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**METROLOGICAL SUPPORT AT PARACHUTE DELIVERY OF PEOPLE,
TECHNIQUES AND CARGOES**

Yurii Adamov, Kharkiv

The introduction of European standards to ensure the safe delivery of people, equipment and cargoes by parachute during a special or rescue operations has led to new requirements for airborne landing equipment (ALE), equipment and all types of maintenance, including metrological support.

Metrological support is an independent subsystem of technical support and significantly influences the success of landing. As part of the technical support, metrological support guarantees the completeness, accuracy and reliability of measurements performed during the operation (during its maintenance, renewal, preparation, and intended use).

To investigate the state of metrological support for landing, the author analyzed the publications where the following issues were identified:

- imperfection of the normative base of metrological support in the field of defense;
- optimization of the metrological system of the testing field;
- the impact of metrological support on the effectiveness of weapons use and military equipment;
- improvement of the mechanism for assessing the quality indicators of metrological support for weapons and military equipment.

An analysis of recent research and publications on metrological support for the preparation and implementation of landing showed that the issue of improving the measurement and maintenance of airborne equipment is not sufficiently considered. There is no information about studies in this direction, therefore, there is a need for solving the scientific task of improving the metrological support of landing of people, equipment and cargoes. Validity of metrological information is a guarantee of high reliability of airborne equipment, reliability during service or

designated technical resource and is one of the safety conditions for the landing of people, machinery and cargoes.

Metrological support plays an important role in maintaining the reliability of airborne techniques during the preparation and conduct of landing.

Keywords: metrological support, airborne equipment, landing, landing support.

УДК 37.01

PROSPECTS FOR THE DEVELOPMENT OF MILITARY EDUCATION

Olexander Babarytsky, Kharkiv

Military education as the main source of training and augmentation of the Armed Forces of Ukraine is integrated into the national educational system. This is a necessary and integral part of the military organization of the state.

To date, a numerical strength of the Armed Forces does not play such an important role as it used to be and is not a priority. The key factor is highly professional personnel. The small, maneuverable, "smart" army becomes universal, able to switch from conflict of one kind to a conflict of another kind, to solve both military and peaceful tasks. A modern military employee should be able to manage combat operations, apply the latest weapons and military equipment, be prepared to make decisions independently and act in a variety of conditions of non-standard situations.

The modern system of military education has a solid foundation. All military universities, faculties, institutes, colleges, lyceums are provided with a primer for the training of officers of the staff. An important role is upbringing - it is the development of professional and psychological qualities, which provides high combat readiness, strengthening military discipline and order.

Every year a check on the level of training for graduates of higher military educational institutions is carried out and this is an important direction for the

effective solution of many problems of the system of military education. Considerable attention is paid to the study of foreign languages. Special language courses are designed for all servicemen who need language skills to perform their official duties.

The further development of military education is going to significantly increase the level of management of military education, to give a solution of important tasks in security sector, and to boost defense capabilities of the state. It is planned to significantly change the structure, content and technology of military specialists training at tactical, operational and strategic levels; elaboration of leadership, communicative qualities, skills of creative analysis, readiness to assume responsibility for the decision, ensure its implementation.

Modern development of military education is becoming large scale. Training of educated, intelligent representatives of the military sphere is one of the most important tasks of the state. Those who are currently gaining military education will become great leaders in the future. They will be able to bring our country to a decent level and deliver it to one level with the most developed countries of the world.

***Keywords:** military education, development, military sphere, smart army, professionalism.*

УДК 62.3

OPTIMIZATION OF BRAKE INDICATORS OF MILITARY VEHICLES

Vladyslav Bakai, Kharkiv

A further increase in the car park with a slow increase in speed leads to an intensification of traffic on the streets and roads, which greatly complicates the performance of security tasks.

Ensuring the safety of road transport depends on a range of measures in which the important role is played by the brake dynamics and stability of the car during braking. The problems of ensuring road safety, brake dynamics and vehicle

stability during braking attract more and more attention in all countries due to significant material losses and human casualties in traffic accidents.

The process of braking a car is usually considered to be even horizontal in the conditions of a straight line motion in the absence of any disturbing factors. In this case, theoretical developments are based on the analysis of the plane system of forces.

In this regard, braking of a car on a curved trajectory can't be described using a flat system of forces, since it does not allow to determine the influence of various factors on the brake dynamics and to assess its motion stability. The practice of car operation shows that the performance of the braking mechanisms can fluctuate within a fairly wide range.

Thus, stability of brakes performance on separate wheels has a significant impact on the stability of the car during braking.

A radical means for improving the braking dynamics and stability of the car during braking is the use of automatic regulators of brake forces and anti-lock systems.

The degree of influence of the braking mechanisms on the stability and braking dynamics depends on the operating factors (initial braking rate, road conditions and conditions of the car's gear), and its design parameters (the ratio of braking forces on the wheels of the front and rear bridges, the weight distribution on the front and rear tilts wheels, the suspension and drive steering).

Depending on the design of the car, the distribution of its weight on the axles changes in the degree of influence of brake mechanism's distortion on the front or rear axle wheels. So, for trucks, where 60-70% of its weight falls on the rear axle, the impact on stability and braking dynamics has a greater impact on the unevenness of rear wheel braking.

Keywords: *automotive equipment, brake indicators, road transport, traffic accidents, safety, stability.*

ROLES & RESPONSIBILITIES OF A BATTALION CHIEF OF STAFF

Yevhen Bezborodov, Kharkiv

Position of chief of staff is one of the most important in the management of a battalion. Therefore, we would like to mention what role and duties the chief of staff fulfills and what functions chief of staff executes in combat.

Roles:

Chief of Staff is the second in command of a battalion, a combat force typically consists of from 200 to 500 soldiers organized into several rifle companies, a weapons company and a headquarters company, as well as the battalion command structure. In addition to exercising command in the absence of the battalion commander, Chief of Staff is chief of the battalion's staff and coordinates logistics for the unit.

Responsibilities:

1. The most important task is to be ready to step in at a moment's notice and take command of the battalion.

2. Chief of staff directly or indirectly supervises three of the four components of the battalion staff: the command section and the coordinating and special staffs.

3. In addition to his duties as an assistant commander, chief of staff is the battalion's logistics coordinator.

4. One of the Chief of Staff main responsibilities is the synchronization of the battalion's information management. In a military environment, this is the timely delivery of relevant information to the appropriate personnel in a form that contributes to a more accurate understanding of a particular situation and enhances decision making.

In conclusion we can say that Chief of Staff is the major leading officer in a structure of a battalion. He performs work on the organization of a fighting order and activity of division.

Keywords: battalion, chief of staff, command, job, military.

УДК 355.641

**NUTRITION OF THE SERVICEMEN OF THE NATIONAL GUARD
OF UKRAINE IN THE ZONE OF JOINT FORCES OPERATION**

Vladyslav Bezliudnyi, Kharkiv

One of the main aspects of providing the units of the National Guard while conducting military and combat tasks is the quality of food supply of the personnel. That is why the main efforts in provision should be focused on improving nutrition.

Before leaving to a designated area of operations to conduct training and combat tasks, the personnel of the National Guard of Ukraine shall be provided with prescribed stocks of foodstuffs. In the course of conducting training and combat tasks the planned replenishment of stocks is carried out.

In the zone of Joint Forces Operation hot meals nutrition organized three times a day per person according to the standards of nutrition, determined by the decision of the Cabinet of Ministers dated March 29, 2002, No. 426. In addition, at present additional meals are provided to a specified category of personnel in accordance with the Cabinet of Ministers Resolution No. 158 dated June 4, 2014.

Also, all year round, the personnel is provided with bottled drinking water , making 1.5 liters per serviceman per day.

In case when the intervals between meals exceeds more than 7 hours, an intermediate meal is organized for personnel within daily allowance.

In the Joint Forces Operation zone, food is delivered once a week, bakery products - once every three days. To cook in the field trailed and portable kitchens are deployed. In the case when hot meals cannot be provided, troops are issued a daily set of dry products for 3 days.

Keywords: National Guard of Ukraine, food supply, three meals, drinking water, a daily set of dry products

**ON THE PRINCIPLES OF FIELD CATERING PROVISION OF THE
NATIONAL GUARD OF UKRAINE**

Ihor Boiko, Kharkiv

In the field, meals for military personnel are organized by military units from field kitchens. For cooking, distribution of bread, butter, sugar, tea, or boiled drinking water, the unit food point is deployed and daily outfit is assigned.

Ready meals are released to military men in individual bowlers or disposable dishes. In addition to bowlers, they are provided with a mug, spoon and flask.

Currently, the National Guard receives daily sets of dry products, which are designed to increase the combat capability of personnel at various stages of combat training activities. To perform combat missions in the area of Operations of United Forces, a meal, ready to eat (enhanced daily field meal set) has been developed. The energy value of these rations makes 4198 kcal and 3962 kcal, respectively.

Power mode depends on the nature of the combat missions performed. Hot food is cooked, as a rule, three times, but not less than twice a day. In the latter case, intermediate meals are given between hot meals: at the same time as morning meals for intermediate meals, the personnel are given dry food. A food point is deployed at a site not less than 100 per 100 meters, at which, as a rule, they are equipped in tents:

- field kitchens (at a distance of no closer than 30 m from one another);
- food warehouse;
- a room for cold processing of fish and meat;
- a room for cleaning potatoes and vegetables;
- a room for storing and cutting bread, portioning butter and sugar;
- tea making point;
- washing of kitchen utensils and equipment;
- two field dining halls for conscript, contract servicemen and for officers;
- tents for personnel of the food point, which is in the outfit;

- a place to store reserves of fuel and water.

If absolutely necessary, it is allowed to combine cutting meat, fish and vegetables in one tent, but on different tables.

At a distance of 15m from the kitchen, a place for cleaning potatoes and vegetables is arranged, at a distance of 20 m - a point for washing bowlers, mugs and spoons, at a distance of 50 m - a place for collecting food waste, 75 m - a toilet for cooks and personnel for a food point. The point for making tea and boiled water is equipped with boilers or food kettles for preparing boiling water, an extractor for brewing tea.

Tea and boiled water must be dispensed through a system of pipes and taps. The washing point for bowlers, mugs and spoons is equipped with a tank for heating water and dispensing it with pipes and taps, a tank with a lid for collecting food waste, a box for detergents. To collect the wastewater, they pull out the absorbing pits, equipped with tight-fitting lids.

Culinary processing of food, cooking, operation of technological equipment and maintaining order in the premises of the food point are carried out in compliance with the sanitary rules established for stationary canteens.

In the field it is forbidden to prepare cold snacks, courses from minced meat and fish, cutlet mass, jelly and compote. It is prohibited to issue meat portions without repeated heat treatment. Storage of prepared food is allowed in thermos for no more than 2 hours, after which it must undergo a second heat treatment.

Food is delivered in a special transport. Delivery of meat, fish and bread to food point is allowed in special tightly closed boxes, which are upholstered with galvanized iron or tinsplate from the inside and seams soldered of food tin. All food delivery vehicles must be kept clean, weekly washed with soda solution and have sanitary passports issued by the sanitary-epidemiological station. In the field, they quickly become boring and poorly consumed: crackers, dried vegetables, including potatoes, food concentrates, barley and pearl barley.

On the march, food is prepared three times a day, the first hot meal is scheduled 1-1,5 hours before the estimated time of departure (ETD), the second reception - on a halt in the second half of the daily transition, the third reception is organized in the night rest area. If it is not possible to prepare hot food and give it out during the march, the soldier is provided with some of the food in a dry form before the departure, but hot tea is made in any case.

When on the night march, hot dinner is issued 1-1.5 hours before the ETD. Breakfast and lunch are planned in the area of day rest.

The delivery of food to personnel on the march is made from the trailer kitchens directly to the bowlers. At the same time filling the flasks with boiling water is organized.

***Keywords:** meals, military personnel in the field, food point, meal, items of the food point, catering supply on the march.*

УДК 623.45

WEAPONS OF MASS DESTRUCTION

Roman Brykulia, Kharkiv

Weapons of mass destruction (WMD) generally include nuclear, biological, chemical weapons. The term first arose in 1937 in reference to the mass destruction of Guernica, Spain, by aerial bombardment that was made by the German Luftwaffe during the Spanish Civil War.

Nuclear weapons did not exist at that time, but biological weapons were being researched by Japan and chemical weapons had seen wide use. Following the bombing of Hiroshima and Nagasaki, and progressing through the Cold War, the term came to refer more to non-conventional weapons: atomic, biological and chemical weapons.

The phrase entered popular usage in relation to the U.S.-led multinational forces 2003 invasion of Iraq and today the most widely used definition is that of nuclear, biological or chemical weapons.

The development and use of WMD is governed by international conventions and treaties, although not all countries have signed and ratified them. There are 8 countries that are known to possess nuclear weapons and other WMD, only 5 of which are members of the Nuclear Non-Proliferation Treaty. All states which possess WMD can be divided into four main groups.

The first one is the group of states which are commonly accepted to possess nuclear weapons: China; France; India; Israel; Pakistan; Russia; the United Kingdom; and the United States of America.

The second one is the group of states with access to nuclear weapons through nuclear sharing agreements: Belgium, Germany, Italy, the Netherlands and Turkey.

The third is the group of states currently suspected of possessing or developing nuclear weapon capabilities. They are Iran and North Korea.

And the final group of countries comprises states that formerly possessed nuclear capabilities: South Africa, as well as Belarus, Kazakhstan, and Ukraine following the collapse of the former Soviet Union.

Weapons of mass destruction, especially nuclear weapons are rarely used because their use could escalate into a war so destructive it could easily destroy huge segments of the world's population. During the Cold War, this understanding became known as mutually assured destruction and was largely the reason war never broke out between the WMD-armed United States and the Soviet Union.

But nowadays there is a great concern that the weapon of this kind can be available for terrorist organizations, moreover can be used by these organizations.

Keywords: nuclear, biological, chemical, nuclear capabilities, WMD.

**INCREASE SURVIVABILITY OF COUNTERBATTERY RADARS TYPE
AN/TPQ THROUGH THE USE OF DECOY STATIONS**

Roman Bubenshchikov, Lviv

Andrii Zvonko, Lviv

Sergii Stegura, Lviv

The leading role for the functioning at the proper level artillery units, including destruction by fire belongs to vehicles which are involved in counter-battery struggle. Experience of carrying out anti-terrorist operation indicates that good counter-battery struggle is an important factor of success in wars of this kind. Especially when the use of military aircraft is minimized.

Existing counter-battery systems, which are in use by the Ukrainian Armed forces does not fully meet the requirements of such plants in modern combat, so the analysis of possibilities of radar in other countries, own experiences, their immediate use is an extremely important issue.

