HIGH-PRECISION WEAPONS

12+

Rostec

High-Precision Weapons Holding

Special Edition №01, 2017

EXHIBITIONS 2017

The largest world defensive exhibitions in which the enterprises of High-Precision Weapons holding complexes participate in 2017

IDEX-2017

February 19–23

United Arab Emirates

LIMA-2017

March 21–25

Malaysia

IMDS-2017

June 28 — July 02

Russia

MAKS-2017

July

Russia

ARMY-2017

August 22–27

Russia

INTERPOLITEX 2017

October 17–20

Russia

Gulf Defense & Aerospace 2017

December 12–14

Kuwait

JSC 'High Precision Weapons' the leading Russian designer and manufacturer of wide variety state-of-the-art military and special equipment, including but not limited to land systems, small arms, air close and short range defense systems, is now opening new business opportunities for partners.

Moscow-based and ranked among top 50 global producers of military equipment by SIPRI chart, JSC 'High Precision Weapons' is legally authorized since November 2016 to provide full spectrum of maintenance and overhaul, modernization and upgrade works and services worldwide.

High Precision

The Most Innovative Weapons in the World

Russia has been famous for its weapons. In the 21st century Russian high-precision weapons sets the fashion in its class. Main developer and manufacturer of such weapons — High-Precision Weapons Holding (a part of the Rostec State Corporation). The work of the enterprises of the holding to ensure existing export contracts and the conclusion new is being conducted almost constantly. There is every reason to believe that results of 2017 will surpass last year's figures, when the High-Precision Weapons recorded the high efficiency of their foreign economic activities.

High-Precision Weapons 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.

Such a success (the holding did not belong to the world's top 100 weapons manufacturers before) can be explained by 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.

A few historical facts about the company.

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 JSC Shipunov KBP Instrument Design Bureau", the "Tula Arms Plant", "Tulatochmash", the "Tactical Missiles Corporation", the "Nudelman Precision Engineering Design Bureau", the "Kovrov Electromechanical Plant", the "V.A. Degtyaryov Plant", the All-Russian Scientific Research Institute "Signal", and others. As of today, there are 19 companies joined in the holding. 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", "Konkurs", "Metis-M1", "Igla-S", "Arkan", "Verba", "Shmel", "Kapustnik", and others as well as on training systems, armored vehicles upgrade, and so on (for more details, see this issue of the newspaper "High-Precision Weapons").

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.

(See page 3)

HIGH-PRECISION WEAPONS Rostec IDEX 2017

PALMA & SOSNA

PALMA designed to defeat all types of air attack weapons, including antiship missiles flying at low and extreme-low altitudes at close approaches to the carrier-ship. System SOSNA is intended to protect army units in any form of combat including on the march against all types of air attacks and reconnaissance means diving and flying at low and extreme-low altitudes.

Combined armament consisting of specially de-signed SOSNA-R high-speed precision-guided laser beam riding missiles and two AO-18KD rapid-fire cannons. This combination provides for a layered air defense against the adversary's air attack weapons in the area of responsibility of the system. Unique specially designed multichannel automatic all-weather day/night optoelectronic control system of high precision. Armament and surveillance and target designation radar are installed directly on artillery mount on "the same axis" to exclude the errors caused by ship strains. Automatic, semi-automatic and inertial operating modes.

SOSNA's system construction is based of new small-size highly effective air defense guided missile and new high-precision ECM-protected optronic control system. The missiles and optronic control system are installed on the turning unit (mount) with gears for laying of two packages of missiles in containers. 12 SAMs are ready to launch and placed compactly enough on a launching mount owing to small weight and dimensions of missiles. The turning part is made as firing compartment which can be mounted on various carriers (load-carrying capacity more than 3.5 tons).

Structurally the firing module is comprised of an artillery mount with gear system and optronic control system. As armaments of firing models are used two AO-18KD rapid-fire modernized cannons guns with linkless ammunition feed, increased projectile muzzle velocity and with essentially increased service life, and also highly effective eight SOSNA-R light hypersonic SAM.

SAM SOSNA-R has two stages and consists of march stage (shell) and droppable solid-propellant low smoke booster that has short working time. The missile has canard configuration and two-channel aerodynamic guidance configuration that is realized by two pairs of orthogonal aerodynamic control surfaces. SOSNA-R missile is deployed in a launcher container. It is maintenance-free. The missile is launched for the container.

The missile is rolling during the flight. Initial rotating is received during its movement inside the container, during the flight the rotating is continuing due to wing unit. To control the rolling missile, gyroscope measures missile attitude position by list. The combined control system is used for missile guidance. On launching trajectory – a smoke-protected radio command system that is function in radiolocation mode. At High-precision guidance of march phase is realized in laser information field received by photodetector that is installed in the missile back end. The missile munitions includes blast warhead, rod-fragmentation warhead, impact fuse and laser noncontact target sensor with continuous radiation.

The optronic control system of PALMA ADMGS ensures the target detection, automatic acquisition, tracking, measuring of angular coordinate and distance, and also laying of an information field of laser-beam control channel to the target at any time in the conditions of jamming and natural noise.

Optronic control system consists of gyrostabilized platform with two-channel stabilization and guidance system, TV system, thermal imaging channel, thermal imaging channel of missile direction finder, missile control laser-beam channel, laser range finder, digital computer, automatic control unit for target and missile acquisition and tracking, stabilization and guidance system equipment, display and control equipment.

Main advantages of PALMA ADGMS:

1. Combination of high combat performance, rather low cost and jamming immunity, hiding operations, impossibility of the system destruction by antiradar missiles.

2. High firepower attained as a result of a merger of two factors: short flying time of the missile to the target and the ability of the gun mount to conduct rapid fire.

