat terrain and is as far as most of foreign AF assets reach today.

3UBK14F1 with 9M119F1

The year of 2019 marked the 58th anniversary of the RPG-7 – the weapon is still among the most advanced AT systems in close combat. Its specific feature is that it was the first among light anti-tank weapons (LAWs) to adopt the rocket-propelled solution for grenade launching. While the system was developed at Bazalt, the RPG-7 originated at the OKB-575 design bureau in Kovrov. Its mass production was also set up there. It is effective, reliability, and simplicity in operation made the RPG-7 a name among LAW capabilities. A range of new rounds for the grenade-launching system made it effective not only against a tank, but also enemy infantry, his personnel in buildings and field shelters. The weapon also poses a threat to enemy “ammunition and POL depots. New projectiles for the RPG-7V, with greater weight and ballistic features changed to a certain extent, required the weapon to be upgraded. For better handling properties, the RPG-7 got a removable bipod. Its sight- ing decisions also needed some work on them: the optical sight, dubbed PGO-7VZ, as well as iron sights received a new range dial.

RPG-7V
New-generation Russian armoured vehicle

The success in military operations in today’s conflicts often depends on the mobility of military formations, in some cases, this eliminates the possibility of the battle. High maneuverability of small units, especially when moving across broken country with water barriers, could be provided by an armoured fighting vehicle that negotiates the obstacles on the fly, without advanced preparation. And it was the vehicle that was developed by the designers of the Special Design Bureau of Machine Building (KBM) and specialists of the Kurgan Design Bureau (Kurganmashzavod) having created the developmental prototype of BT-3F armoured fighting vehicle on of the BMP-3 infantry fighting vehicle chassis.

In the first instance, Kurgan designers sought to lay high level of protection into the new vehicle. Great attention was paid to qualitative improvement of the characteristics of habitability and ergonomics. The basic parameters of mobility and unification with the base vehicle were kept. The BT-3F armoured personnel carrier inherited high protection from the BMP-3 against both conventional and asymmetric attacks, as well as against dispersion from a nuclear explosion, which makes it possible to use these vehicles together in combat missions.

The SETS16U remote-controlled weapon station mounted on the BT-3F with the 12.7 mm ‘Kord’ machine gun is equipped with the TV-thermal imaging sight with the laser rangerfinder. It is indispensable for combating light armored targets and weapons, the destruction of the enemy’s manpower. It is essential for fighting soft targets and fire units for destruction of enemy fighters. By the way, the video surveillance system provides the all-round view of the area, while the image is displayed on the driver’s and mounted troopers’ video and vision devices. Due to the use of units and assemblies of serial production of the BMP-3 IFV, being in service for a long time, in the design of the armored personnel carrier being in service with the, the new BT-3F can be introduced into the serial production at the Kurganmashzavod in short time, without actually carrying out preparatory work. And there will be no problem to train the crew having experience of the BMP-3 and BMP-IFV operation.

This circumstance makes it possible to name those states as the most promising foreign markets of BT-3F vehicles which already have the BMP-3 IFV in service. Of course, the BT-3F amphibious armored personnel carrier manufactured by ‘Kurganmashzavod’ JSC will occupy its niche in the global arms market, where the Russian offer is traditionally strong.

Verba: Best of the Best

The Russian man-portable air-defense system (MANPADS) ‘Verba’ – is weapons of the new generation, a unique and second-to-none design. ‘Verba’ has been developed by the ‘Engineering Design Bureau’ (KBM). The Verba MANPADS was unveiled at the Army-2015 International Military-Technical Forum in Kubinka (Moscow region, Russia's last fall). Due to its performance and capabilities, this MANPADS is superior to all comparable foreign counterparts in use.

The man-portable air-defense system is intended to be fired by one person. The maximum range that can be achieved is the well-known ‘Igla’S’ system. Even though the new MANPADS looks similar to its predecessors, this is a fundamentally different weapon with new performance. ‘Verba’ can successfully engage not only traditional air targets – aircrafts and helicopters – but also targets with low thermal radiation, such as cruise missiles and drones.

Its main advantages from the predecessor are substantial. For the first time, the multispectral optical heating-seeking head (the three-spectral optical sensor) was used.

Three sensors constantly recheck each other, which enables faster discrimination between appropriate targets and decoys, and decreases the chance of disruption from countermeasures. The seeker automatically ‘selects’ decoys and concentrates on the proper object, even though its thermal radiation is lower. However, this is an object to engage. The sensitivity of the seeking head is increased eightfold. The track initiation and air engagement area increased respectively, namely by 2.5 times compared to the ‘Igla’S’ MANPADS. The seeker’s horizon is 3°.

The system is equipped with the ‘Maugli-2’ night sight. The new engine of the missile enables the shooter to hit a target at a distance of 6 kilometers. The minimum engagement altitude is 10 meters; the maximum engagement altitude amounts to 5.5 kilometers. The weight of the launch installation with a battery and a loaded missile only amounts to 17.25 kg.

Those are second-to-none defense technologies. According to Valery Kashin, General Designer of KBM, the missile is ‘completely digital’ and hermetically sealed. The materials used for its production are not sensitive to aggressive media. In flight, the missile is controlled off-line. The self-guidance system has been designed in such a way that the missile can deceive the missile protection system of the targets. The shooter only has to pull the trigger. The missile will do the rest. The identification friend-or-foe system significantly reduces the risk of shooting down the friendly aircrafts.

The ‘Verba’ MANPADS can be fired not only while held on one’s shoulder. It is intended to mount ‘Verba’ on ships and helicopters. From the very beginning, the ‘Verba’ MANPADS was developed with consideration for an opportunity to use it on another armored vehicles.’