From January 2015 in the anti-terrorist operation, which takes place on the territory of Donetsk and Lugansk regions started using the counter-battery systems AN/TPQ.

Their main purpose (in the opinion of the direct participants of the fighting) is the possibility of warning the personnel, by means of communication, about the fire of the enemy by the rocket launchers (MLRS) with mortars, self-propelled and howitzers artillery. As a result of this, additional 5-15 seconds of time for the shelter of personnel, as well as to detect and determine the coordinates of fire artillery positions and the probable dropping of shells and mines.

The practical experience of using the AN/TPQ radar shows that these stations, despite their wide capabilities, have many disadvantages that are likely to reduce their survivability.

One of the major disadvantage is that they work in the active mode, so they are vulnerable to the impact of electronic reconnaissance of the enemy, and, in the

absence of appropriate masking quickly find themselves as UAVs and enemies reconnaissance groups.

To improve the stealth and survivability of the radar type AN/TPQ from the means of enemies radio reconnaissance and electronic warfare systems proposed the use of simulators for the radar or decoy stations (false targets).

Developed requirements for the design and appearance of the simulated radar signal for maximum range the task and not allow the enemy to distinguish the true signal or the false.

Compliance requirements are formed and developed recommendations will allow you to enter the enemy misleading, to call down artillery fire of the enemy, to detect his firing positions and to increase survivability of the radar type AN/TPQ in combat.

Keywords: *artillery units, anti-terrorist operation, counter-battery systems, AN/TPQ.*

УДК 623.1

MODERNIZATION OF BTR-4E

Dmytro Budov, Kharkiv

The BTR-4E is the export version of the BTR-4, an 8x8 armoured personnel carrier (APC) designed by the Ukrainian Company Kharkiv Morozov Machine Building Design Bureau. This is the latest generation of wheeled armoured personnel carrier (APC) manufactured by the Ukrainian defense industry. The weight of a vehicle is 22,400 kg. Speed is 110 km/h.

This is a new development of 8x8 armoured vehicle which is not based on Russian technology of wheeled combat vehicle as the BTR-80.

The BTR-4E is designed to be used as personnel carrier vehicle for infantry units or as a wheeled infantry fighting vehicle with weapon station to provide fire support.

It can be operated under various climatic conditions from a temperature range of -40° to +55°C. In July 2012, Ukrainian Defense Ministry has announced the delivery of first BTR-4E for its armed forces. The BTR-4E is already in mass production and is in service with Ukraine and Iraq.

The BTR-4E can be fitted different types of weapon station, but the standard version is fitted with a remotely operated weapon station called BM-3 Shturm.

The design of the BTR-4E is divided into three compartments with driver and commander seats at the front, engine and transmission in the middle and troops compartment at the rear.

The vehicle has a crew of three and seven infantrymen can be carried at the rear of the vehicle. Each soldier has individual seat. The driver sits at the front of the vehicle on the left with the commander to his right. The BTR-4E hull is protected against firing of small arms. The BTR-4E has also protection against mine blast.

Standard equipment of BTR-4E includes heater, night vision, automatic fire suppression, a central tire inflation system, a winch with a maximum capacity of 9 tones and NBC (nuclear, biological and chemical) protection systems. The driver is equipped with one white lamp and infrared lamp located at the left side of its front window.

Keywords: APC, armoured vehicle, automatic fire, BTR-4E, protection, small arms.

УДК 358.1

ON THE PROMISING POTENTIAL OF UKRAINE IN THE FIELD OF ROCKET CONSTRUCTION

Oleh Budur, Odesa

In Ukraine, there are now two main design associations that are engaged in the creation of new rocket systems and are developing options for upgrading existing systems - the State Kyiv Design Bureau "Luch" (Kiev) and the State

Design Bureau "Yuzhnoye" (Dnipro). These two research and production associations are responsible for the development and coordination of a number of missile programs in Ukraine and are leading enterprises in their industry.

One of the most famous projects of the Luch design bureau was the so-called Alder rocket complex, which in fact is a deep modernization of rocket launchers for the 9K58 Smerch multiple rocket launcher systems. The rockets developed by the Design Bureau Luch in the framework of Alder are modernized projectiles from the Smerch multiple rocket launcher with an installed system for the correction of the projectile flight path due to impulse engines. Despite a number of loud statements by politicians and military experts, the range of the new ammunition does not exceed one hundred and twenty kilometers. The main feature of the ammunition from the design bureau "Luch" is precisely in the relatively high accuracy of firing due to the installation of the projectile correction system during the flight. This makes it possible to significantly reduce the consumption of ammunition for hitting one target and to increase the accuracy by several times in comparison with Soviet ammunition intended for Smerch.

The Ukrainian Armed Forces are in dire need of such missile systems to partially replace the outdated Smerch and Tochka-U tactical missile systems.

Work is also underway on the creation of combat command and control vehicles, the provision of combat duty, transport-charging and new radar over-the-horizon detection.

Keywords: *Armed forces of Ukraine, rocket systems, rocket, high firing accuracy, design pools, projectile.*

**METHOD OF MORPHOLOGICAL ANALYSIS OF PATENT
INFORMATION FOR THE CONSTRUCTION OF FORECASTING
STATISTICAL MODEL OF DYNAMIC TYPE PROTECTIVE
DEVICES DEVELOPMENT**

Mykhailo Buhera, Kharkiv

Currently different means of dynamic type (DT) are used for the protection of armored vehicles, they are enough analyzed, but all these works consider existing technical solutions (TS) that are technically implemented in completed samples of military equipment.

Taking into consideration the tendency of development and quality changes of the means of destruction, the forecasting process of the development of dynamic type protective devices (DTPD) becomes very important. It can be traced by analyzing patenting information on technical solutions that were not technically implemented.

Dynamic protection is a kind of protection of combat armored vehicles (tanks), which proved its effectiveness during the combat actions in ATO area. Taking into consideration the development of antitank weapons, existing level of armored protection, including DTPD, can not fully ensure the protection of tanks.

The analysis of patenting information on the DTPD means of weapon and military equipment shows the intensity of patenting activities in the course of the years both in our country and abroad – Russia, Israel, US, Germany and Great Britain.

The need for dynamic protection was demonstrated with the emergence of Israeli tanks with "reactive" ("explosive") armor during Lebanese war in 1982, this armor revolutionized the principles and methods of armoring of armored combat vehicles (ACV).

Analyzing the dynamics of patenting curve, it is easy to claim that in the given time interval dynamics of patenting is not a monotonically increasing

function, and there are jumps (areas of rapid growth), which, in its turn, associated with military actions (activity) and ACV employment (tanks).

Given patenting dynamics determines the amount of inventions and patenting activity from year to year and it does not allow forecasting the directions of further development of samples.

Thus, the object of study is the process of forecasting of DTPD development and the subject of the study, based on domain, is the patent research method (PRM) of statistical processing of patent information with the application of morphological analysis.

Therefore, the development of methods of forecasting of DTPD development is driven by the need to solve (objectively existing in DTPD means) contradiction between the use of statistical methods for processing patenting information, on the one hand, and predictive estimate of properties development, on the other hand, the solution of which will help to consider properties and, consequently, to predict and to offer DTPD technical implementation.

Based on the purpose of the study, the scientific objective of the study is the development of PRM by using statistical processing of patenting information with the application of a statistical forecasting model of DTPD development, constructed using morphological analysis.

***Keywords:** morphologic analysis method, patenting information, dynamic type protective devices, technical solutions, weapons and military equipment.*

УДК 355.02+355.356

**PRIMARY TASKS IN THE MILITARY-TECHNICAL SPHERE ARISING
FROM THE LAW OF UKRAINE "ON NATIONAL SECURITY OF
UKRAINE"**

Ihor Chepkov, Kyiv

Over the past three years, there has been some contradiction in the legal framework of the security issue:

on the one hand, three strategic documents on national security approved by the President of Ukraine for 2015-2016;

on the other hand, a number of current laws of Ukraine.

That is, different normative acts of the same thematic area operated simultaneously, which significantly differed from its conceptual construction, terminology, main content, which caused the corresponding legal uncertainty of a significant number of real aspects of the state policy of ensuring national security. At the same time, it was changed to the opposite normal procedure of law and rationing, when normative acts are developed, as a rule, on the basis of already adopted legislative acts.

In scientific papers and analytical materials for 2015-2018, the Central Research Institute of Weapons and Military Equipment of the Armed Forces of Ukraine repeatedly drew attention to the inadmissibility of such a state and proffer relevant suggestions.

In order to overcome these disputes in June 2018, the Verkhovna Rada of Ukraine adopted and in July this year the President of Ukraine signed a new Law "On National Security of Ukraine".

The meaning of this law is determined by:

establishment of legislative and regulatory framework;

the beginning of the next stage of reforming the entire system of national security of Ukraine;

the radical nature of these reforms, which is expressed in the abolition of the validity of the three laws in force in Ukraine, the introduction of radical changes in the six other laws, the radical transformation of the Military Doctrine of Ukraine in the form of the Strategy of Military Security of Ukraine, etc.

Regarding the military-technical sphere, the main provisions of the Law of Ukraine "On National Security of Ukraine" form the renewed paradigm for the further development of armaments and military equipment, the novelty of which is determined by the substantial changes introduced:

- on the one hand, the general structure of the basic principles of the functioning of the entire sector of security and defence of the state;

- on the other hand, into the system of management of the Armed Forces of Ukraine and defence planning algorithms.

Thus, the Law of Ukraine "On National Security of Ukraine", which creates an important stage in reforming the system of national security of Ukraine, puts in the military-technical sphere new complex tasks that are of fundamental importance for activating the process of further equipping the Armed Forces with modern weapons and military equipment and will require the most responsible attitude to their successful solution.

***Keywords:** national security, military doctrine, strategy, military security, development, armaments, military equipment*

УДК 355+316(043)

THE CONCEPT OF 'HYBRID WARFARE' IN THE CONTEXT OF NATIONAL SECURITY

Andrii Chizhenko, Kharkiv

A hybrid (non-classical, unconventional) warfare does not deny the possibility of deploying classical (conventional) wars. Moreover, it does not reduce the threat of a nuclear war. However, in the modern context the hybrid form of warfare is spreading, since it gives the sides of the conflict additional opportunities with comparatively few casualties. Hybrid warfare is a type of conflict in which political, economic, informational and psychological methods of influence on the enemy are used simultaneously. These methods are combined with military actions in the form of reconnaissance and sabotage operations conducted by special forces detachments, formation, support and coordination of illegal paramilitary separatist and terrorist groups.

The main features of the hybrid warfare are:

- priority given to non-military methods and forms of influence;

- single center management for planning and conducting operations during hybrid warfare;

- simultaneous attack on the main areas of public life of the enemy (economics, politics, infrastructure, ethnic and religious relations, etc.);

- the use of military actions is largely hidden.

The main purpose of the hybrid warfare is not the physical destruction of the enemy, but its conquest and the use of material and human resources. In classic wars that are aimed at the destruction of the enemy, the parties have significant human and material losses which considerably reduce the winner's gains. In the case of hybrid warfare using non-military means of force is a priority. It allows to save material and human resources maximally.

Consequently, the hybrid warfare strategy is determined by a combination of diverse military and non-military forms and methods of fight and combat. The concept of hybrid warfare does not reject traditional views on the war, but rather complement them according to dynamic changes in the international security environment and other important factors that influence the methods of warfare.

***Keywords:** hybrid warfare, national security, human resources, military actions, methods of influence.*

УДК 623.8

THE PROVISION OF THE ARMED FORCES OF UKRAINE WITH ISLAND-CLASS PATROL BOATS

Andrii Chorny, Odesa

The concept of «mosquito fleet» is regarded as the main direction in the formation of the naval staff of the Ukrainian Navy in the nearest future. The main advantage of such a fleet is, first of all, its cost effectiveness. They are cheaper than a fleet of large ships, more maneuverable and have high-speed.

A good example of «mosquito fleet» can be artillery boats «Gyurza-M» or amphibious assault boats «Centaur», which have already been tested. The boats of the type «Lan», armed with Ukrainian cruise missiles «Neptune», are being designed. In addition, Ukraine will receive two more island patrol boats from the United States in the summer of 2019.

Island-class patrol boats were built for the US Coast Guard between 1985 and 1992. A total of 49 patrol boats of the class were built. The US Coast Guard began to replace them with new Sentinel-class patrol boats in 2014, yet 12 Island-class patrol boats remained in service. The United States is handing over decommissioned patrol boats of the Coast Guard to its allies. The United States will have about 30 Island-class patrol boats left after it transfers two boats to Ukraine.

The basic modification of Island-class patrol boats has a displacement of 168 tonnes, a length of 34 meters, a width of 6.4 meters, and a speed of 29.5 knots. They have a crew of 16, including two officers. Patrol boats are armed with a 25mm cannon and two machine guns. In addition, patrol boats are equipped with an AN/SPS-73 radar system and a 5.4-meter Zodiac Hurricane 540 inflatable boat.

The essential problem of the modernization of the Ukrainian fleet is to man new combat units with personnel. The naval crews should have practical experience in performing tasks at sea, be physically and psychologically tough and prepared, motivated and have a high level of moral and professional skills.

Keywords: *Ukrainian Navy, naval crews, Coast Guard, patrol boats.*

УДК 355.7

DUTIES OF THE CHIEF OF QUARTERING SERVICE OF MILITARY UNIT

Serhii Demydenko, Kharkiv

The aim of the report is to analyze the duties and responsibilities of the Chief of the Quartering service of the military unit. The chief of the quartering service of the military unit is under the Deputy Commander of military unit on

logistics and is directly responsible for personnel of the Quarters service of the military unit.

The Chief of the Quarters service of the military unit must:

- organize the correct technical operation and timely maintenance of barracks and housing stock, municipal facilities, the equipment, and the apartment property which are in use of military unit;
- provide through the design organizations production of necessary technical documentation for objects under maintenance or new constructions, to carry out inspection of the repaired facilities;
- keep a record of soldiers and workers, who are not provided with living quarters and make proposals for their provision with housing;
- plan distribution of apartment property, fuel, materials for maintenance, capital repair and construction of the facilities performed as a force account work within a military unit;
- organize write-off of construction materials spent on capital repair and maintenance;
- organize correct operation and maintenance of buildings and structures of the barracks and housing stock and public facilities of educational centers;
- monitor the maintenance in good condition of the premises of military camps, water sources, air and cable power networks, external water supply networks, sewerage, heat and gas supply systems;
- carry out landscape gardening and improvement of the military camp;
- carry out the selection of employees to perform work on the operation and repair of the barracks and housing stock, municipal facilities and equipment;

The Chief of the Quarters service of the military unit performs the duties in accordance with articles 82-84 of the Manuals of the Internal Service of the Armed Forces of Ukraine and other provisions.