3. PALMA ADMGS and SOSNA ADMS have two common structural components: SOSNA-R SAM and Optronic control system.

JSC «Kovrov Electromechanical Plant»

Kovrov Electromechanical Plant is exhibiting its traditional products at the exhibition Idex-2017 (Abu-Dhabi, UAE):

- Electrohydraulic systems of stabilization and guidance,
- Drives for control of complexes of different purpose,
- Navigation and gyroscopic devices for topographic positioning system of objects, as well as new articles.
- Development of a range of remotely controlled vehicles for antiterrorist forces and operation in the condition hazardous for humans.
- Combat module with remote control CMRC «Arbalet-DM» produced by a Russian company "Oruzheiniye Masterskiye", where KEMP is the main subcontractor for the development and production.

Traditional products are represented by multimedia facilities, and new projects are made in the form of 3D models. Arbalet-DM is represented as a working model in the scale of 1:3.

CMRC «Arbalet-DM» is accepted in the Russian Army. It can be installed almost on any armored mobile machinery, stationary objects. KEMP suggestion is to mount it on remotely controlled machines. In 2016 CMRC «Arbalet-DM» was shown on the basis of Tiger armored vehicle on the Victory parade on May 9. The main purpose is to provide combat machinery with high-precision destructive equipment at simultaneous gunner protection from enemy's fire. It is located inside of the armored vehicle. The specialists pay attention to the high combat characteristics of the article, as well as its reliability and efficiency.

HIGH-PRECISION WEAPONS

«HIGH-PRECISION WEAPONS»
Corporate edition of JSC NPO
«High-Precision Weapons»

Project manager:
Irina Galkina

Managing directors
of the project:
Natella Nikulina
Valery Stolnikov

The newspaper is prepared
with participation Industrial
Weekly newspaper

Design and imposition:
"The united industrial edition"

By preparation of the
Vysokotochnye Kompleksy
newspaper materials are
used the press services of the
enterprises entering into
«High-Precision Weapons»

Edition address:
Kiyevskaya St., 7
121059, Moscow,

Phone: +7 (495) 981-92-77
Fax: +7 (495) 981-92-78

www.npovk.ru
i.galkina@npovk.ru

Kornet-EM

New Capabilities of Antitank Guided Missile Systems

Antitank guided missile systems (ATGM) have been developed and produced globally for already half a century. Since then they became the most popular and wanted type of high precision weapons (HPW) thanks to their usability and relatively low cost. ATGM systems today are not just a specialized anti-tank weapon, they are also efficiently used to engage a wide range of other small dimension targets like lightly armoured and soft-skinned vehicles, various fortifications, manpower and elements of enemy's infrastructure.

The IIIrd generation Kornet-E system developed by KBP and adopted in 1998 features a laser beam riding guidance system. It was the first ATGM system completely jamming proof and capable of firing on the move. As of today the Kornet-E ATGM system with a firing range of 5500 m is the most state-of-the-art specimen of multipurpose tactical short range weapon system which uses missiles with tandem shaped charge warheads for engagement of primarily heavily protected targets (tanks, pillboxes and the like) and missiles with high explosive warheads for engagement of a wide range of targets posing threat on a battlefield.

A future ATGM system must be a versatile defensive-offensive guided weapon, whose portable and combat vehicle transportable modifications ensure a wide range of applications in close range tactical zone in various combat environments.

A KBP-designed versatile Kornet-EM ATGW meets the latest requirements to a future ATGM system. Its state-of-the-art engineering solutions endow Kornet-EM system with a series of new qualities.

The use of technical vision with automatic target tracker makes it possible to exclude an operator from missile guidance process and in fact implements the "fire-and-forget" principle without using expensive seekers in the missile. This gives a 5-times increase in accuracy of target tracking during real combat use and high hit probability at any system operating range which is twice higher than that of the Kornet-E ATGM system.

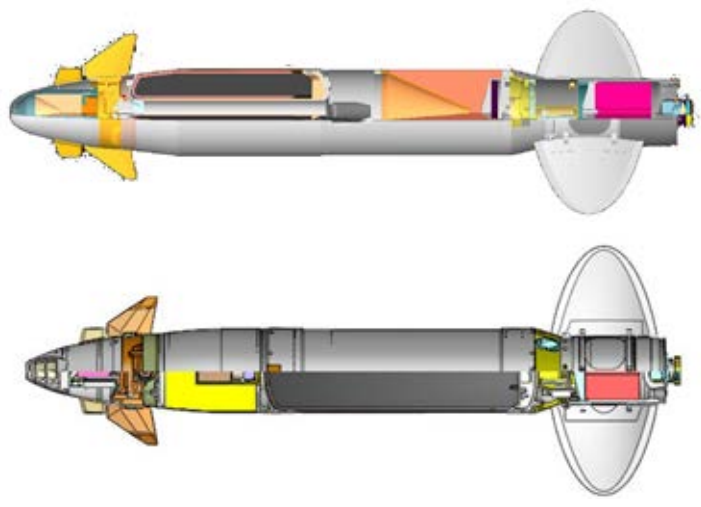
Engagement of targets in automatic mode reduces psychophysical stress to operators, requirements to their skills and duration of their training.

The block-modular principle of system design traditionally used for the Kornet family makes it possible to install both one and two automatic launchers onto a wide range of relatively inexpensive low load bearing capacity platforms of various origin (1-1.2 tons for single launcher version and 1.7-1.9 tons for double launcher version).

The combat vehicle with two launchers ensures simultaneous salvo firing against two targets, this significantly increasing the system's firing rate and number of targets handled. Similar to Kornet-E, the Kornet-EM system retains salvo firing capability with two missiles in one beam against one target to get over active protection systems.

The system's firing range was almost doubled – up to 10 km.

Increase of firing range and accuracy and use of automatic target tracker make it possible to track both slow ground targets and faster targets. This helps the Kornet-EM system meet requirements essentially new for antitank guided weapon systems – engagement of small size aerial targets (UAV, helicopters and attacking airplanes).



Efficient engagement of aerial targets by Kornet-EM system is ensured by combination of automatic high precision guidance system and guided missile with thermobaric WH with impact and proximity target sensor and flight range of up to 10 km.

The use of proximity target sensor guarantees reliable engagement of aerial targets at any range. Combined with powerful high explosive warhead the proximity target sensor makes it possible to compensate possible misses by destruction of UAV (or helicopters) by overpressure.