In its tactical and technical characteristics, the ‘Verba’ MANPADS is superior not only to the Russian systems such as ‘Igla’, ‘Igla’S’ currently accepted into service but also to its foreign counterparts such as the American ‘Stinger-Block-I’ and the Chinese ‘QW-2’. ‘Verba’ is superior to the American MANPADS in all indices.

BUR small-size system

The rocket-assisted grenade launchers earned a reputation of convenient, efficient and popular close range engagement asset. Further, the introduction of various types of warheads has considerably broadened their application range.

KBP Instrument Design Bureau have been over a long time involved in the searches aimed to extend the firing range and enhance accuracy of grenade-launching (flamethrower) system rounds, as well as increase the payload relative to the total weight of the weapon.

The R&D resulted in rocket-assisted infantry flame-thrower of increased range and power with thermobaric warhead (RPO PDMA), adopted for service with Russian Army in late 2003. Further, based on the design of RPO PDMA-K, KBP developed a small-size grenade-launcher system (SGLS) ‘BUR’.

The small-size grenade-launching BUR is intended for:

• engagement of manpower in urban enviroment, inside buildings, fortifications, as well as exposed on various terrain (including mountainous areas);
• inactivation of soft-skinned and lightly armoured vehicles.

The system allows firing from limited space rooms. The system ensures reliable firing within the whole operational temperature range: from minus 40°C to plus 60°C and in adverse conditions.

While developing the SGLS the designers managed to create a highly accurate rocket assisted grenade launcher allowing effective engagement of wide range of targets depending on the mission scenario at ranges up to 650 m. To guarantee high accuracy of firing a ‘reactive-active’ grenade propulsion principle was introduced, since standard methods, e.g. increase of the booster motor power or employment of sustainer motor running during the flight, lead to increased size and weight of the weapon or higher dispersion respectively.

The ‘reactive-active’ propulsion principle implies jet thrust acceleration of the grenade placed in a barrel fixed to the jet engine and simultaneous active acceleration in the moving barrel due to gas bleeding from the engine chamber. Further, the barrel and engine stop, inducing additional acceleration to the grenade. Thus, the energy induced to the grenade is increased (doubled) and accordingly grows the muzzle velocity compared to that of the conventional design grenade launchers with similar container length. However, high grouping of shots is maintained.
New capabilities of antitank guided weapons

Development and manufacture of antitank guided weapons have been carried out for half a century all over the world. Within this period these guided missile systems have turned out to be in the forefront and through popular type of high precision weapons due to combination of such advances as simple operation, reliability, pin-point guidance and affordability. High popularity of antitank guided weapons is primarily explained by their ability to cause damage to the enemy that shall be crucially higher than friendly force expenditures. In fact one-two antitank guided missiles can be devastating for enemy forces being by ten or even hundred times lower than that of MBT.

Initially antitank guided missile systems were developed to fight tanks. However modern battlefield scenario has greatly changed – large-scale hostilities between tank armies has given way to scattered fights in local conflicts. And on this new battlefield ATGW have appeared to be an attractively effective not only against MBT but also against other small-size targets including lightly armed and soft vehicles, cars, fortifications, manpower, enemy infrastructure, fire points and snipers.

The Kornet-E weapon system developed by JSC ‘KB Kornet′ has created the Kornet-Е/ЕМ and to solve the above tasks, JSC ‘KB Kornet′ has created the Kornet-Е/ЕМ which allowed to realize ‘fire and forget’ or ‘fire, see and adjust’ principles without using a seeker onboard the missile due to alternative solution to have a target automarker added to the ground-based equipment installed on board the vehicle. This approach allowed to transfer seeker functions from an ‘expendable’ part of the weapon system into its ‘constant’ multiple-use part.

Machine vision plus the target automarker increases target tracking accuracy by 5 times compared to the previous ATGW generation and thus provides for high fire accuracy at ranges up to 10 km.

The major modernization of the PKMs (the PKM and PKM-S) was done at the 57th PCKP. As a result of the modernization, the PKM improved its combat effectiveness. The PKM can shoot both from a standing and a prone position at a distance up to 1.5 times longer and thus is more effective than the PKM-S.

The second major improvement is the introduction of a new 7.62 mm 7.62 mm Pecheneg machinegun (6P41N). The modernization of the PKMS includes the introduction of the new 7.62 mm machinegun 7.62 mm Pecheneg (6P41) Kalashnikov Infantry gun, which was developed as a second-generation machinegun. It has a new type of a breech mechanism, which ensures rapid loading of ammunition. The new 7.62 mm machinegun is designed to provide high accuracy and fire rate. It is capable of firing up to 800 rounds per minute. The new machinegun is a compact and lightweight design, which is suitable for infantry use. The 7.62 mm Pecheneg machinegun is designed to be used in a variety of roles, including firefighting and close combat. It is also suitable for use in both urban and rural environments.

The KORD is unique. It is the world's most powerful and mobile weapon system. It has a high rate of fire (up to 700 rounds per minute) and a long-range. It is designed to be used as a single weapon or as a part of a larger weapon system. The KORD is capable of engaging targets at ranges of up to 7,000 meters. It is a highly accurate weapon system, with a high probability of hitting a target.

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The military equipment and arms created at the enterprises of High Precision Weapons holding are actively applied in different regions of the world.

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- Kyrgyzstan
- Moldova
- Russia
- Tajikistan
- Turkmenistan
- Ukraine
- Uzbekistan

Near and Middle East
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- Iraq
- Jordan
- Kuwait
- Oman
- Syria
- UAE
- Yemen

Africa
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- Egypt
- Ethiopia
- Gabon
- Ghana
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