Keywords: chief, quartering service, duties and responsibilities, the Manuals of the Internal Service.

УДК 621.396

**INFORMATION APPROACH TO ESTIMATION OF THE
MULTISPECTRUM MONITORING DEVICE EFFICIENCY**

Andrii Diakov, Lviv

Integration of active and passive partial spectral channels within the combined information measuring system is a powerful tool for increasing the self-descriptiveness and jamming immunity of monitoring devices.

In literature it is shown that the multispectrum devices (MD) is defined by a number of spectral partial channel and a value of spectral channels cattering (which is more important) maximum increase of the efficiency is achieved in integration of the physical sensors which differ essentially in band (e.g. optical, infrared, radio-frequency). In this case, the information band of the monitoring system and its jamming immunity are increased. The latter is due to low probability of simultaneous jamming uppression in all partial channels.

The most important element of on engineering synthesis of the MD structure is selection of an optimality criterion by which the MD efficiency is defined and the best version of the equipment construction is found. The main requirement to this criterion may be stated as follows:

- unambiguous device performance data relation;
- possibility of its use for all types of physical sensors;
- using it as a measure of a nonrandom value.

For estimation of the MMD self-descriptiveness it is suggested to develop the technique which is used in video spectrometers.

In video spectral survey, due to acoustic-optical filters, the number of partial channels for information collection increases up to 200-1000 in achieving of high resolution. As a result, there is formed a multidimensional spatial spectral image in

which each elementary part of the image (pixel) is characterized by its own spectrum. Such image is called «information cube» which two measures correspond to a flat image of the monitored object, and a third measure corresponds to the frequency of the partial channel.

Thus, in using the technique, which is applied in video spectrometers for multispectral system, the hyperspectral cube is deformed as follows:

- number of partial channels is decreased from several hundreds to three: photocontrast, infrared, radar;

- in a RF partial channel, due to a low angular resolution, the object image is reformatted to the range – Doppler frequency system. It should be noted that the physical position of the center of the formed image coordinate system is changed.

In the infrared (photo) channel it coincides within the lower left boundary of the monitoring zone. In the radar channel it coincides with the initial point of the selected area in range. In this case, it is suggested to use the quantity of the information contained in the formed image as a measure of the optimality in the synthesis of the MMD structure.

***Keywords:** a partial spectral channel, an optical channel, a radio channel, spectral image, information cube.*

УДК 355.2

ON THE PROBLEM OF CREATING MODERN MOBILIZATION DEPLOYMENT SYSTEM IN THE NATIONAL GUARD OF UKRAINE

Oleh Fedosenko, Kharkiv

Currently, when the Armed Forces of Ukraine alongside with the National Guard of Ukraine are being at the stage of reforming and development, mobilization training plays an important role for timely and organized mobilization of population, for bringing them into the state of the highest possible combat readiness, as well as for meeting challenges and requirements of the defence of the state during a special period.

A comprehensive analysis of mobilization deployment demonstrates how complicated the mobilization system is, and how difficult it is to bring military units and formations into the state of high combat readiness.

The creation of modern system (ground) for mobilization deployment in the National Guard of Ukraine should be based not only on analytical materials, but also on practical aspects of mobilization, the ways how to put mobilized troops into high combat readiness, and how to use experience gained during training on conducting mobilization exercises, improving and searching for new forms and methods of mobilization work while taking into account the requirements of the present.

The timely implementation of the planned measures for mobilization and bringing the military units and formations into combat readiness requires the headquarters to provide exceptional clarity in the management of organization. The mobilization training of troops must reach such an extent of level that each military unit and formation should be able to take actions on their own, without waiting for any assistance or / and guidance from senior executives.

Such potential of the troops is ensured primarily by

- the completeness and feasibility of the plans for mobilization and for bringing them to combat readiness,
- comprehensive provision,
- correct understanding of the situation,
- high training level of personnel,
- constant communication and exchange of information between the troops.

Keywords: *deployment, Armed Forces, methods of mobilization, training.*

MISSILE COMPLEX «VIELHA»

Serhii Halushka, Kharkiv

Ukraine now needs weapons that are guaranteed to destroy the identified important targets by point strikes. For this purposes a new Ukrainian weapon system «Vielha», which is demonstrating the capabilities of precision weapons in the tests, and its further close combat prototypes are ideally suited.

«Vielha», a new high-precision armament, operates at the same distance as Smerch, from 20 to 70 kilometers. The whole cycle of production of a new missile is placed at State Design Bureau «Luch» - the engine case, nozzle block, stabilizers, the combat part, the safety-executive mechanism, the guidance system, the system for receiving satellite signals, the gas control, the fuzes.

During the set of tests «Vielha» demonstrated a larger accuracy than missiles of the rocket fire system «Smerch», produced in the USSR.

It is an eight-meter missile, which flies guided at a speed of 30 meters per second. It can be kept on the correct course only by the reactive power of the pulsed engines, so after the launching the guided rocket is stabilized at the expense of small single-use jet engines, which are 90. They are outside the control unit in several rows, they all work in a few seconds. The calculations are carried out by the processor, taking into account all the data necessary for the exact orientation of the rocket.

When the missile begins to decrease, the control system integrates signals from the global satellite positioning system and its own inertial system, and forms commands on the steering wheel. The positioning system of the new missile takes into account the possibilities of different positioning systems.

The deployment of the complex together with the charge of missiles takes place within 30 minutes. «Vielha» will make a high-precision tactical weapon suitable for mass use.

Keywords: *Vielha, missile complex, high-precision, tactical weapon.*

УДК 675.6.

IMPLEMENTATION OF INTERNAL AUDIT IN NATIONAL GUARD OF UKRAINE

Yurii Hirkin, Kharkiv

The aim of the research is to give a detailed analysis of the internal audit in the NGU and its development, achievements and challenges. Today, the issue of implementation of an effective system of organization of internal audit and adaptation of its methodology to the activities of budget institutions in general and to the National Guard of Ukraine in particular is being actualized.

The theoretical foundations for organizing internal audit in budgetary institutions are examined, and the process of implementing internal audit in the NGU, identifying its main problems and perspectives is studied.

There are quite a number of organizational and functional deficiencies that hinder the implementation and development of internal audit, which is why the priorities of budgetary institutions for further work on methodological support of internal audit are defined.

Attention is paid to a number of typical problems of divisions, the main directions of solving the problems of internal audit of the NGU, the criteria for internal and external quality assessment of internal audit.

An internal audit should include the collection of audit evidence by the employees of the internal audit unit with the use of methods, methodological techniques and procedures that provide substantiation of the findings based on its results, while the employees of the internal audit unit should independently determine these methods, methodological techniques and procedures depending on the situation and in accordance with the requirements of internal audit documents.

Keywords: *internal audit, public institutions, state financial control, internal audit standards, organization of internal audit.*

УДК 355.6

**THE DEVELOPMENT OF US MILITARY RATIONS: FROM PAST
TO FUTURE**

Dmytro Holosenko, Kharkiv

Modern ration research for the United States armed forces began when the US Army Quartermaster Corps opened a new Subsistence Research and Development Laboratory at its Chicago Depot in 1936. Out of that facility would come a whole range of specialized rations, scientifically designed and tested, for use in all sorts of military situations and climates.

Prior to 1940, each American military service was responsible for the procurement and distribution of their subsistence items. In 1941, based on the recommendation of the Hoover Commission study to centralize perishable food management into one organization, the Market Center System was established under the Army Quartermaster Corps (QMC). This organization sought and hired high quality experts from industry (i.e., Kroeger and Winn-Dixie supermarket chains) to serve as buyers and managers, supplementing Army personnel.

Until the mid '60s the demand for food was largely for non-perishables: both canned and dehydrated. But in 1966 thousands of portable, walk-in, refrigerated storage boxes filled with perishable beef, eggs, fresh fruits and vegetables began arriving in Vietnam. Change continued at a rapid pace throughout the 1970s and 1980s. The Direct Commissary Support System (DICOMSS), a data processing system to manage semi-perishable food items, was implemented.

The 1990s brought new challenges and roles. Significant support was provided during DesertShield / Storm, Hurricane Andrew relief efforts, Operation Restore Hope (Somalia Relief), Operation Provide Promise (Bosnian Relief), and Cuban/Haitian relief efforts.

Under the auspices of the DoD, the US Army Natick Soldier Research Development and Engineering Center (NSRDEC) DoD Combat Feeding Directorate (CFD) and the Defense Supply Center Philadelphia's (DSCP)

Directorate of Subsistence, Operations Rations Business Unit, collaborate employing a total life cycle approach in developing, testing, evaluating, procuring, fielding, and supporting all military rations. These rations are a vital contribution to the overall quality of life of the individual combatant.

DoD CFD is responsible for the research, development, engineering, integration, and technical support for the entire family of combat rations. In accordance with U.S. Army Regulation 40-25, Nutritional Standards and Education, the OTSG approves all menu changes that are made to rations. The Joint Services Operational Rations Forum (JSORF), which meets annually, approves all changes made to individual components within rations. The Operational Rations Business Unit at DSCP is responsible for developing and implementing a master strategy for the integration of the U.S. food industry into the combat ration program. The Directorate of Subsistence is also responsible for ensuring a logistical infrastructure is in place to supply present and future customers with the highest quality combat rations in a timely manner and at an affordable price.

Keywords: *combat rations, procurement, distribution, perishable, non-perishables, menu changes.*

УДК 352/354

ON THE PRINCIPLES OF INTERNAL AUDIT

Vadym Honcharov, Chernyhiv

Internal audit - the activities of the Internal Audit Service of the Armed Forces of Ukraine, aimed at improving the financial and material resources management system, preventing the facts of illegal, ineffective and ineffective use of budgetary funds and state (military) property by controlled entities, the occurrence of errors or other deficiencies in their activities, improvement of internal control.

The purpose of the audit is to provide the commander of the military unit and the military authorities with objective, independent conclusions and recommendations for their adoption of appropriate management decisions regarding the lawful and effective use and preservation of state funds and military property, the causes, conditions and consequences of identified violations and shortcomings in the expenditure of financial and material resources and other violations of the requirements of the legislation of Ukraine in the economic, financial and economic sphere and their prevention in the future.

During the audit, the state of internal control of military units is checked and evaluated.

Internal control is the activity carried out by the subjects of internal control in accordance with the Standards, to ensure:

- achieving the stated goals in the most effective, efficient and economical way;
- compliance with the requirements of the law when performing the assigned tasks;
- preventing potential events that adversely affect the achievement of goals;
- reliability, completeness, objectivity and timeliness of providing authorized officials of the Armed Forces of Ukraine information for the adoption of appropriate management decisions;
- conducting financial and economic activity in accordance with the requirements of the legislation;
- effective management of information flows (receiving, transmitting, storing information) and providing information security.

So, when assessing the state of internal control over the financial and economic activities of military units, it is determined whether the organization of the system of internal control in general fulfills the requirements of the guidelines for the organization of accounting, the registration of the relevant primary documents, etc.

Keywords: *audit, standards, management, funds, Armed Forces.*

УДК: 629

TECHNICAL SUPPORT OF TROOPS

Volodymyr Hovezhenko, Kharkiv

Comprehensive provision is a complex of measures that creates troops with favorable conditions for the accomplishment of tasks. The comprehensive support of the battle is carried out continuously, both during preparation and in the course of the battle.

The technical support includes a set of measures for: equipping battalion with weapons; organization of their trouble-free operation; the mastering of arms and military equipment by personnel; timely resumption of weapons and equipment after injuries; accumulation of inventory standards of material and technical means; renewal of logistics base; management of technical support units.

During the strategic deployment, preparation and conduct of the ATO, the following types of military transportation are carried out:

- operational (military troops);
- mobilization of the reserve component to active duty in military units, military schools and educational centers;
- supply and evacuation transportation by military vehicles, armaments, military equipment and material and technical means.

Operational transportation:

- personnel of military units together with armament and military equipment for carrying out combat missions, carrying out rotation of units, returning to permanent places of deployment;
- personnel of military units performing tasks in the ATO zone;
- rotation of personnel, dismissal of prisoners of war, evacuation of wounded and sick.

Mobilization transportation:

- transportation of reservists called up for mobilization to military units.

Delivery transportation:

- weapons, military equipment and material for the upgrading of military units, for repair, evacuation of damaged military equipment;

- transportation from the national economy of engineering and construction equipment to military units.

The analysis of military transport showed that railway transport is the mostly used for operative movement of military units.

For the purpose of organizing military transportation by railroad on the Donetsk railway, the provision of unhindered advancement of troops and transport was deployed by additional command rates of military commissions at 6 stations of Donetsk railway and 4 discharge stations of the Prydniprovska and Pivdenna railways in the ATO zone.

The continuity of military transportation can be achieved by its planning, and preparation of routes and vehicles for conducting transportation in advance.

An important factor in the successful implementation of military transport is the organization of interaction between troops and transport authorities.

***Keywords:** comprehensive provision, technical support, operational transportation, mobilization transportation, delivery transportation, railway transport.*

УДК 358.1

LIGHT ANTI-TANK GRENADE LAUNCHER RPG - 7

Vitalii Hrynakovskiy, Kharkiv

RPG-7 was adopted by the Soviet Army back in 1961, and despite such a solid age, it still remains in service. This grenade launcher participated in countless conflicts and wars on all continents. The emergence of new, more advanced ammunition makes the RPG-7 dangerous, even for modern tanks and armored vehicles.

RPG-7 is the favorite weapon of guerrillas and revolutionaries. It was used by Vietcong fighters in the Vietnamese jungle and Afghan Mujahedeen against the Soviet troops. By its simplicity, cheapness and efficiency, this weapon is not inferior to the Kalashnikov assault rifle.

No one knows how many instances of the RPG-7 today can be fighting in different countries of the world. Some experts believe that only «legal» (that is, issued by the manufacturer or under the license) copies are produced more than a million units. No one can say how many grenade launchers were released without a license or were stolen from military depots after the collapse of the USSR.

The RPG-7 can fire a variety of warheads for anti-armor or anti-personnel purposes, usually fitting with an impact and a 4.5 second fuze. Armor penetration is warhead dependent and ranges from 30 to 60 centimeters RHA; one warhead, the PG-7VR, is a «tandem charge» device, used to defeat reactive armor with a single shot.