The maximum flight range of the missile being equal to 10 km ensures Kornet-EM system's advantage in fighting helicopters as it enables the system to fire from a stand-off distance.

The Kornet-EM system includes:

- combat vehicle with two automatic launchers and operator's panel with a display;
- Automatic launcher with four ready-to-fire guided missiles thereon is fitted with TV+IR sight incorporating high resolution TV cameras and third generation thermal imager, built-in laser range-finder and laser missile guidance channel and an automatic target tracker with laying drives.
- guided missile with HE warhead with impact and proximity target sensor and an antitank guided missile with firing range of up to 10 km;
- antitank guided missile with a maximum firing range of 8000 m and shaped charge warhead armour penetration of 1100 - 1300 mm which enables the Kornet-EM system to engage contemporary and future tanks bearing in mind the tendency to growth of their armour protection.

The Kornet-EM missiles are compatible with portable 9P163M-2 launcher with variable magnification sighting channel (12x and 20x), fitted with a third generation thermal imager.

Comparative analysis of the Kornet-EM system performance specifications with those of its foreign counterparts shows that in the aggregate the former 3.0-5.0 times exceeds the latter in terms of combat efficiency at the same time being simpler in use and maintenance and featuring 3-4 times cheaper ammunition which as an expendable component to great extent defines army operating costs.

Main performance specifications	
Flight range	150-10000
TNT equivalent, kg	7
Target sensor	impact and proximity
Maximum flight speed, m/s	320
Weight with launch tube, kg	33
Length of launch tube, mm	1210
Main performance specifications	
Flight range	150-8000
Armour penetration, mm	1100-1300
Maximum flight speed, m/s	300
Weight with launch tube, kg	31
Length of launch tube, mm	1210

High Precision

(See page 1)

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. The newest technological solutions are used. 20 years ago, the proportion of high-precision weapons used in local conflicts amounted to up to 7%. In recent years, this share has increased by up to 90-95%. The most designs of the "High-Precision Weapons Holding" are the best in the world and determine the technological vectors of development in their segments.

There is no doubt that the main task of the High-Precision Weapons Holding is to strengthen the defense capability of Russia and to supply the Russian Army with the most modern and the most reliable high-precision weapons. Within the scope of the contract, the holding regularly transmits to the Russian Ministry of Defense the corresponding quantity of planned weapons. There are "Iskander-M", "Pantsir-S", "Verba", "Shturm-SM" and other systems among the most critical supplies. Due to the holding, the Russian Army is armed with the best weapons in the world.

In 2016, the High-Precision Weapons holding toped the planned revenue value by more than one milliard US dollars. The holding is gradually taking a more important position in the global arms market. A considerable amount of holding's production enterprises supplies is carried out serving the interests of many regions. Moreover, the arms produced by the holding constitute the basis of high precision weapon park of many countries. The High-Precision Weapons holding is the biggest developer and producer of the top-notch high precision weapons in Russia.

HIGH-PRECISION WEAPONS Rostec

IDEX 2017

BRIEFLY

9 MM SPECIAL ASSAULT RIFLE AS

The 9 mm assault rifle AS is intended for noiseless and flameless shooting. The automatic reloading is based on the work of powder gases. The assault rifle is intended to engage the enemy manpower protected with bulletproof jackets and the non-armored vehicles. The design features of the assault rifle are: high characteristics in the accuracy of fire and closely-grouped fire are achieved due to original design of the assault rifle barrel; the high hitting is guarantied due to the subsonic velocity of a bullet; making single and automatic shots; the folding metal buttstock and the quick detachable silencer make it possible to reduce assault rifle dimensions; mounting seats for optical and night sights; absolute harmless handling is guarantied with safeties. The advantage of the assault rifle is a detachable double-column sector-type magazine with the cartridges located in a chess-board order and interchangeable with VSS and AM magazines. It fires the 9-mm armor-piercing cartridge SP6 or 7N12 and 9-mm sniping cartridge SP5.

9 MM SMALL-SIZE ASSAULT RIFLE AM

The 9 mm small-size assault rifle is intended to engage the enemy manpower wearing bulletproof jackets as well as the non-armored vehicles at a distance of 200 m. The automatic reloading is based on the work of powder gases. The design features of the assault rifle are: the magazine quick "ejection" mechanism; the metal folding buttstock reduces the overall dimensions and allows to deliver aimed fire with folded or non-folded stock; the assault rifle dimensions are the same as a submachine gun has but the firing range and hitting effect of the assault rifle are considerably better. The advantage of the assault rifle AM is a detachable double-column sector magazine with the cartridges located in a chess-board order and interchangeable with magazines of the AS and VSS firearms. The 9-mm armor-piercing cartridge SP6 and 9-mm sniper cartridge SP5 are used for shooting.

ANTI-TANK GUIDED MISSILE 9M113M

The missile is intended to engage modern vehicles equipped with the explosive reactive armor, fortified fire emplacements, both moving or stationary surface and afloat targets, low flying helicopters at any time and weather conditions. The operating temperature range is from –50°C to +50°C. The missile may be launched from a combat vehicle or remote launcher. The control of the missile is semi-automatic, the commands are transmitted over the wire communication line.

Always and Everywhere

Unlimited Use of the ADS Assault Rifle

Combat diver units appeared in our country in the latter half of sixties. In 1967 an Inshore Undersea Warfare Unit was organized (IUWU) at the Black Sea fleet. The reason for this was active foreign development work on regular combat diver units to perform commando-type reconnaissance operations. Fresh in the memory was the wreck of the Novorossiysk battleship happened in the bay by Sevastopol on 29 October of 1955. Although assumption of sabotage was least probable (even now), to write off such danger was impossible. The divers of counter underwater warfare support required a weapon capable of undersea firing.

The 5.66mm APS assault rifle and 4.5mm SPP-1 pistol designed for this purpose are of particular interest in the range of underwater weapons due to unusual engineering solutions. Despite the advantages of the systems, a significant shortcoming with them is ineffectiveness when firing on land. In addition, it must be noted that life of the APS assault rifle when firing on land is just 180 shots. Therefore, special forces going on a combat mission both underwater and on land, had to take two weapons: undersea for water and regular for surface combat.