Current production ammunition for the RPG-7V2 consists of four main types:

- PG-7VL, 1977, improved 93 mm HEAT warhead effective against most vehicles and fortified targets.
- PG-7VR, 1988, dual 64 mm/105 mm HEAT warhead for defeating modern armored vehicles equipped with reactive armor blocks. The first warhead (64 mm HEAT) detonates the reactive armor block prematurely and the second warhead (105 mm HEAT) passes through the gap to hit the exposed armor underneath.
- TBG-7V Tanin, 1988, 105 mm Thermobaric warhead for anti-personnel and urban warfare.
- OG-7, 1999, 40 mm Fragmentation warhead for anti-personnel warfare.

Keywords: grenade launcher, tanks, armored vehicles, conflicts and wars, Kalashnikov assault rifle.

INFORMATION-PSYCHOLOGICAL COUNTERACTION IN THE COURSE OF THE NATIONAL GUARD OF UKRAINE UNITS TASK PERFORMANCE

Ivan Hukalo, Kharkiv

Over the last years the means of informational and psychological impact on consciousness of the personnel of law enforcement bodies including the National Guard of Ukraine has become increasingly important. It is connected with the development of new information technologies and oversupply/glut of info sphere within which the servicemen spend their time both on and off duty. In such conditions information-psychological counteraction or as it is frequently called psychological war becomes vitally important.

The National Guard of Ukraine still does not have a special unit to perform the information-psychological counteraction. There are no special techniques, technologies and equipment to detect informational and psychological impact on servicemen. The legislative basis on the information-psychological counteraction performing by the units of the National Guard of Ukraine is absent. The fact that the role, place and means of information-psychological counteraction are not studied developed enough defines the up-to-dateness of the research.

Information-psychological counteraction is a deliberate process of psychological influence in order to strengthen the morale state of the military personnel and to neutralize the demoralizing activity of the enemy.

The consequences of informational and psychological impact might be on the one part - psychological fortitude disorder, twisted perception of reality and a serviceman's participation in it, demoralization, professional motivation reduction; on the other part - aggravating of personnel's psychological and personal problems such as maladaptation, growth of anxiety and fear, unmotivated bullying, carelessness and apathy.

Even if the above facts could be taken into account, effective counteraction to negative informational and psychological influence must be carried out not only by the law-enforcement bodies but with the participation of the state authorities, local authorities, mass media, political parties, etc.

Thus, the information-psychological counteraction is possible only on the assumption of: creation of a special unit, that is supposed to constantly deal with issues of information and psychological impact; developing of the necessary methods and technical means for effective informational and psychological influence; the legislative base creation; development of an effective model of interaction between law enforcement agencies and state bodies on issues of information and psychological impact counteracting.

***Keywords:** information-psychological counteraction, law-enforcement bodies, psychological influence, psychological war, information technologies.*

УДК 327.5

CURRENT DIRECTIONS OF NATO-UKRAINE MILITARY COOPERATION

Tymur Hyulialiiev, Kharkiv

Consultations and cooperation between NATO and Ukraine cover a wide range of areas including peace-support operations, defence and security sector reform, military-to-military cooperation, defence technology, interoperability and industry, science and environment, and public diplomacy.

NATO-Ukraine cooperation in the military sphere is carried out in accordance with the requirements of the annual national program, NATO-Ukraine cooperation and the Work Plan of the NATO-Ukraine Military Committee for the current year. A key objective of cooperation in this area is to strengthen democratic and civilian control of Ukraine's armed forces and security institutions. It includes four main directions, namely:

-raising the level of operational capabilities and interoperability of the

Armed Forces of Ukraine with NATO;

- cooperation on transformation, defense reform and professionalization of the Armed Forces of Ukraine.

- ensuring the participation of the units and personnel of the Armed Forces of Ukraine in peacekeeping and security operations and NATO Response Force.

- the use of mechanisms for military cooperation, consultation and cooperation, public information activities.

The realization of these directions is carried out by means of measures aimed at:

- practical use of military aspects of standardization to support the tasks of the Armed Forces of Ukraine, namely: improvement of strategic and defense planning, combat and mobilization, training of forces and development of operational capabilities;

- improvement of training of certain units of the Armed Forces of Ukraine, achievement of interoperability with NATO forces' military units, including the ability to perform missions in the combined multinational formations;

- improvement of management and communication system of the Armed Forces of Ukraine in order to ensure its interoperability and to continue the exchange of air data in the framework of the NATO *Air Situation Data Exchange* (ASDE);

- improvement of the logistical and medical systems of the Armed Forces of Ukraine, taking into account the need to provide support to national units on the territory of Ukraine and beyond;

- training personnel and units of the Armed Forces of Ukraine for participation in antiterrorist operations, anti-piracy operations and development of cybernetic defense capabilities;

- transition to the augmentation the Armed Forces of Ukraine by contracted servicemen, including further improvement of the personnel management system;

- optimization of the network of higher military educational institutions and educational units, improvement of the system of NCO multi-level training under the contract and commissioned officers of;

- training the troops based on multifunctionality, mobility and compatibility with the NATO standards;

- training, certification and practical participation of certain assets of the Armed Forces of Ukraine in the NATO Response Force, Peacekeeping Operations, counteraction to acts of piracy and terrorism;

-implementation of mandates of military-political dialogues, working meetings and consultations at all levels, development of military cooperation and harmonization of bilateral cooperation with the Alliance.

Ukraine's cooperation with NATO in the area of defence and security sector reform is crucial to the ongoing transformation of Ukraine's security and remains an essential part of its democratic transition.

Keywords: *NATO, cooperation, democratic transition, the Armed Forces of Ukraine, transformation.*

УДК 355

**PROSPECTS FOR THE DEVELOPMENT OF ARMAMENT AND
MILITARY EQUIPMENT OF THE LAND FORCES OF THE ARMED
FORCES OF UKRAINE BY 2020**

Ihor Ivanov, Kharkiv

The provision of weapons and military equipment to the Armed Forces of Ukraine in the long-term will be carried out by modernizing, repairing and gradually procuring the latest samples (systems, complexes) of missiles and ammunition of domestic and foreign production within the framework of the respective state target defense programs, implementation of innovative solutions that can be used for the development of new weapons and military equipment. Among them the following categories can be identified:

- renewal of armored arsenal with modern (modernized) models of domestic weapons - Oplot tanks, Bulat, BTR-3, BTR-4, BMP-1 tanks with a new combat module, heavy military infantry vehicle based on T-64 tank, Light Armoured Multipurpose Tracked Tractor MTLB with increased armor protection and a new combat module;

- equipping units of Missile Forces and artillery: modern unmanned aerial vehicles of domestic production (classes mini-and micro-) that will determine the location and character of the enemy's targets. Modern multifunctional means for providing shooting (navigation, meteorological support, intelligence and targeting), in particular, a complex of domestic production based on the apparatus of the CH-3003M and laser range finder;

- equipping the air defense units with new automated control systems to enable sector managers to have operational information about the airborne enemy;

- the introduction into the organizational structure of units battalions of air defense equipped with modern civil mobile radar systems that are capable of effective detection of small-scale airborne targets (type of air defense) at extremely small and small heights, ensuring their technical connection with air defense control points;

- development of domestic portable anti-aircraft missile systems, short-range short-range and short-range radar.

To make these provisions work well, efficient logistics system of the Armed Forces of Ukraine, integrated with relevant components of the other defence forces and able to effectively cooperate with the NATO and EU forces are expected.

Keywords: *domestic production, logistics system, military equipment, the Armed Forces of Ukraine.*

PROSPECTS FOR THE DEVELOPMENT OF ARTILLERY FUSES

Ihor Kalmykov, Kharkiv

For many years, artillery shells have traditionally been equipped with four types of fuses – impact fuses, delay impact fuses, time fuses and proximity fuses.

Until now, such fuses contained a large number of mechanical parts with their inherent disadvantages. At present, all types of fuses are gradually replacing mechanical parts for electronic blocks, enabling the combination of all types of actions in one device. But, despite the long-lasting character of this major trend, traditional mechanical fuses continue to have advantages in some areas of application.

One of the problems that arises from replacing mechanical subsystems with electronic blocks is to equip the fuse with a power source. In spite of this, in the leading countries of the world (USA, Israel, United Kingdom, South Africa, Germany, France) an intensive development and testing of prospective electronic tube artillery fuses is underway.

Among the electronic explosive devices created recently, the most widely used are time fuses. At the same time, such fuses, as a rule, also retain the function of impact action when encountering an obstacle, that is, they are fuses of combined action.

The USA has the most advanced level of development of artillery fuses. Under the US program of OCSW (Objective Crew Served Weapons) aimed at modernization on close combat weapons, alongside with 30-mm rounds for automatic guns, a 25-mm grenade was developed for an automatic grenade launcher with a time fuse.

Currently, land forces and the US Marine Corps use HE (high explosive) fragmentation shells equipped with proximity fuse M732A2 made by ATK Alliant Techsystems. Using the rotary ring, the flight time to the target is set in the range

of 5 ... 150 s. For proximity explosion of the projectile, a built-in Doppler radar of continuous radiation is used.

The growing need in high accuracy of shooting at a large range led to the emergence of programs for the development of fuzes, which combine the implementation of classical functions with one form or another of the correction of the flight trajectory of the projectile in one device. The flight trajectory of artillery shells with "intelligent" fuses can be adjusted either in range only, or both in range and direction. The most common type of correction is a correction in range only, because when shooting at long distances, the precision of range is a dominant component of the overall failure. The mistake in range can be corrected by changing the aerodynamic resistance of the projectile.

Correction of the trajectory both in range and direction would have required the equipment to fit a fuse with stabilized by the angle of decline (horizontal) rudders, and most precision-munitions designer groups, based on practical considerations, would prefer to develop special projectiles, than fuses of that kind.

Thus, from the above mentioned it is clear that the world is actively conducting research and development on the creation of long-range projectiles. In the development of artillery ammunition, the emphasis is shifted to the problem of increasing the accuracy of firing of conventional ammunition. Close attention is paid not only to the development of a new class of fuses, but also to their elemental basis, the possibility of using promising technologies in the design and manufacture of fuses.

Consequently, the main areas of development of fuses are:

- combining the types of fuses (impact fuses, delay impact fuses, time fuses and proximity fuse) into one multifunction device;
- replacing mechanical sub-systems of the fuse with electronic blocks;
- replacing mechanical timing mechanism in time fuses with electronic timer;
- application of inductive installers of modes of operation in a fuse;

- use of «intelligent» fuses with the correction in range of flight.

Keywords: *artillery, fuse, development fuses, «intelligent» fuses, impact fuses, delay impact fuses, time fuses, proximity fuses, electronic timer, electronic blocks.*

УДК 355.6

PROBLEMATIC ISSUES OF THE LOGISTIC SUPPORT SYSTEM DURING PERFORMING THE TASKS OF TERRITORIAL DEFENSE

Yevhen Kaplun, Kharkiv

At the present time, due to the changing socio-political situation in the world in the whole and in Ukraine especially, new challenges related to the protection of state sovereignty, territorial integrity and inviolability arise.

The performance of such tasks, including the tasks of territorial defense throughout the entire territory of Ukraine or in its separate areas, is mainly on the Armed Forces of Ukraine.

The National Guard of Ukraine, as a military formation with law enforcement functions, also takes an active part in the tasks of territorial defense. The units of the National Guard of Ukraine conduct territorial defense tasks under the command of the Headquarters of the territorial defense zone, which is located in the respective military-land zone of responsibility of the operational command of the Land Forces of the Armed Forces of Ukraine, together with other military formations, and law enforcement bodies.

Realization of the tasks of territorial defense entrusted to the subjects of the security and defense sector, which includes the National Guard of Ukraine, namely: implementation of a set of military measures that are used during a challenge or repulsing the act of aggression for the purpose of security of the state frontier from external encroachment; provision of conditions for reliable functioning of state bodies, mobilization and operational deployment of troops (forces); protection of key infrastructure and communications lines; counter sabotage and reconnaissance

forces and other armed formations of an aggressor on the territory of the country; and sustainment of military regime depends on the military-economic potential of the country.

Protection of the state is impossible without reasonable logistical assistance, an integral part of which is the logistic support. Each military unit of the National Guard of Ukraine has a system of logistic support for handling of logistic activities. Such a system has its structure, forces and means, and tasks assigned to the system of this type of security.

In peacetime the system of material support of the military unit of the National Guard of Ukraine, that operates in the normal mode, during performing its tasks in training and combat operations, fully meets demands of the units of the National Guard of Ukraine. However, if we consider the effectiveness of the system of logistic support during the engagement in a special period, conducting area defense, its ability, as the facts prove on the example of the military units of the National Guard of Ukraine in eastern region, is not sufficient to carry out its tasks in the context of the cost of financial resources, in the limited availability of technical resources, time frame, etc., which also largely depend on the structure of the logistic supply system. Therefore, there is an urgent need to consider the structure of the material logistic system with the further development of a synthesis methodology of a reasonable structure that will enable the units of the National Guard of Ukraine to fulfill the tasks of territorial defense.

Keywords: *logistic support system, territorial defense, the National Guard of Ukraine.*

**DEVELOPMENT OF INTERNATIONAL COOPERATION IN THE
NATIONAL ACADEMY OF NATIONAL GUARD OF UKRAINE**

Maksym Karpenko, Kharkiv

In this paper, we consider the way the National Academy of the National Guard of Ukraine is actively developing new forms of cooperation with universities-partners through common participation in international projects financed by international funds and programmes, continues to expand its foreign relations within the framework of programmes of international cooperation with the law enforcement units of the countries of the world.

This allows us to study the best practices of officer training and exchange experience with different countries of the world, and contributes to the establishment of mutually beneficial relations, expanding horizons.

The purpose of this activity is the integration of the Academy into the European educational system, as well as attraction of foreign investments in the sphere of education of Ukraine.

On the basis of the language center, which is created in the Academy, officers are trained for international peacekeeping. Officers and cadets are on business trips abroad, participate in internships, exercises, international seminars and conferences in different countries.

Within the framework of international cooperation, a program of teaching French and German to students of the Academy directly with native speakers of these languages has been functioning for several years. I believe these measures contribute to the improvement of language training of cadets and students, and for teachers of French and German languages enriching pedagogical experience of international teaching practice.

Thus, international relations of The National Academy of the National Guard of Ukraine contribute to the growth of professional potential of scientific and pedagogical workers, the development of educational, material and technical

support of the educational process, the growth of the authority of the Academy both in Ukraine and abroad.

Keywords: development, NANGU, improvement, experience, international relations.

УДК 623.438.3

PERSPECTIVE MOVABLE FACILITIES TO RECOVER MATERIAL

Oleksandr Khlystun, Kharkiv

Intensive development of facilities and methods of conduct of battle actions produces enhance able system requirements hardware of troops, including to the complex of movable facilities of renewal of armament and military technique. However, the analysis of the state of park of movable facilities of renewal in troops exposes the tendency of their aging. Presently, the bulk of movable facilities of renewal in troops is made by the complete set of machines of 1980th.

Experience of conduct of the battle operating showed on east of Ukraine, that the existent recovery of military motor-car technique system provided the decision of the tasks laid on it not to a full degree. Often the repair subdivisions placed on the collapsible point of the damaged machines appeared under loaded, because present in their order regular evacuation facilities did not provide timely delivery of the damaged objects.

Taking into account the necessity of creation of mobile universal repair-evacuation technique that will allow by means of the same cars to conduct evacuation and moving of repair shops (baskets-containers) in the new districts of development to unite separate evacuation and repair subdivisions in a single organ (mechanism), making repairs and providing itself by a repair fund.

An example for the development of mobile in the modular execution of technical equipment by domestic enterprises can serve as Leyland DROPS (Demountable Rack Offloading and Pickup System), which translates as “loading

and unloading system". This machine with a platform and a lifting mechanism from the hydraulic drive has the ability to load (the platform with the load moves from the ground to the frame), to transport and unload 15 tons of cargo. The DROPS system is controlled by the driver without leaving the cab. Duration of loading or unloading is only a few seconds. This car was specially designed for the Armed Forces of Great Britain. Leyland DROPS brilliantly showed its best qualities in the conditions of real combat operations during the operation "Desert Storm", as well as during the UN peacekeeping operations in Bosnia.

The creation of mobile repair and evacuation equipment will provide:

- an increase in the efficiency of the use of dual-use vehicles in the recovery system of weapons and military equipment;
- the integration of disparate evacuation and repair units into a single body (mechanism) that produces repairs and provides itself with a repair fund;
- reducing the number of vehicles to ensure the functioning of the recovery system of weapons and military equipment;
- empowering the evacuation and transportation of tracked vehicles, tractors, etc. without attracting additional special evacuation equipment.

Keywords: *movable facilities of renewal, repair-evacuation, baskets-containers, empowering.*

УДК 356: 658.7

THE CURRENT CHALLENGES OF SUPPORT AND SUPPLY SYSTEM OF UNITS IN COMBAT ENVIRONMENT

Yurii Konopliov, Kharkiv

The purpose of this article is to analyze the ways of forming a reasonable rational variant of the support and supply system (SaSS) of the Armed Forces of Ukraine (AFU).

In this time, there is a problem situation, in which the process of optimizing the effectiveness of combat operations of troop groups is not always accompanied by a search for a reasonable rational variant of their logistics.

The classical structure of the Soviet Army's SaSS, which remained for Ukraine, was based on a set of stationary logistic bases with a sufficient number of transport units and units of the logistics, which allowed the creation of a deep-seated system of logistics of troops.

Numerous reforms and reductions in the AFS in recent years negatively affected the quantitative and qualitative composition of the logistics departments and logistics specialists at various levels, which in turn led to a limitation of the ability to provide comprehensive support to combat units at the beginning of the armed conflict in the East of Ukraine in 2014.

In addition, as a result of the reduction of the network of logistic centers, the terms for replenishment of stocks were increased during combat alert and in the course of fighting, due to the increase in distances from them to parts.

Thus, at the present time in the SaSS area of the AFU there are a number of problems, the main of which are:

- SaSS is unbalanced by subordination, cumbersome in terms of organizational and a staff structure of the governing bodies, as a result highly costly, doesn't take into account the changes in the structural adjustment of troop control units;
- there is a need to establish a new improved logistics system and the introduction of a system of reliable support for troops by ammo and other material and technical means;
- outdated and imperfect legal and regulatory framework in the support and supply area of the AFU.
- Improvement of the efficiency of the logistics system of the AFU may be achieved by the following measures:

- the location of mobile modules of logistics centers to be carried out in accordance with the loading of the Logistics, taking into account the location of the combat units;
- to expand the system of training of specialists to reduce the dependence on the services of commercial structures, especially during the conduct of hostilities;
- to accelerate work on increasing the number of newest models of logistics equipment in logistics and combat units.

Keywords: support, supply, logistic system, Armed Forces of Ukraine.

УДК 623.438.2

ARMORED PERSONNEL CARRIERS TODAY AND TOMORROW

Mykola Korosteliiov, Kharkiv

Appearing a few decades ago, armored personnel carriers firmly took their place in the units of the National Guard of Ukraine, this type of equipment clearly showed how an armored vehicle for transporting personnel is more convenient and reliable than unprotected vehicles.

However, over time, the tasks assigned to the Armored Personnel Carrier slightly changed, just as the modern war changed its appearance. As a result of such transformations, the disadvantages of the concept of a relatively light wheeled or tracked vehicle for transporting personnel began to appear more and more clearly.

To date, there is a specific situation in which armored personnel carriers, created in accordance with the ideas of past years, can no longer fully work on the battlefield. Urban battles and counter guerrilla operations, as practice has shown, are too risky for vehicles that do not have all-round protection against large-caliber small arms and anti-tank weapons. Attempts are regularly made to correct the current situation by changing certain elements of the project, but not always these changes give the expected.

Itself suggests a way to solve all problems or, at least, to minimize them. The most obvious is the design of a new armored personnel carrier with acceptable all-around protection against small arms and anti-tank weapons, perhaps even of a modular type.

In this case, you may have to sacrifice the ability to cross water obstacles or the ability to transport several cars at once on one transport plane.

In accordance with the available weight, it is necessary to design the power plant of the machine having a specific power of not more than 19-20 hp. per ton of weight. A hypothetical prospective armored personnel carrier should be equipped with an engine, the characteristics of which will ensure sufficient power density even after the installation of all possible additional protection systems.

It is quite clear that such an approach to shaping the appearance of the future armored personnel carrier will not allow for the refinement of existing equipment.

Most likely, you will have to start a completely new project and, using the developments of the previous ones, to ensure compliance with the existing requirements. It is unlikely that such a project will be simple and cheap, but it will significantly increase the combat potential of the infantry. Now there is reason to believe that the wars of the near future will be exclusively local in nature, and besides urban battles will retain great importance. In this case, it is required to work out as soon as possible the appearance of a new protected transport for infantry and begin its development.

Keywords: *armored personnel carriers, vehicle, all-round protection, protection systems.*

**ON PROVIDING SERVICEMEN OF THE NATIONAL GUARD OF
UKRAINE WITH PERSONAL CLOTHING ITEMS IN TIME OF PEACE
AND SPECIAL PERIOD**

Anatolii Krutenchuk, Kharkiv

The provision of material supply of servicemen of the National Guard of Ukraine is conducted in accordance with regulations and includes:

- clothing supply and creation of appropriate conditions for storage of individual items of material property;
- creation and storage of stock reserves of military property;
- maintenance of ablutions;
- recovery of clothing items;
- accounting management, and store service reporting;
- planning and control of finance and state funds allocated for providing clothing items.

Clothing property are the items of uniform, shoes, underwear, bed linen, special equipment, insignia, sport equipment etc. According to the established standards of providing servicemen with clothing property the first distribution of clothing items starts as soon as servicemen obtain particular status and rights. Military personnel categories which are eligible to receive clothing items:

- Senior (General) Officers – on a day of promotion to the rank of Major-General;
- commissioned Officers – on a day of promotion to their first officer rank;
- non-commissioned officers, who sign a contract, and members of military reserve – on a day of their enlistment by the order of Commander of a military unit;
- cadets studying at higher military institutions – on a day of their enrollment to the educational establishment;

- conscripts – on a day of their enlistment in a military unit;
- servicemen who were transferred to a new unit from another military formation, reenlisted public authorities – on a day of their enlistment in a military unit;
- members of a military reserve who were called to active duty by a particular order – on a day of their enlistment;
- servicemen who were called to active duty during the mobilization, in the special period along with retired military personnel called to field (special) training – on a day of their enlistment in a military unit.

Next distribution of the clothing items starts after the term of wearing previously issued clothing items is over. Military personnel who are provided with clothing property through the military unit in which they serve include:

- commissioned officers and enlisted men who sign a contract and also reservists are provided with military clothing items directly through a store service of the military unit;
- cadets studying at higher military institutions – through the departments they are studying at;
- servicemen who were called to active duty – through the unit they are servicing in;
- servicemen who were called to active duty during the mobilization, in the special period along with retired military personnel called to field (special) training – through the unit they are servicing (training) in.

Distribution of the clothing items among military personnel who are not under provision of a military unit is prohibited. Clothing items are given ready-made or they can be individually tailored. Distribution of the military clothing among the servicemen for their personal usage is carried out according to their anthropometric measurements including height, neck size, waist and hip measurements, foot size.

Individually tailored uniforms for enlistees of non-commissioned officers rank who are serving under a contract and those who were called to active duty is possible only with the written permission of Department of Clothing Provision and only in the case when necessary sizes of ready-made clothes (uniform, footwear) offered by supplier companies are out of stock. Uniform items are made from different material for each rank. Clothing items are given to enlistees for the further service term.

Distribution of the clothing items among military personnel prematurely (before the term of wearing according to the established standards is over) is prohibited, with the only exception of cost-free clothing items substitution in case of their loss or damage by the servicemen when being on duty or because of natural disasters, and after detecting some defects. The terms of wearing of substitute clothing items are calculated from the date of their issue.

***Keywords:** clothing items, distribution of the clothing items, Senior (General) Officers, non-commissioned officers rank, store service, individually tailored uniform, anthropometric measurement, uniform items, clothing items substitution, rendition.*

УДК 355.6

BASIC PROVISIONS ON LOGISTIC SECURITY OF THE NATIONAL GUARD OF UKRAINE

Maksym Kryvorotenko, Kharkiv

Modern challenges and threats to the state security of Ukraine require the creation of effective mechanisms for fighting and counteracting such threats, in particular, the urgent reformation of security and defense sectors, including the National Guard of Ukraine, as one of the key components of this sector, based on EU principles and standards and NATO.

The logistics support of the National Guard of Ukraine, as well as of the Ukrainian Armed Forces, should include:

- logistics support planning;
 - identification of material and technical support needs;
 - development of technical tasks for the production of armament and military equipment and logistics equipment for the specific needs of the National Guard of Ukraine
- procurement, supply, storage, repair, maintenance, operation, sale, disposal of surplus weapons and military equipment;
 - planning and implementation of military transportation by all available means of transport, quartering of troops, procurement of works and services, bath-laundry and trade and household services, catering, procurement or construction, maintenance, operation of military infrastructure objects.

The logistics support of the National Guard of Ukraine must conform to the following principles consistent with NATO's legislative logistical support, namely: priority, sufficiency, efficiency, flexibility, transparency, coordination, responsibility, cooperation, interoperability, sustainability, etc.

The logistics support system of the National Guard of Ukraine should be divided into operational, operational-tactical and tactical levels, with a clear distribution of functions and powers for the organization of logistics support of the National Guard of Ukraine. Therefore, it is advisable to take into account the above provisions when developing the relevant guidance documents on the creation of a logistics system for the National Guard of Ukraine.

Keywords: *logistics, National Guard of Ukraine, components of logistics, functions of logistics, principles of logistics, system.*

THE ROLE AND PLACE OF ARMORED VEHICLES IN MODERN MILITARY CONFLICTS

Ruslan Kulyk, Kharkiv

Land forces in the overwhelming majority of countries of the world are an organized set of military formations with a hierarchical system of governance, a large number of personnel and diverse types of weapons. Analysis of weapons and military equipment, which is used by land forces of the Armed Forces, shows that their main samples are tanks, armored combat vehicles, self-propelled and trailer cannons and mortars, anti-aircraft missile complexes, and the like. The use of the listed weapons and equipment on the battlefield usually involves the operation of a very cumbersome and inert system, which, as evidenced by the experience of recent wars and armed conflicts, is not always easily-guided and highly effective.

The analysis of research and publications on the development and use of armored vehicles has shown that they are mainly based on the chassis of multipurpose vehicles and carry out tasks for personnel transportation, fire support of actions of tactical mobile groups that are in isolation from the main forces, as well as the execution of special, reconnaissance, search and rescue tasks.

The experience of using UPS in the military conflicts over the past years, in particular in the ATO area in the east of Ukraine showed a discrepancy in the tactical and technical characteristics, the technical readiness of certain types of ABBs, the nature of the tasks that are actually dealt with. One of the reasons for this discrepancy is the low level of protection of the UPS and the personnel from the defeat of small arms, fragments of bombs, mines. Such circumstances led to the creation, in a proactive manner, of both industry and volunteer organizations of many variants of improvised armored cars.

The involvement of traditional armored tank vehicles, armored personnel carriers, or armored personnel carriers to protect against terrorist attacks has shown

insufficient efficiency. As a consequence of this, the Military Armies of the world's leading countries began to be equipped with an ever-increasing number of armored MRAP-protected vehicles (Mine Resistant Ambush Protected).

The use of armored vehicles allowed to achieve: reduction of personnel and equipment losses; increase of survivability, maneuverability and firepower of subdivisions; increasing the autonomy and duration of action units in isolation from the main forces; preservation of motor resources and combat capability of the basic samples of military armored vehicles, as well as increasing the level of protection of special equipment. Modern armored cars are characterized by high traction-speed properties, high cross-country mobility, the availability of weapons and special equipment, increased security, reduced of being transported, the possibility of transportation by airplanes and helicopters, as well as high autonomy.

Keywords: machinery, cars, military, improvement.

УДК 355.2

**VOCATIONAL IDENTIFICATION OF HIGH-SCHOOL STUDENTS
REGARDING PROFESSIONAL MILITARY SERVICE FROM
SCIENTIFIC AND PEDAGOGICAL PROSPECTIVE**

Bohdan Kushnir, Kharkiv

In 2002 reformation of military formations and law-enforcement agencies of special purpose was started by changing the way of their recruitment from conscripts to professional army. However, only the Security Service of Ukraine (in 2007) and the State Border Guard Service of Ukraine (in 2008) succeeded to complete this process.

The main part of military personnel who sign the contract for the first-time are those who stayed in the army after regular service. If the transition of military formations and law enforcement agencies of special purpose to the professional method of composition will end (the enlistment for the regular service will be

canceled), and the conditions under which this process will be carried out will remain unchanged, the effectiveness of the implementation of military operations will decrease.

After talking to a military personnel, a regular serviceman can find out about the conditions of service as a recruit, about the prospects of further service, he is able to obtain all the necessary information for a positive decision on the conclusion of signing a contract. Of course, other people do not have this opportunity. Through mass media, general information about the attractiveness of the military profession - such as defending Motherland, honor and devotion - can be disseminated. For a detailed explanation of the entire set of material benefits, career prospects and educational programs, you must work individually with each potential candidate. Consequently, with the termination of the existence of the professional method, the most significant conditions for the formation of a regular service of readiness for military service under the contract will disappear. In this case, there is a practical problem.