Modern marine special forces are multifunctional because they mostly comprise universal combat divers capable of performing any tasks: underwater sabotage in enemy's seaports, protection of water areas against enemy underwater swimmer saboteurs and while doing so, act as normal scout saboteurs on land. Russian and foreign experience of using by such units confirms that they fulfill their tasks on land in 80-90% cases. Therefore, such units required to have special multipurpose (underwater and above water) in-service weapon, a sort of universal amphibious rifle. Its firing effectiveness (accuracy, grouping, armour penetration), however, must equal the 5.45mm AK-74 assault rifle on land and 5.66mm APS assault rifle under water.

In 2007, KBP Subsidiary TsKIB SOO completed its development work on the 5.45mm ADS special amphibious assault rifle, designated as ADS that solved the problem of firing under and above water.

The objective of developing the ADS assault rifle was to create a special amphibious assault rifle and special underwater cartridge to replace the in-service APS assault rifle as a combat weapon for special forces of the Russian Navy.

The assault rifle is designed for enemy manpower engagement and fire weapon neutralization:

- on land – when firing assault rifle with any standard 5.45x39mm cartridges and underbarrel grenade launcher with standard 40mm VOG-25 and VOG-25P rounds;
- under water – when firing special underwater 5.45x39mm cartridges.

It was made possible by developing a new underwater cartridge with the same overall dimensions as standard land cartridges.

The ADS special amphibious assault rifle with integrated underbarrel grenade launcher features bull-pup layout that enables shorter assault rifle length in comparison to conventional layouts (with the same barrel length), enhanced manoeuvrability, better balance and eliminates unfolding/folding of the buttstock.

Forward ejection of fired cases with sealed receiver reduces gas contamination at shooter's face, prevents from injuring by a case when working in a group, also (unlike sideward ejection) makes it possible to fire by a left or right-handed shooter without swapping any parts.

Use of impact-resistant plastic, special materials and coatings contributes to enhanced corrosion resistance and lower weight of the weapon.

A gas regulator added to the gas system enables to switch between "water" and "air" gas operation.

At present, the ADS assault rifle is being tested by marine special forces subunits of the Northern, Black Sea and Pacific fleets of Russia. It has been positively evaluated by the units employing it for its versatility and compact size.

For the first time in global practice, one weapon allows the combat diver to perform missions under water and on land.

Navigation System

«VNII «Signal» JSC is a modern diversified company engaged in research and development and production of weapons and military equipment for sixty years. It is a subsidiary company of «High Precision Systems» holding which belongs to «Ros-tec» Corporation. «VNII «Signal» team works hard to develop new types of equip-ment using latest scientific and technological innovations.

«VNII «Signal» research and development activities comprise: Automated fire-control systems for the artillery of the ground forces; Drives, laying and stabilization systems for artillery weapons, armored vehicles, air defense missile/gun systems, launchers, antenna stations for army forces, navy and air force; Navigation and survey systems (NSS) for land combat vehicles, geodetic support vehicles and equipment to provide traveling security of strategic missile systems; Hydrostatic transmissions, elec-tro-hydraulic control systems and hydraulic machines; Inertial navigation units (INU) and instruments.

Over 70 types of land track and wheeled combat vehicles of the Russian Armed Forces are equipped with autonomous navigation and survey systems (NSS) designed by «VNII «Signal» team. More than 30 versions of navigation systems have been adopted for service and are in serial production. Due to more than half century activi-ties «VNII «Signal» gained great experience, did profound design groundwork, creat-ed research and trial facilities necessary to provide designing, testing, preparing of production, serial output and life-time maintenance of positioning, navigation and survey systems for land combat vehicles.

Strapdown inertial navigation systems (SINS) surpass gyro-stabilized INS in size/weight characteristics, reliability, robustness, easiness of manufacture. As a rule they have lower power consumption and shorter readiness time. Strapdown inertial navigation systems do not restrict CV maneuvers; they also are more efficient to pro-vide system operation during failures of measuring instruments. All the above-mentioned features determine the choice of SINS as an efficient source of inertial data for navigation systems of various CV, especially for those operating in hard mechani-cal impact environment.

1NA1-E integrated navigation system for CV of Pantsir-S1 system is one of the most significant latest development. The system is designed to provide navigation of land combat vehicles, including automated determination and indication of the direc-tional angle, pitch and roll angles, and CV current position while moving or being at a stop.

Key specifications of 1NA1-E Inertial Navigation System (Export Version):

- Automated determination of the increments of current coordinates of CV position in SK-95 reference system with RMSE less than 0.5% of traveled distance within the operation time up to 10 h.;
- Automated determination of CV current position in integrated mode using SNE data with the error less than ±20 m;
- Automated determination of directional angle with RMSE less than 7.2 an-gular minutes;
- Automated determination of pitch and roll angles with RMSE less than 3.6 angular minutes;
- Automated determination of CV speed;
- Operation control from external device (from CV AS terminal unit);
- Data exchange with CV central computing system;
- Output of navigation data via GOST P52070-2003 serial interface bus;
- System readiness time after initial data input does not exceed: a) 3 min. for quick alignment to either input heading or heading, stored in the system memory; b) 7 min. for standard alignment.
- The drift of directional angle does not exceed ±6 angular minutes within 4 hours of operation;
- Continuous running time of the system is up to 24 hours;
- Maximum total power consumption of the system does not exceed: a) 200 W within the first minute after energizing; b) 150 W in the steady-state mode.
- System weight is 18 kg at the most.

ZiD-labeled weapons

Submachine-Guns to Precision Missiles

The Degtyaryov Plant equips the navies, air forces and armies of 17 countries all over the world. The facility's products range from submachine-guns to precision missiles. What makes this diversity of weapons similar is that whatever sees the light of the day thanks to the efforts and talent of Degtyaryov's team always hits the target.