It is advisable to solve this problem in general educational institutions through professional identification of senior pupils regarding signing the contract for the military service.

***Keywords:** army, military formations, conscript, law-enforcement agencies, honor, recruit.*

УДК 355.6

ON THE DUTIES OF THE CHIEF OF CLOTHING SERVICE IN THE NATIONAL GUARD OF UKRAINE

Vasyl Kuzmuk, Kharkiv

The chief of clothing service of a military unit is responsible for providing the personnel of the unit with clothing and household goods according to the standards of supply. They deal with maintenance, storage and keeping the supplies in order and proper serviceability; individual tailoring of clothing and footwear to

personnel. Besides, their remit includes combat training and education of the subordinate personnel and setting high standards of military discipline.

The chief of clothing service is subordinate to the Deputy Commander, logistics, and directly controls personnel of clothing service of a military unit.

The chief of clothing service of a military unit carries out the duties according to the articles 82-84, 98 of the Internal Service Regulations of the Armed Forces of Ukraine and article 3.1.9 of these Regulations and in special cases gets under command of superior chief of clothing service.

In addition, chief of clothing service is obliged:

- to participate in the development of the annual economic plan of a military unit for a year and organize the implementation of related to the service provisions;
- to check the level of provision of uniform and accessories for soldiers and sergeants who are going to retire;
- from time to time to conduct morning inspections of uniform and footwear of personnel;
- to organize the work of bath and laundry facilities in the military unit, as well as to provide control of the quality of laundry service;
- to assist the Commissary service in determining the demand in military uniform, insignia and other accessories to be on sale for the unit personnel, and to monitor the supplies to make sure that they are always on stock.

This position makes an integral part of a military unit.

Keywords: *chief of clothing service, the Armed Forces of Ukraine, duties and responsibilities.*

**FUNCTIONING OF THE CIVIL DEFENSE SUBSYSTEM
IN THE MINISTRY OF DEFENSE OF UKRAINE**

Serhii Kuznietsov, Kyiv

The main purpose of the creation and functioning of the functional subsystem is to protect the population and territories from possible emergency situations of the Ministry of Defense and the Armed Forces of Ukraine in peacetime and in a special period, ensuring the readiness of the forces and means subordinated to them for actions aimed at preventing and responding to extraordinary Subsystem Functions:

implementation of civil protection measures in the military sphere;

ensuring the readiness of the bodies of military management, the forces and means subordinated to them, which are involved in the elimination of possible emergencies and dangerous events;

timely and accurate information of servicemen, civil servants and employees of the Ministry of Defense and the Armed Forces of Ukraine about the threat of emergence, the actual situation and the measures taken;

carrying out rescue and other urgent works on localization of emergencies and liquidation of their consequences;

ensuring the planning of measures for civil protection of the functional subsystem;

organization and conducting of trainings on the preparation of government bodies and their forces subordinated to the elimination of possible emergencies;

ensuring the implementation of the requirements of technogenic safety at potentially dangerous objects and objects of high danger and other objects that may create a threat of an accident;

creation, preservation and rational use in military units, institutions, enterprises, organizations of reserves of material resources necessary for prevention and response to emergencies and their consequences;

the exercise of other powers in the field of civil protection, provided by law.

During the elimination of the consequences of man-made and natural-emergencies, determined emergency response forces are carried out from the control points at the points of permanent disposition. Moving control points are kept ready to perform assigned tasks.

For the control of the functional subsystem in the modes of daily operation and high availability, the forces and means of the stationary information and telecommunication units of the Armed Forces using the fixed communication network, telecommunication networks of general use and special purpose, as well as the network of government communications are used.

Emergency response forces include forces of consolidated units (troops, teams, groups) of military units, enterprises, institutions and organizations determined by commanders and emergency response plans.

The provision of emergency response forces by the necessary logistical equipment, military-technical property in accordance with the norms are carried out by the relevant military management bodies, which are entrusted with the functions of providing and functions of the customer.

Involvement of emergency response forces to the emergency response is carried out by the management bodies subordinated to such forces in accordance with the Consolidated Plan for the participation of the Armed Forces of Ukraine in the elimination of the consequences of man-made and natural disasters, emergency response plans and localization plans and liquidation of the consequences of emergencies in the manner prescribed by law.

Functional subsystem of prevention of emergencies and liquidation of their consequences at the objects of the Ministry of Defense, Armed Forces of Ukraine in co-operation with other security forces in general is able to prevent emergencies and take effective measures to eliminate their consequences.

Keywords: *Ministry of Defense, function Subsystem, objects of the Armed Forces, military management, protect the population, emergency situations.*

УДК 355.6

FEATURES OF MATERIAL-TECHNICAL SUPPLY OF THE MILITARY UNIT

Vyacheslav Leiko, Kharkiv

The functioning of any entity in the economic system, including the military unit, cannot be effective without a reliable, well-established logistical and financial support for its activities. Military units are legal entities and in this capacity, within the limits of the current economic and financial legislation of Ukraine, independently organize commodity-money activities on material and technical and financial provision.

Logistical and financial support of the military unit is a system of commodity-money and economic relations that arise between the military unit, on the one hand, and the higher authorities of military management, authorities, enterprises, organizations and institutions, on the other hand, in the process of centralized supply of material, technical and military resources (raw materials, fuel, equipment, property, materials, weapons and ammunition); execution of contracts of sale (wholesale), sale of funds for the sale of products and means of production; provision of logistical support and financing of their activities.

Keywords: *financial security, money supply, real estate, material and technical support.*

УДК 355.6

BASICS OF ORGANIZATION OF LOGISTIC SUPPORT OF TROOPS

Volodymyr Lyadyk, Kharkiv

This work presents basic theoretical provisions, and the requirements of the guidance documents for the basics of logistics of troops. Logistics, along with moral and psychological, combat, technical and medical support, is an integral part of the comprehensive provision of combat operations of the troops and consists in organizational and practical measures for its types: material, transport, engineering

and airfield, airfield and technical, veterinary, commercial and domestic, residential, operational and financial support of units and formations in order to maintain them in a combat-ready state and create favorable conditions for the performance of tasks.

Logistics support is organized and carried out according to the plan of the battle in close coordination with technical and medical support on the basis of centralized decisions on placement and movement administrative, technical and medical support to the units and formations.

The success of logistics support in the units and formations during the fighting fully depends on the timely and high-quality training of their rear. Preparation of the rear is carried out simultaneously with the training of troops. It is organized by the Deputy Commander of units at the rear through the chiefs of services and commanders of units in the rear.

Comprehensive training and maintenance of units of the rear in high combat and mobilization readiness and ability to organize the transfer to combat includes various activities. Combat (including tactical and rear) mobilization, humanitarian and special training of Deputy Commanders of units and formations in the rear and heads of services, commanders of rear units are organized and carried out with consideration of the nature of modern combat, the specialization of units and features of possible areas of hostilities.

Direct preparation of rear units for particular level of readiness begins from the moment of receiving the task and transferring it from peaceful to military position. As a result of these and other activities, the military rear should be fully prepared to perform tasks to ensure the availability of units in the course of hostilities.

The placement and movement of units in the rear in the preparation and in the course of the battle is held with the purpose of timely performance of tasks for logistics and rear services and technical support. Therefore, for logistical support of troops it is necessary to know certain rules and regulations.

Keywords: rear, provision, training, logistical support, units and formations.

УДК 355.4

**PRINCIPLES OF NATO LOGISTICS AS EXAMPLIFIED BY THE
ARMED FORCES OF BUNDESWEHR**

Oleksandr Malyk, Kharkiv

In our research we regard logistics as a stockpiling and distribution of state resources, which are allocated for military purposes and are to provide armed forces. A good example can be set by the organizational structure of logistics in NATO countries. Here logistics covers:

- material and technical supply and preservation of material and technical means in good condition;
- transport and transportation of sick and wounded and placing them in hospital, the construction of military facilities, logistics and administrative activities.
- material and technical support (supply, evacuation and maintenance of material and technical means).
- health service (medical waste, evacuation and accommodation in hospitals of sick and wounded), cash supply, field mail, etc.

To ensure supply within the ground forces, subunits and supply units are created. In the structure of the battalion there are the Chief of Support services, a group of the support services, a group of material accounting, the head of supply company, the commander of the support units of the battalion.

In the general structure of the Bundeswehr, starting from the corps and below, there are the following divisions and supply services units. Supply companies provide support and supply for the corps (ammunition, fuel, food, engineering equipment, etc.) in which the storage of short-term stocks of material resources and supplies is organized, as well as handling (loading, unloading and

reloading) of cargoes. Three transport battalions transport the necessary cargo to the warehouses of the supply base.

For the purpose of operational support of units with military ammunition, special supply chains are established, which cover the route directly from the supply base to the battlefield.

Keywords: logistics, support and supply, distribution of resources, transportation, evacuation, rear.

УДК 614.8

SHOCK BLAST WAVE – IMPACT AND INDIVIDUAL PROTECTION

Ivan Martyniuk, Lviv

Local wars and armed conflicts over the last decennary have changed the tactics of fighting - more often used rocket bombs, mortar or artillery shelling, including with the use of rocket jet systems; raid clearings of the area; the use of mine explosive devices, etc., due to the change in the type of weapons used (in Korea, Vietnam, Algeria, Syria, Israel, Iran, Afghanistan, Iraq, Yugoslavia, etc.). The statistics show that today the main cause of injuries or deaths is a shock wave and high-speed penetration of the wreckage. The high probability of injuries is explained by the increased danger of an explosion during the search for, loading, unloading, transporting, disposing of and destroying explosive dangerous objects (EDO).

Shock blast wave, arising from the bursting of a mine or a projectile, is accompanied by supersonic flow and overheated air, causing thermal damage to the outer covers and respiratory tract. The load on a person from an explosive wave depends on the pressure, time of action and velocity of wave propagation and is determined taking into account the environment of the terrain (soil, air, water), its interaction with obstacles and other factors. The mechanical impact on the personnel composition depends on the location in the zone of the explosion: the zone of detonation of the wave, the zone of action of the explosion products, the

zone of action of the air shock wave. This leads to various complexity of lesions from light to extremely severe, possibly lethal.

The problem of individual protection of servicemen (especially engineers) from the impact of high-speed particles (fractures of EDO during the explosion), from a few grams to tens and hundreds of grams, flying at speeds from 0.3 to 10 km / s, has become particularly relevant.

The most effective and complex protection against damage to firearms, cold weapons, ammunition fragments is the means of personal protection and equipment of fighters (kevlar (aramid) helmets, body armor, etc.). More attention is being paid to the ability to provide protection not only from debris, but also from bullets, which is a more complex task. Another problem is the weight of protective equipment. So, the weight of an anti-bullets body armor on average is up to 12 kg, and reducing the weight reduces its protection. The use of advanced technologies: "liquid armor", nanoparticles, fibrous fibers of different thickness with helium, which instantly hardens when hit the ball will reduce the weight of the protective equipment. Thus, a body armor made of fiber and fabrics on their basis with the same size and protective ability as steel plates, will weigh 2.5 kg, and from the "liquid armor" - 1.8 kg. In addition, "fluid armor" distributes the impact forces across the entire area of the equipment, while a solid armor plate concentrates it at one point and often causes a soldier serious injuries: from hematoma to fractures.

Experimental studies of the interaction of various protective materials with high-speed particles (firearms, cold weapons, ammunition fragments) are necessary for research and creation of effective personal protection and equipment of fighters (especially engineers). They are very expensive. In order to predict the development of a dangerous situation and prevent its adverse effects, it is possible to use the mathematical modeling of the explosion dynamics, taking into account the various factors affecting it (creating regular models, that is, models that take into account, on the one hand, the basic physical processes, and, on the other hand,

adapted to practical use). Thus, the process of improving personal protective equipment and equipment should be continued.

Keywords: *explosive shock wave, explosive hazardous items, fragments of ammunition, explosion dynamics, personal protective equipment and equipment, body armor, mathematical modeling.*

УДК 355(477)37

**ANALYSIS OF MODELS, METHODS AND METHODS OF
CALCULATION OF THE COORDINATE OF THE SURFACE SOURCE
BY THE MOBILE EQUIPMENT IN THE INTERACTION WITH THE
UAV**

Anatolii Melnychuk, Kharkiv

In the context of events unfolding on the battlefield, the situation is considered when the enemy fires several types of weapons, and the task of the division commander is to analyze all the enemy's fire points, their location before the enemy destroys ours. And if intelligence information obtained with an unmanned aerial vehicle (UAV) comes to the mobile device and after processing it gets to the screen in the form of coordinates of the enemy's fire points, indicating the type of enemy weapon, and also in real time?

The purpose of the work is to study the possibility of creating a system for determining the coordinates of the sound source (shot) on the basis of a mobile device in conjunction with the UAV. Determine and implement the algorithm for constructing a mobile application for Android that calculates the coordinates of the shot.

In modern problems of optimization of the applied nature the target function depends on many starting parameters. In many cases, there is no formula for the target function, but there is only the possibility of determining its values at arbitrary points in the area under consideration by some computational algorithm or by physical measurements. The task is to approximate the definition of the

smallest value of a function in the whole region with its known values at separate points.

The general search methods using continuous search for solving multidimensional optimization problems are not effective. Necessary special numerical methods based on purposeful search.

The method of gradient descent reduces the problem of finding the smallest value of the function of many variables to the multiple solutions of one-dimensional optimization tasks for each design parameter.

Using the fastest descent method with split step, the step size for each iteration is selected, provided that any next step brings us closer to the extremum of the hyperboloid, and hence to the corresponding value of the coordinates of the desired point.

By analogy with the principle of building it we will construct a system of interaction between the elements of the model of calculating the coordinates of the source of the shot (Global Positioning System - Global Positioning System). And so, by analogy with GPS, determining the coordinates of the shot it is proposed to conduct the measurement by measuring the time of reception of the signalmicrophones from the source of sound.

Keywords: *surface source, fire points, unmanned aerial vehicle, coordinate, interaction, battlefield.*

УДК 355.6

PERSPECTIVE OF DEVELOPMENT OF TACTICAL BOOTS IN THE ARMED FORCES OF UKRAINE

Vadym Melnyk, Odesa

At this time the Armed Forces of Ukraine are actively developing and testing new models of uniforms and equipment for servicemen. The active development of new items of combat clothing is determined by the high requirements that apply to the uniforms of NATO standards. It is modern military

clothing that can fully protect soldiers from the effects of natural phenomena in various climatic conditions and protect them while performing their duties.