7.62 mm Pecheneg machinegun

The major modernization of the PKMs pawned a new 7.62 mm machinegun designated as Pecheneg. The emphasis was made on achieving greater density of hits, longer service life of the barrel, and improving performance. Required were measures to get rid or compensate partially accuracy degrading factors. These include barrel vibration, heat induced ballistic performance degradation, and mirage caused by barrel heat in front of the sight (optical sights are particularly affected). The new weapon proved to be a powerful fire support asset in infantry units combining the power of a medium machinegunand flexibility of a light machinegun. The 7.62 mm machinegunthat was adopted by the Armed Forces was designated as Pecheneg (6P41) Kalashnikov Infantry Machinegun. Its derivative compatible with a night sight received another index — 6P41N.

The special design of the barrel assembly and jackets that were introduced to it made the barrel more rigid, improved its cooling properties, protected the assembly from weather impact, reduced vibration, and protected the line of sight from heat mirage. A slit between the jacket and surface of the barrel, ribbing, and ejector at the muzzle provide forced air-cooling evenly overthe barrel part.

12.7 mm 6S8 sniper system

One of the products developed most recently at the Degtyaryov Plant is the 12.7 mm 6S8 (6S8-1) sniper system. It is a special weapon designed to destroy lightly armored and soft equipment, personnel of the enemy regardless of whether they have their personal protection gear on, single and group targets, and technical assets at a range of up to 1,500 m. The system is also effective against enemy's snipers. The 6S8 consists of the 6V7 sniper rifle, 7N34 sniper rounds, 1P71-1 optical sight, and 1PN111 night sight. The 6S8-1 has no night sights. Unlike previously designed Russian rifles for snipers that are automatic, the 12.7 mm 6V7 is loaded manually.

This improves density of hits. To minimize the size of the rifle, its long barrel notwithstanding (1,000 mm), the designers adopted for it the bullpup configuration. Never before had this solution been used in large-caliber sniper weapons. The 6V7 is also lighter than its foreign counterparts, whose weight is above 20 kg and sometimes 30 kg, for example, rifles produced by South Africa's Truwello and Denel. The shorter barrel of the American Barrett M107 does not help, leaving it heavier and bigger than the Russian 6V7.

RGS-50M multi-purpose hand-held grenade launcher

The range of missions performed by special units of the Ministry of Interior, FSS, and law-enforcing agencies expanded recently. A hand-held multi-purpose grenade launcher system was developed for security agencies. It includes the RGS-50M grenade launcher and a range of projectiles. The weapon can perform a variety of tasks from temporarily disabling the enemy, either exposed or taking cover in rooms, to destroying his personnel or vehicles if required.

The weapon features a simple design that paves the way for high reliability in all operating conditions. Its removable recoil spring iscombined into a single unit with the weapon stock, equipped with a rubber cushion. This recoil momentum reduction arrangement allows 0.4 kg grenades to be launched at a muzzle velocity of 90m/sec. There is a collapsible grip under the tube to maintain a firm grip on the weapon when firing a projectile. Thanks to the low velocity of projectiles and barrel design,the weapon produces a moderate noise, tantamount to a pop.

The RGS-50M is a grenade launcher that can be deployed against targets at a certain range (up to 150 m) or in the vicinity. Its special ammunition can neutralize the enemy to clear the way for personnel of special units to the assault objective and use their organic weapons.

This is an effective weapon that allows special law enforcement agencies to perform a wide range of missions in counter-terrorist operations. To facilitate this the system includes a variety of projectiles: GSZ-50 stun grenade, GS-50M tear gas, EG-50M rubber canister, EG-50 rubber damaging agent, GO-50K fragmentation, GD-50 smoke grenade, and GK-50 shaped charge. The latter can penetrate a 20 mm aluminum plate, while posing no lateral threat beyond 7 m.

For as long at the weapon has been in service with anti-terrorist units, it has never been anything less thanan effective asset.As it has ever been the RGS-50M has no foreign counterparts.

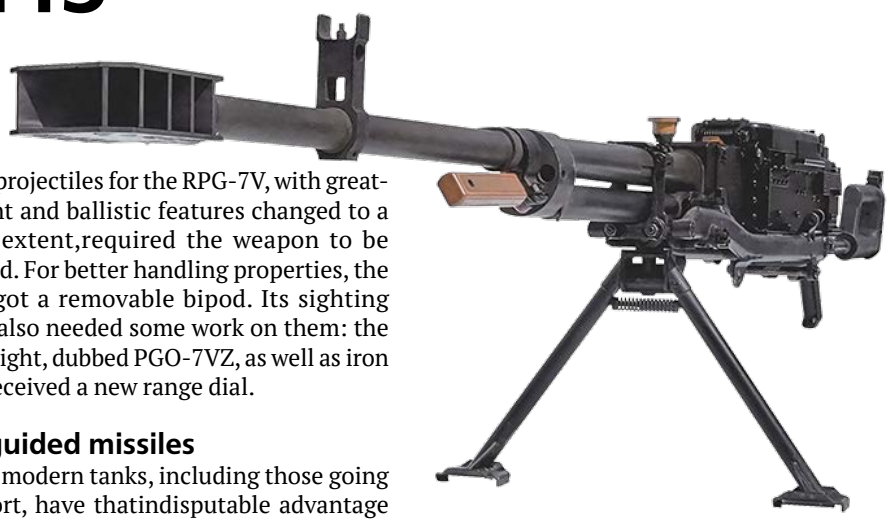
RPG-7D3 light anti-tank weapons system

The year of 2011 marked the 50th anniversary of the RPG-7, but the weapon is still among the best AT systems in close combat. The Americans in Iraq and Israelis in Lebanon in the summer of 2006 lost a great number of their tanks, including recently developed, to RPG-7 grenade launchers used by their enemies. 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. Its effectiveness, reliability, and simplicity in operation earned the RPG-7 fame across the globe and contributed to its proliferation.

New technologies nudged our designers to look into ways of boosting LAW capabilities.

A range of new rounds for the grenade-launching system made it effective not only against armored equipment, but also exposed infantry of the enemy, his personnel in buildings and field shelters. The weapon also poses a threat to enemy'sammunition 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 sighting devises also needed some work on them: the optical sight, dubbed PGO-7VZ, as well as iron sights received a new range dial.

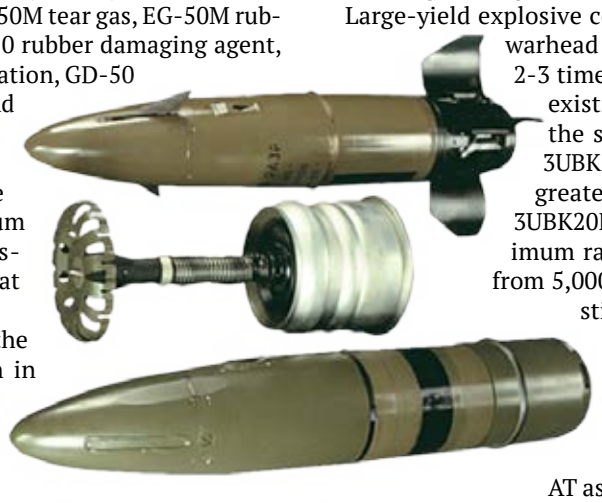
Tank guided missiles

Russian modern tanks, including those going for export, have thatindisputable advantage over other countries' tanks of having aguided 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 3UBK20, 3UBK14F, 3UBK14F1, and 3UBK20F1 missiles armed with tandem shaped and fragmentation warheads. All of them are produced at the Degtyaryov Plant in Kovrov.

In pursuit of a solution the Degtyaryov Plant in a concerted effort with GosNIImash (State Scientific and Research Institute of Machine-Building, Dzerzhinsk, Nizhny Novgorod Region) developed the 3UBK20F1 projectile carrying the 9M119MF1 high power HE missile.

Its substantial 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 compounds in the warhead made the charge 2-3 times superior to any existing projectiles of the same caliber. The 3UBK20F1 possesses far greater power than the 3UBK20F. While the maximum range has dropped from 5,000 m to 3,500 m, it still corresponds to the range of starting a fire combat on a flat terrain and is as far as most of foreign AT assets reach today.



Hand-held DP-64

The DP-64 special grenade launcher is part of the solution. It is designed to protect anchored ships in outer harbors and at homeports, surfaced submarines, waterworks, offshore oil and gas rigs, etc. from detected combat divers and raiders. The weapon equipssurface ships, submarines, and boats.

The DP-64 is a twin-barrel, breech-loaded weapon, operated by one person. It is capable of aimed fire over up to 400 m. There are two types of projectiles, armed with the FG-45 and SG-45 grenades. The latter is a signal projectile appropriate to mark the location of a diver, while the former, high explosive, will be fired to destroy him.

Being relatively compact and light with alocked breech, the DP-64 can be fired as an SA weapon from any point of the deck of a ship, tower of a surfaced submarine, troop compartment of helicopters, as well as piers and waterworks platforms. The grenade launcher can also be a handy asset of patrol boat (including inflatable) crews deployed at ports and naval bases. It is good for any climatic condition, easy to operate and maintain.

9M120-1 and 9M120F-1

The Ataka missile system is a successor to the Shturm AT weapon, developed by S. Nepobedimy led team of designers at the Kolomna Engineering Design Bureau (FSUE KBM, present JSC Research and Production KBM) in the early '70s. Among major requirements were the maximum range of no less than 5km and supersonic speed of the missile. There were tactical considerations to the latter requirement, as a subsonic missile would take 30 sec to fly 5 km. That is a substantial margin for a tank crew – provided the threat is timely detected – to take protective measures, like discharging smoke or aerosol, returning fire to the ATGM location to neutralize the operator physically or psychologically, as well as concealing the tank behind ground folds or constructions.

The 9M120-1F carries a fuel-air HE warhead to suppress fire emplacements, destroy fortifications, light armored and soft targets, aircraft equipment, and protected personnel. The HE chargeyields the equivalent of 9.5 kg of TNT. The guidance is performed by a control system. Its carrier part automatically directs the missile to the line-of-sight trajectory and maintains it on the pathuntil the target is reached. The missile then destroys the target automatically.

Heavy machineguns

The 12.7 mm KORD machinegun, is indeed a sniper weapon, relatively mobile too. The KORD is unique. It is the world's first general-purpose heavy machinegun. It will fire equally well from prepared and unprepared sites, buildings, vehicles – both stationary and moving – whenever the gunner can assume a comfortable firing position. The relatively small weight and fast deployment capability allow the crew to change positions and support advancing infantry staying with the combat order. If attached to the 6T19 mount with a bipod and the combat situation dictates that, the weapon can be handled by a single crewmember.

The quick-change barrel is based on a technology developed at the plant. It ensures even heating of the barrel and only minor heat distortion. Thanks to the steel grade, new production and bore chrome plating technologies the life approached 10,000 rounds. The barrel is fitted with a highly effective muzzle break. The weapon has inherited the gas-operated action with a long-travel rod, while locking is performed by rotating of a lengthwise sliding bolt, featuring two rows of lugs. The new barrel, upgraded locking assembly, as well as reduced impact of action operations on the barrel led to 1.5-2 times as good density of hits as that of the NSV using the same mounts.

The 6P58 KORD on the 6U16 mount (for firing at ground and aerial targets) weights below 60 kg, while the 6U16-mounted 6P59 configuration on the SP multi-purpose postis no heavier than 90 kg.The SP post equipped with the 6U16 rotating mount can be deployed on small ships, RW platforms, in fixed emplacements, etc. The 6U16 resembles a swivel with fixing points for the ammunition box to the right of the receiver, link/case collectors to the left of the receiver/right and ahead of the receiver respectively. It can be deployed on Tigr special vehicles, transport craft, BTR-D APC for airborne troops, etc.