The most important element of uniform is combat boots. After all, the right choice of the type of shoes and their quality play an important role in the execution of military tasks by a serviceman.

In this report we will consider new shoes, which may later be used to provide the Ukrainian Army and other agencies. «Talan» Company has developed a new model of summer combat boots for the military, which is now undergoing tests, in particular in the area of Joint Forces Operation.

More than 30 pairs are already undergoing test operation in the airborne brigade of the Armed Forces. Also, the manufacturer invites everyone to join the discussion of a new model of shoes and promises to play the quiz on this model at the end of the year and award those who are actively joining the discussion and distribution.

Experimental summer combat boots have different, unusual design, and they are lighter than regular boots, with the GORE-TEX membrane, with a new Italian pad, and also they have a new modern sole. The look of the boots is deceptive. The material, they are made of, is hard to damage, besides dirt, dust or water do not get inside the boots due to a special the external net, and this quality is confirmed by positive feedback of the military.

The new soles have an open protector pattern and a trapezoidal spike shape. According to the designers, in order to clear the protector from the dirt soldiers have to hit the boot several times on a hard surface.

The soles have sharp forms of the protector, which are pointed in different directions. Thus, effective adhesion of the boots to the surface in different directions is provided, which is especially important when using shoes in the field.

There are drainage channels on the spike of the protector that provide a stable position of the boots on wet surfaces. In the shin part of the shoes there are additional hooks that keep the boots in a stable position when working with a

shovel on a ladder or under other conditions when the shoe contact with the surface occurs in the shin area.

In the sock and heel parts the sole has a ribbed structure and provides the maximum adhesion of the boot to the walking surface. The sole is made of rubber, an intermediate layer – polyurethane. For the first time «Talan» has been using the Move Light system, which perceives and extinguishes fatigue during walking. That helps to relieve fatigue from legs, for example, when servicemen jump from combat vehicles. This sole was designed specifically for military purposes, and the company has hopes that its functionality will be confirmed by practical use.

After completion of the tests, the new model can replace the summer boots that are currently being used by soldiers of the Armed Forces of Ukraine.

Consequently, on the basis of the foregoing material, I can certainly say that the Logistics of the Armed Forces of Ukraine cares about Ukrainian servicemen by improving the quality of military clothing and equipment. This factor has an important role in strengthening the combat capability of each soldier and the unit on the whole.

Keywords: *tactical, model, boots, sole, protector, field conditions, hookup, GORE-TEX, Move Light.*

УДК 355.3

ON IMPLEMENTATION OF NATO STANDARDIZATION IN THE NATIONAL GUARD OF UKRAINE

Oleh Mitin, Kharkiv

The National Guard of Ukraine gradually comes closer to the standards of the leading countries of the world. Carrying out responsible military tasks every day, the National Guard of Ukraine simultaneously implements the most advanced achievements in the field of defense construction. Step by step it approaches the standards of the leading countries of the world. The management and

communication systems are being improved rapidly, the logistics is constantly developing, the newest models of military equipment are being adopted.

The ability to work together is more important than ever for the Alliance. States need to share a common set of standards, especially among military forces, to carry out multinational operations. By helping to achieve interoperability among NATO's forces, as well as with those of its partners, standardization allows for more efficient use of resources and thus enhances the Alliance's operational effectiveness. A Standardization Agreement (STANAG) is a NATO standardization document that specifies the agreement of member nations to implement a standard.

NATO Standardization is guided by the following basic principles:

- standardization is an engineering management function.
- standardization is voluntary;
- standardization is a means of achieving the desired end, but is not an end in itself.

Standardization of materiel interfaces at the appropriate level of assembly and function is essential to effectively implement interoperability, interchangeability, intersupportability and operational plans. Standardization is a desirable and an efficient means for implementing operational plans and for enhancing the NATO economy. Standardization is not desirable when it would hinder the production of war material, research and development or operational techniques. The maximum practical degree of operational standardization should be achieved on a NATO-wide basis so NATO forces may operate together as effectively as possible.

The ultimate goal for achievement of NATO wide standardization should not impede special standardization agreements by smaller groups of NATO nations. NATO nations are responsible individually and jointly to equip the forces which they have earmarked for or assigned to NATO. The degree of materiel standardization to be achieved will often depend on conflicting requirements since

some nations must use equipment designed to meet worldwide commitments while others need equipment suitable for a particular type of regional terrain or climate.

Clear, precise and consistent use of terminology is essential to ensure effective communication within any multinational organization. The standardization of terminology is a prerequisite for both operational and materiel standardization. The exchange of information in pursuit of multinational standardization is governed by national security policies.

Thus, to reach complete compatibility with the NATO nations the National Guard of Ukraine should complete the following tasks:

- provide NATO military requirements and recommendations on all operational, materiel and administrative standardization matters;
- direct the NATO Terminology Program;
- directing the military application of the Principles of NATO Standardization;
- ensure appropriate levels of standardization for efficient interoperability of joint forces.

Keywords: *NATO, STANAG, standardization, effective communication, exchange of information, complete compatibility, main tasks of the NGU.*

УДК 355.4

CIVIL MILITARY COOPERATION AS A KEY OF SUCCESS IN JOINT FORCE OPERATION

Anatolii Mozhovyi, Kharkiv

The most important role of Civil Military Cooperation (CIMIC) is to support of Ukrainian armed forces in order to success their mission. Secondary, to make trust and support all civilian population in area of operation (AOR) to action taken by Ukrainian military forces and other government (nongovernmental) authorities. The CIMIC is an advisor of a force commander on what to do or not to do in particular cases.

In June 2014 have escalated violence and began active combat action on Eastern Ukraine with Russian armed forces. Since February 2015 we have seen freezing active combat action at war zone at Eastern Ukraine. It gives opportunity for military forces and civilian administrations to recognize all problems and needs in area belong and behind war contact line. In order to normalize civilian life and make favorable condition for Ukrainian military to react on Russian military aggression. CIMIC officers take the establishment of Civil-Military Cooperation contributed to a significant increase of trust of civilians to the Armed Forces of Ukraine as an institution of state, allowing to minimize the impact of the effects of military operations (action) on civilians in the area of Joint Force Operation and increased the possibility to adequately in time react on the negative impact of information flow of Russian Federation on the population of Ukraine.

Main efforts of Civil-Military Cooperation are:

- Support to the Armed Forces of Ukraine in Joint Force Operation.
- Assistance and help to the civilian population;

The action and right efforts of Civil-Military Cooperation save lives and health our soldiers and civilian population.

Keywords: CIMIC, Joint Force Operation, communication, national interest, trust.

УДК 623.1

OPTIMIZATION OF AUTOMOTIVE PARAMETERS OF KRAZ

Serhii Odainyk, Kharkiv

Optimization of the design parameters of the car is one of the most important ways to increase the technical level, efficiency of the use of motor transport.

Transmission is an element of construction, the parameters of which determine the technical and economic performance of the car. One of the main design parameters of the transmission is a number of transmission numbers. A number of transmission ratios of the mechanical transmission significantly affects

the performance of the tire-speed properties and fuel efficiency of the car. When designing a car, it is necessary to determine the gear ratios of the transmission in such a way as to provide the required level of high-speed properties in the given operating conditions at the minimum fuel consumption. However, only some studies give unambiguous mathematical dependences for determining a number of transmission numbers. In most cases, the methods used to determine the number of transmission numbers of the transmission do not take into account the design parameters of the car: the size of tires, parameters of the engine, its high-speed external characteristics, type of road, etc. Some of these parameters are taken into account when determining the gear ratios of the lower and upper levels of transmission. In determining the transfer numbers of intermediate stages, the most widespread geometric series or breakdown of the speed range by geometric progression has been most widely used. But to improve the fuel efficiency of the car, transmission ratios of which are obtained by geometric progression, it is possible only by reducing the density of gear ratios of higher degrees and increasing the density of lower stages, too. However, recommendations for changing the density of a series in each case are not given, and the subsequent calculation is carried out by trial and error based on the experience and intuition of the developer. Therefore, it is very important to apply methods of optimization of gear ratios, which will reduce the number of calculation options and time to develop a new car.

The practice of world automotive industry suggests that the further development of any production is associated with the development and release of vehicles of different purposes, which differ not only in the design of the body (cabs), but also the type of its engine, gear ratios of transmission, suspension bracket design, braking system, other units and systems. This also applies to the Kremenchug plant, which car types include car dump truck, saddle tractor, all-wheel drive high-throughput car, cars of 4x2, 4x4, 6x4, 6x6 wheel chains with different types of engines. However, as previous studies have shown, the

transmission ratios of KrAZ gearboxes, even with the YMZ-238 engine, are not optimal, but with the expansion of the functionality of the car and its various engine types, this problem is even more complicated.

Keywords: KrAZ, transmission, engine, fuel consumption, speed, optimization.

УДК 357.3; 623.437.093

KRAZ VEHICLES IN SERVICE WITH NGU

Dmytrii Oseiko, Kharkiv

The history of KrAZ is a long and difficult path to a world-class car factory. The enterprise for the entire period of its existence, since 1945, has changed the nature of production three times. But, despite frequent reorganizations, KrAZ is one of the few enterprises in the country that managed to enter the top ten of the automotive industry.

The sales geography of KrAZ vehicles is consistently expanding due to the development of new sales markets: only recently it has been possible to enter markets where KrAZ has not previously been present, including Rwanda, Myanmar, Macedonia, the Philippines, and Thailand.

During the use of vehicles in the ATO zone, the Kraz brand cars adequately coped with the tasks assigned to them, and armored vehicles saved lives of personnel more than once.

To date, there is an active renewal of the fleet of the NGU and there are no competitors right away.

KrAZ trucks meet the modern requirements of international standards on environmental and road safety. The quality management system of AvtoKrAZ is certified for compliance with the requirements of the international standard ISO / TS 16949: 2009.

AvtoKrAZ is an export-oriented enterprise, the export of KrAZ vehicles, in total sales makes more than 70%. KrAZ truck is known for its power,

reliability and ease of operation and repair in more than 70 countries around the world. Its endurance was checked by time and millions of kilometers of roads and off-roads, the harsh climate of all continents.

Today, in service with the NGU there are about 500 KrAZ vehicles, trucks and crew vehicles, such as «Fiona», «Cougar», «Spartan», «Shrek», KrAZ 6322 «Raptor» , KrAZ 6322 «Soldier», etc. Even before the Russian aggression in 2013, the development of the production of armored vehicles fell, and already in 2015, KrAZ won the first tender for the purchase of military vehicles. Therefore, based on all the parameters and qualities that AvtoKrAZ company provides, the choice falls on the vehicles of this enterprise, even though there are factories in Ukraine producing similar products.

***Keywords:** the NGU, vehicles, KrAZ, war, world quality.*

УДК 355.6

LOGISTICS IN MULTINATIONAL OPERATIONS

Serhii Osypov, Kharkiv

Any military operation requires the use of material resources. Logistical support in multinational operations occupies a large role, since timely and complete logistic support of forces is the way to the high-quality execution of tasks that the National Guard performs.

NATO defines logistics as the science of planning and carrying out the movement and maintenance of forces. It is of vital importance for any military operation and, without it, operations could not be carried out and sustained. Logistics can be seen as the bridge between deployed forces and the industrial base, which produces the material and weapons deployed forces need to accomplish their mission.

Multinational logistics is any coordinated logistic activity involving two or more nations supporting a multinational force under the auspices of an alliance or coalition. Logistic support during multinational operations differs from

unilateral joint operations in that the participating nations represent different national and military objectives, cultures, and approaches to logistic support. This impacts how the US organizes, prepares, and executes logistic support during multinational operations. A significant challenge in multinational logistics (MNL) involves establishing effective command and control (C2) processes that are acceptable to all troop contributing nations.

The joint logistics environment exists at the strategic, operational, and tactical levels of war. Operations are distributed and conducted rapidly and simultaneously across multiple operational areas within a single theater or across boundaries of more than one geographic combatant commander and can involve a variety of military, interagency, nongovernmental organizations, commercial, and multinational partners.

The value of logistics can be determined by how well the force is deployed and sustained. Three logistic imperatives help determine this: unity of effort, joint logistics enterprise-wide visibility, and rapid and precise response. Because participating forces represent sovereign nations, there are several unique principles for MNL operations. Multinational operations are activities undertaken within collective security and collective defense framework, in accordance with the international law and internationally confirmed agreements.

A successful use of forces in multinational operations is provided through existence of clear mandate and mission, provision of adequate forces who have capabilities to perform a mission, planning and provision of capacities for safe withdrawal of forces from a mission, if needed, logistics support, support to command over forces and legal and social protection of people engaged in operations.

Multinational logistics principles include: collective responsibility, authority, cooperation, coordination, assured provision, sufficiency, efficiency, flexibility, visibility and transparency, synergy, simplicity, timeliness.

Keywords: *logistics, logistic support, multinational operations, multinational logistics principles.*

УДК 355.1

ORGANIZATIONAL CULTURE AS A FACTOR OF PROFESSIONAL BURNOUT

Maksym Otkydach, Kharkiv

The phenomenon of professional burnout was discovered and described at the end of the twentieth century. In modern socio-economic conditions professional burnout becomes a vital problem. Our modern stressful lifestyle requires the maximum voltage from a professional because of the high level of uncertainty and accelerated pace of life. On the other hand, the rapid development of technologies opens new opportunities for prevention and reduction of professional burnout manifestations. The topicality of the issue is determined by the pressing need of solving problems related to professional burnout.

Professional burnout is a state when a person feels exhausted morally, mentally, and physically. For a person it becomes harder and harder to wake up in the morning and to start working activity; to focus on responsibilities and to fulfill them in time. A working day is spread until late at night, the usual way of life is destroyed; relations with other people are spoiled.

Those who confront such a phenomenon do not immediately realize what is happening. People become annoyed and vulnerable. They throw up their hands in the case of slightest failures and do not know what to do, what kind of treatment to choose.

The data obtained in the result of various studies do not leave any doubt concerning the peculiarities of organizational culture (one of factors that affect the burnout). Organizational culture affects the degree of employee's professional burnout. But with regard to the specifics of such influence, the opinions of scientists differ substantially.

The increased level of exactingness and aggressiveness inside organizations, lack of attention to the benevolent relationships building is a fertile ground for the expanding of employees' uncertainty in their professional skills, reducing of emotional interest and work involvement, increasing of indifference or professional snobbery.