HIGH-PRECISION WEAPONS Rostec

IDEX 2017

BRIEFLY

9 MM SPECIAL SNIPER RIFLE VSS

The special sniper rifle is intended for noiseless and flameless shooting. The rifle is equipped with an optical sight also it is possible to install a night sight device. The automatic reloading is effected by the energy of powder gases. The firing and trigger mechanism of a striker type allows to deliver both single-shot and automatic fire. The sniper rifle features: the original design of the barrel allows to achieve high characteristics in the accuracy of fire and closely-grouped fire; the subsonic speed of a bullet and its high hitting effect; a silencer ensures noiseless and flameless shooting; a quick assembling into three parts makes it comfortable to carry the rifle secretly (in a special bag or case); the presence of safeties makes the rifle harmless in handling and prevents making any shots even if the trigger is accidentally pulled or the rifle is dropped or hit when the barrel bore is not locked. The advantage of the sniper rifle is the presence of a detachable double-column sector-type magazine with the cartridges located in a chess-board order and interchangeable with AS and AM magazines.

7,62 MM SPECIAL SELF-LOADING PISTOL PSS

The SSP is an individual weapon for the secret attack and defence also it is intended for noiseless and flameless shooting. It shoots CP4 cartridges at a range of up to 50 m. The reloading is carried out automatically with the aim of the blowback bolt recoil energy. The pistol has the firing and trigger mechanism that allows to fire with the full-cocking or self-cocking. The safety system prevents accidental shots even if the trigger has been accidentally pulled or the pistol has been dropped. The reliable work of the pistol is guaranteed in any climate conditions. The operating temperature range is from — 50°C to +50°C.

KALASHNIKOV 5,45 MM SHORT ASSAULT RIFLE

The Kalashnikov 5,45 mm short assault rifle with a folding stock is an exceptionally effective individual weapon for shooting in the conditions of limited space. The small size and high hitting capability make it possible to use the assault rifle in every extreme situation. The conventional (with a steel core), tracer and high-penetrating bullets are used for firing. The energy of powder gases is used to reload the assault rifle. The firing and trigger mechanism of a hammer type is capable of delivering both automatic and single-shot fire. The folding stock is very handy, the fire may be delivered from various positions. The assault rifle dimensions are considerably smaller with a folded stock. The magazine is detachable of sector type double-column with the location of cartridges in a chess-board order. The operating temperature range is from – 50°C to +50°C.

Optimal modernization of the Combat Module

Making in Russia BMP-2 can meet the latest modern requirements and military objectives

Many countries keep on upgrading the main fleet of their combat vehicles. In Russia, a BMP-2 mechanical module was selected as a basis for designing a uniform combat module weighing below 3 tons for upgrading Russian combat vehicles. Russian infantry fighting vehicle BMP-2, being the main combat vehicle of multiple countries' land forces, was adopted for service in 1980 and used to exceed most of its foreign counterparts in terms of combat capabilities. Nowa-days BMP-2 still basically meets the modern requirements.

Currently a huge fleet of such combat vehicles is in service both with the Russian army, as well as abroad. These vehicles have been produced for several decades and presently their weapon systems do not meet modern requirements. However, their life cycle is quite long and reaches 30-40 years. The light-weight category combat vehicles (IFV, air-borne assault vehicles, APC) are able to determine the combat potential of a country's armed forces due to their applica-tion versatility. Infantry fighting vehicles (BMP-1, BMP-2, BMP-3) and airborne assault vehicles (BMD-3, BMD-4) are the most common hardware of land forces and airborne troops.

The analysis of current state and development tendencies of weapons and fire control systems shows that BMP-2 weapon system is falling behind the modern level a number of parameters:

- guided weapon firing is possible from stationary position only due to wire command link of "Konkurs" anti-tank guided missile (ATGM);
- "Konkurs" ATGM has low penetration capability and is not effective against modern tanks like M1A2 "Abrams";
- "Konkurs" ATGM has low firing rate due to manual reloading of the launcher. Such reloading requires long time and besides that the loader may be injured by splinters or small arms fire;
- at night the system may fire only automatic cannon or PKT machine-gun at range not exceeding 800 m;
- the BMP-2 fire control system is not automated, i.e. it is lacking in onboard computer, modern sights, target au-totracker, and does not allow for accurate firing, limiting the effective range of 30 mm cannon to 1100–1400 m. when firing on the move the system does not provide for required accuracy of line of sight stabilization due to BPK-2-42 sight rigidly bound to the weapon;
- 30 mm projectiles flat trajectory firing is not efficient against prone or entrenched manpower;
- firing at aerial targets carried out using center rings of 1PZ-3 sight, actually delivers only a psychological effect, since the typical aerial target hit probability is hardly one percent.

The firepower of a combat vehicle is determined by its weapon system, thus, the increase of combat efficiency may be achieved by weapon system modernization. BMP-2 has a high weapon system upgrade potential. The challenge of increasing the firepower of existing BMPs providing their superiority over other modern vehicles has been successful-ly met by KBP Instrument Design Bureau.

The upgrade was implemented on a serially produced BMP-2 turret with 2A42 automatic cannon (without chang-ing the mechanical module and turret internal layout). The design concept implies the following (Figure 1):

- mounting two "Kornet-E" ATGM launchers on the turret sides, each launcher equipped with independent elec-tromechanical vertical drive and carrying two ready for fire missiles;
- replacement of standard BPK-2-42 sight with combined gunner's sight equipped with independent LOS stabili-zation system and incorporating optical, IR and laser rangefinding channels, as well as missile guidance channel;
- installation of onboard digital computer with sensors system;
- installation of TV-IR target autotracker;
- installation of 30 mm grenade launcher with independent electromechanical vertical laying drive and 300rds feed magazine;
- installation of commander's panoram-ic sight with independent LOS stabilization system and incorporating opti-cal and laser rangefinding channels;
- installation of high-precision digital weap-on stabilizer.

The weight of add-on equipment installed does not exceed 500 kg, including around 260 kg of extra ammunition: 30 mm grenades and ATGM.

The specifications of upgraded BMP-2 with new B05Ya01 combat module are given in Table: due to introduction of day/night FCS the system provides accurate firing with all types of weapons, including guided, at moving and station-ary targets, round-the-clock engagement of all types of targets from stationary position, on the move and afloat at the range up to 4000 m with automatic cannon, up to 2100 m with automatic grenade launcher, up to 5500 m with 9M133-1 ATGM. Besides, 9M133M-2 ATGM with tandem shaped-charge warhead and 9M133FM ATGM with HE warhead and 9M133FM-3 ATGM with HE warhead and proximity fuse, recently designed by KBP, allow firing at range up to 8 km.

"Kornet-E" ATGM penetration capability, increased up to 1100-1300 mm, allows reliable engagement of modern advanced tanks fitted with add-on ERA («Leclerc», «Abrams», «Leopard»). Besides, HEF warhead of the missile is able to destroy concrete fortifications and strongpoints. Due to stand-off range targets engagement capability the upgraded BMP-2 are sure to prevail in combat with enemy tanks and IFVs.

The improvements implemented in "Kornet" ATGM (9M133M-2, 9M133ФМ-3) provide for considerable en-hancement of its performance without increasing weight and dimensions. These improvements ensure: destruction of modern and advanced tanks taking into account their armour protection growth tendency; engagement of any armoured vehicle at stand-off range; engagement of low altitude assault and reconnaissance aircrafts (including drones;

- installation on two stabilized launchers of BMP-2 ICV of four ready-to-launch guided missiles significantly in-crease fire rate when firing ATGMs. This rules out the necessity to reload the guided missile launcher during the com-bat, which increases the survival potential of the crew and of the entire combat vehicle, since stopping of a CV for ATGM reloading during a combat makes it a perfect target;
- implementation of TV-IR-auto target tracker enables to increase the accuracy of target tracking 3–6 fold in com-parison with manual tracking. The human is excluded from aiming circuit, the results of aiming become independent on psychophysical state of the gunner, which is dramatic in stressful battlefield environment. Accurate target tracking be-comes a granted technical specification, which enable to decrease the requirements towards the gunner training level and reduces the training period of the gunners. Automatic target tracker adds the FCS a qualitatively new feature, putting to life the "fire-and-forget" principle when firing a guided missile. At the same time the missile cost is significantly lower than that of a missile with a seeker which fulfils the function of the auto-tracker;
- the possibility of KORNET ATGM launch in an elevated mode (above bore sighting line) almost excludes the possibility of detecting the missile by the enemy;
- laser guidance mode of the ATGM with orientation of the missile within the laser beam provides for high jam-ming-immunity against all types of active jamming, since the jammer cannot be behind the ICV and send the same en-coded messages;
- to overcome systems of targets' active protection and to provide for guaranteed engagement of crucial targets salvo launch of 2 ATGMs riding on one laser beam is provided.

IDEX 2017

Rostec HIGH-PRECISION WEAPONS

Innovative BAKHCHA-U

Unified B8YA01 Combat Module for Light-Weight Class Vehicles

Infantry fighting vehicles and armoured assault vehicles are the main firing and transporting assets of infantry and airborne troops, providing the transportation of the infantry and creating armour shelter of the adequate level for the latter. Such vehicles are widely used to negotiate water obstacles and to provide fire support to the infantry. They remain a significant component of any land grouping both in integrated all-arms battle and in local conflicts.

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 1980-s 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 high fire power (2A70 gun-launcher, 2A72 automatic gun and 7.62 machine-gun integrated in a single module and an automated fire control system) developed for BMP-3 by KBP Instrument Design Bureau (Tula city) predetermined popularity of BMP-3 vehicle 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 whole range of targets: tanks, lightly-armoured vehicles, ATGWs, sheltered and unsheltered manpower, 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 surveliance and sighting system;
- providing for efficient repelling 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 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 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 tracers, HEF incinerating projectiles, 2000 pcs of 7,62 mm rounds, single autoloader for HEF and guided projectiles contains 4 pcs of 100-mm guided missiles 3UBL23-3 "Arkan", 34 100-mm HEF rounds 3UOF19-1 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 lightly-armoured combat vehicles BMP-3, BMD-3, BMD-4, BTR-90, or as separate subsystems.

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

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

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

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 carry out all- around 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 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 (up to 1 mrad.) not only in traversal 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 firing process with all arms by the commander by day and at night, including guided weapon 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 psychophysical 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.
- In the new weapon stabilizer the speed of laying has been increased and a digital control unit has been introduced. This has allowed to implement new control algorithms, to increase the accuracy of weapon stabilizing and maximal laying speed up to 60 degrees/second , to provide for optimal operation of turret and gun laying drives in different modes, adjustment of drives when using on vehicles with different load.
- Integrated into the armament system of BMD-4 new 1B538M digital ballistic computer automatically generates accurate firing settings, enabling to program and reprogram almost endless number of ballistics. Significant increase of the autocannon accuracy with all tip[es 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 the combat vehicle and target movement, wind speed, temperature and air pressure, charge temperature, deviation of the projectile muzzle velocity from normal value, target elevation, roll and pitch angles, projectile angle of jump.

HIGH-PRECISION WEAPONS

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

Europe

Albania
Bulgaria
Cyprus
Czech Republic
France
Germany
Greece
Hungary
Macedonia
Poland
Romania
Slovakia
Turkey

Commonwealth of Independent States

Armenia
Azerbaijan
Belarus
Kazakhstan
Kyrgyzstan
Moldova
Russia
Tajikistan
Turkmenistan
Ukraine
Uzbekistan

IDEX 2017

Asia-Pacific Region

Cambodia
China
India
Indonesia
Korea
Korea, D.P.R.
Laos
Malaysia
Mongolia
Sri Lanka
Viet Nam

America

Canada
Cuba
Ecuador
Nicaragua
Peru
Uruguay
Venezuela

Near and Middle East

Iran
Iraq
Jordan
Kuwait
Oman
Syria
UAE
Yemen

Africa

Algeria
Angola
Burundi
Cape Verde
Congo
Djibouti
Egypt
Eritrea
Ethiopia
Gabon
Ghana
Guinea-Bissau
Libya
Morocco
Mauritania
Mozambique
Namibia
Nigeria
South Africa
Sudan
Tanzania
Uganda
Zimbabwe