The problem of professional burnout requires further serious scientific analysis. Not only organizational factors should be taken into account, personal factors are important as well. With the domination of a hierarchical (bureaucratic) organizational culture that has strict standards, regulations, low level of creativity and novelty, the factor of depersonalization is sure to grow.

Thus, the expansion of the spectrum of the phenomenon of emotional professional burnout studying is expected to contribute to more accurate understanding of personal and organizational issues that might affect the employee's psychological health and the development of effective burnout syndrome preventive programs.

Keywords: *professional burnout, stressful lifestyle, depersonalization, organizational culture.*

УДК 355.4

ON THE CHARACTERISTIC FEATURES OF MODERN WARFARE

Maksym Papeta, Kharkiv

Modern warfare is a warfare using the concepts, methods, and military technology that have come into use during and after World War I and World War II. The general concept of war was thought to be the form of international conflicts.

Warfare in modern times has been regarded with the inclusion of civilians and civilian infrastructure as targets in destroying the enemy's ability to engage in war. The targeting of civilians developed from two distinct theories. The first theory was that if enough civilians were killed, factories could not function. The

second theory was that if civilians were killed, the enemy would be so demoralized that it would have no ability to wage further war.

With the invention of nuclear weapons, the concept of full-scale war carries the prospect of global annihilation. More recently, it has been introduced as a successfully applied combat power, protection the force, or completion of the mission. This includes enemy and friendly forces; facilities, weather and terrain within the operational areas and areas of interest.

Keywords: *warfare, inclusion of civilians, enemy, full-scale war, friendly forces, operational areas.*

УДК 327.5

MILITARY LOGISTICS OF THE NATO COUNTRIES

Yevhen Popredkin, Kharkiv

The statutory and regulatory documents on the military defense of the Alliance give the following definition of logistics: «Logistics is a science about planning and implementation of the movement of material and technical means, weapons, uniforms, nutrition, deployment of armed forces».

In the broadest sense, it is the management of all aspects of the preparation and conduct of military operations, which include:

- design and development, acquisition, storage, transportation, distribution, care, evacuation and material recycling;
- transportation of personnel;
- purchase or construction, maintenance, operation and the location of military objects;
- purchase or provision of services;
- organization of the logistic support service itself.

According to the NATO priorities the first and the main role is given to industrial logistics, also known as logistics acquisition. It is that part of logistics

which is related to research, design, development, production and acceptance of a specific product or services.

Secondly goes consumer logistics, also known as operational logistics. This part of logistics is involved in admission of original product, storage, transportation, maintenance, including repair and convenient maintenance, operation and utilization of materials.

It must be taken into account that material and technology aspects of logistics described above, ensure that the Alliance's armed forces must build special relationships between the producer and the consumer, while additional ones must be performed according to specific logistic functions.

Keywords: *consumer logistics, logistics acquisition, NATO, military logistics.*

УДК 327:355.6

THE MAIN PRINCIPLES OF NATO LOGISTICS

Kostiantyn Povozyk, Kharkiv

Modern Combined Arms is characterized by high determination, maneuverability, tension, rapid and sharp changes the situation. The battle can be conducted using only conventional weapons, high-precision weapons, in conditions of destruction of enterprises of atomic and chemical industry. In all cases, it requires significant material costs. Successful conduct of a modern battle depends on many factors, of which one of the most important is the state and capabilities of logistics. The success of the logistic support of military units and units during the course the conduct of combat operations fully depends on timely and qualitative preparation of their logistics departments and logistics management bodies.

Taking into account the comprehensive transition of the National Guard of Ukraine to NATO standards, it is also necessary to build a logistics system based on NATO standards. Therefore, the purpose of the report is to concentrate on the

basic principles of logistics of NATO member countries and give a brief description of these principles.

COLLECTIVE RESPONSIBILITY. Nations and NATO authorities have a collective responsibility for logistic support of NATO's multinational operations. This collective responsibility encourages nations and NATO to cooperatively share the provision and use of logistic capabilities and resources to support the force effectively and efficiently. Standardisation, cooperation and multinationality in logistics build together the basis for flexible and efficient use of logistic support thereby contributing to the operational success.

AUTHORITY. There is an essential interdependence between responsibility and authority. The responsibility assigned to any NATO Commander must be matched with the delegation of authority by nations and NATO to allow the adequate discharge of responsibilities. The NATO Commander at the appropriate level must be given sufficient authority over the logistic resources necessary to enable him to receive, employ, sustain and redeploy forces assigned to him by nations in the most effective manner. The same should apply for non-NATO Commanders of multinational forces participating in a NATO-led operation.

PRIMACY OF OPERATIONAL REQUIREMENTS. All logistic support efforts, from both the military and civil sector, should be focused to satisfy the operational requirements necessary to guarantee the success of the mission.

COOPERATION. Cooperation amongst the nations and NATO is essential. Cooperation across the full spectrum of logistics, including between the civilian and military sector within and between nations, will contribute to the best use of limited resources.

COORDINATION. Logistics support must be coordinated amongst nations and between NATO and Nations at all levels. It must also be carried out with non-NATO nations and other relevant organisations as required. Generic and standing pre-arranged agreements are the tools to facilitate logistic coordination and

cooperation. The overall responsibility for coordination lies with NATO and should be conducted as a matter of routine.

ASSURED PROVISION. Nations and NATO must ensure, individually or collectively, the provision of logistic resources to support forces allocated to NATO during peace, crisis and conflict.

SUFFICIENCY. Logistic support must be available in the appropriate quantity and quality, at the appropriate notice, when and where it is required throughout the full spectrum of the Alliance's possible missions. It must be ensured for any NATO-led operation continuously and for the duration required to accomplish the mission.

EFFICIENCY. Logistics resources must be used as efficiently and economically as possible. Needs must be identified in a timely manner to optimise the efficient provision and effective use of such resources.

FLEXIBILITY. Logistic support must be proactive, adaptable and responsive to achieve the objective. Adequate planning which considers potentially changing circumstances enhances flexibility.

VISIBILITY AND TRANSPARENCY. Visibility and transparency of logistic resources are essential for effective logistic support. NATO Commanders require a timely and accurate exchange of information among nations and NATO to prioritise consignment movement into and within the JOA to allow for redirection in accordance with agreements between the Commander and National Support Elements (NSEs), and to effectively employ logistic assets within the JOA.

Keywords: *combined arms, the National Guard of Ukraine, NATO standards, principles of logistics.*

**RESTORATION OF WEAPONS AND EQUIPMENT IN THE
ARMIES OF THE WORLD LEADING COUNTRIES**

Pavlo Protsenko, Kharkiv

As we know, the timely and full restoration of weapons and military equipment increases the combat readiness of the unit or military unit and ensures, first of all, the timely implementation of tasks both in peacetime and in wartime, which is very important at the moment. So consider, as is done in the armies of other countries.

In the armies of the leading countries of the world, members of the NATO serving systems are given great attention, as well as to systems that perform the functions of armed struggle. All tasks of supply troops, maintenance and repair of weapons and equipment is vested in a unified system of logistics, led by the relevant rear (in the theater of military operations (TMO)) in the field army, the division.

The logistic command is responsible for the whole range of issues connected with the supply of the troops with fuel, ammunition, weapons, equipment, property supply of personnel to all types of income, medical support and organizes technical maintenance and repair of weapons and equipment. The USA army adopted a preventive maintenance and repair system. Repair bodies are built on a functional basis, that is, any link of the repair fund performs the functions of maintenance and repair of all military equipment, which is in service with units, parts.

Specialization of the repair bodies according to the types of weapons and equipment. In accordance with the distribution of functions of repair bodies, the USA army introduced the following types (categories) repair of military equipment: army; direct; general; base.

Military repairs are carried out in companies by the crew and the repair section, and in battalions-by the repair platoon. Direct repair is carried out in a division by forces of a repair battalion of maintenance and repair of direct

providing the case, crew of CMS. The General repair is carried out in the case by forces of a battalion of maintenance and repair of the General providing the case, CMS crew. Basic repairs are carried out in the rear of the theater by the repair plant. As repair agencies are equipped with AREM, which are the main means of repair and evacuation, and repair and evacuation cars (REC) for the evacuation and repair of cars. The latter are based on cars. They are used only for equipping repair organs command a division, corps and army.

The FRG army carried out three categories of repairs: military content; field repair; factory repair.

Military the contents of the first stage is carried out in the mouth crew, a service group of the repair platoon of the battalion with up to 6 hours, the second stage - the battalion maintenance office maintenance platoon for up to 24 hours. Field repairs of up to 48 hours are carried out in the brigade, division by the light repair company of the repair battalion, and up to 96 hours in the corps by the medium, mixed or heavy repair battalion. Factory repair is made in the rear area by forces and means of stationary repair part or the industrial enterprise. In the British army repair is divided into military, field and base. Military repair of the first echelon is carried out in the mouth by the crew of the machine, and the second echelon – in the battalion of the mobile repair shop. Field repair of the third echelon is carried out in the brigade or division of the field repair shop, the 4th echelon-in the building, the repair shop of armored vehicles and engineering equipment. Basic repair of the 5th echelon is made by forces and means of repair plant. For each category of repair performed in the armies of the leading countries of the world, the place of performance in the rear area of a certain military formation and repair body is established. For each type and degree of repair the list of repair works and according to it technical equipment of repair bodies is defined.

As our country wants to join NATO, we should study and implement the experience of reconstruction and repair of military equipment in the armies of the

leading countries-members of NATO with the aim of increasing the defense capability of our country.

Keywords: system, repair, maintenance, echelon, workshop, technique.

УДК 623

THE EVACUATION AND TECHNICAL RECOVERY VEHICLE

Bohdan Pypchak, Kharkiv

Heavy tactical evacuation and technical rescue vehicles are built on the chassis of tactical vehicles with high loading capacity.

Armoured evacuation and technical rescue vehicles – are tracked or wheeled vehicles built on the basis of tanks or armoured combat vehicles (ACV) intended to carry out recovery missions, such as:

- using a winch to pul out tanks or ACV that got bogged down in mud, sand or some other soft ground;
- to tow away a damaged vehicle to a place from which it can be evacuated to its repair point;
- to perform simple repairs of the above types of vehicles under the conditions of combat operations.

The main tasks of armoured heavy evacuation and technical rescue vehicles include:

- to evacuate vehicles that are incapable to move independently as a result of enemy operations, mechanical damage, or bogging down in the field;
- to tow damaged vehicles to a place where they can be repaired or loaded on a transportation flatbed and moved to the place where their repair will be possible;
- to replace basic subcomponents of the damaged vehicles, such as: engine or turret;
- to make repair works by using set of tools carried;

- to carry out spare parts;
- to perform welding works;
- to pump fuel out from the damaged vehicles and pump it into operable vehicles;
- to execute earth works using the blade, such as: grading of ground, trenches, back-filling of shell-pits, or removal of rubble (ruins);
- to remove obstacles (fallen branches of trees, wrecks, etc.);
- to evacuate and first aid to the injured.

Special constructions of recovery vehicles allow for any type of evacuation, depending on the vehicles technical condition and on the type of damage. The following methods of evacuation can be used as basic ones: with a raised front of the vehicle (front support), with a raised rear of the vehicle (rear support), on a stiff connection (straight bar).

In order to carry out evacuation-rescue tasks, such types of vehicles have various equipment most of them consisting of: a crane used for temporarily lifting the evacuated vehicle with a high lifting capacity, steered mechanically or hydraulically, rear crane device with a retractable arm with a high lifting capacity, used for lifting one side of the evacuated vehicle and keeping it in this position during towing, a rear (often also front) winch with a special set of sheaves, a set of additional connectors and adapters enabling the connection and evacuation of the vehicles. Most rescue vehicles are also equipped with: first aid kits, kits for cutting open damaged vehicles, such as scissors, saws, hammers, devices and tools for basic repairs of the damaged vehicle, gaswelders, a load-carrying body for carrying spare parts and additional equipment.

Keywords: *rescue vehicle, recovery vehicle, methods of evacuation.*

WAYS TO CREATE A PROSPECTIVE FAMILY DOMESTIC ARMORED WHEELED VEHICLES

Serhii Pysmennyi, Kharkiv

National Guard of Ukraine has a large number of different brands and types of combat wheeled machines, created on the basis of both domestic and foreign chassis and they have a low level of unification. Analysis of combat wheeled machines in Joint Forces Operation shows that they have significant technical disadvantages.

The main of them are: lack of tactical mobility, low combat efficiency and security, the imperfection of tactical-technical characteristics, etc., which in general does not quite match the general technical requirements for the species, systems, samples of armament and military equipment. As a result, there arises a substantial controversy regarding their practical application and discrepancy of the technical and operational indicators of the sample and the nature of the assigned tasks.

This is especially true for samples of combat wheeled cars where more than 90% of components are parts of foreign production. These samples are made on the basis of chassis of civilian cars with gasoline and diesel engine Kraz «Coguar – ARS» Kraz «Cobra- ARS» based on the chassis of the TOYOTA Land Cruiser 79 and TOYOTA Land Cruiser 200 and vehicle Kraz «Spartan – ARS» based on the chassis of the Ford F-550, «Kozak» developed on serial IVECO chassis 4x4.

According to the modern financial and economic condition of our country, this situation is completely unacceptable because it significantly increases the funds and material costs for their operation, maintenance, supply of spare parts. The most rational way of solving this complex issue is creation of domestic promising fighting wheeled vehicles using the domestic manufacturing base for example (car factory "Avto KrAZ"), which is the only Ukrainian producer of heavy trucks with a closed technological cycle of production.

The implementation of this approach will establish a correspondence between installed in the National Guard of Ukraine task requirements and the tactical-technical characteristics of the samples of combat wheeled machines, which are developed, and ensure the development of specific technical solutions to increase the level of their protection and survivability, which as a whole will effectively contribute to minimizing the losses of equipment and personnel.

Keywords: *combat wheeled machines, tactical-technical characteristics, operation joint forces,*

УДК 355.7

PRINCIPLES OF CANTONMENT OF THE TROOPS IN UKRAINE

Serhii Pytel, Kharkiv

The cantonment of troops is the placement of military units, associations, institutions and military educational institutions in designated or captured places (settlements, military towns, training centers, camps, etc.) that provide the necessary conditions for their daily life , activities and support for ongoing combat readiness.

The NGU servicemen who undergo military service under the contract and their family members may be credited to the apartment registration in case they need improvement of living conditions after being admitted to military service within one month from the moment of filing a report in the name of the corresponding official and making the decision of the housing and communal commission of the military unit.

According to the laws of the NGU servicemen who undergo military service under the contract, their members are provided with living quarters on the grounds, in accordance with the procedure and in accordance with the requirements established by the Housing Code and other normative-legal acts.

In addition, the NGU servicemen, other than regular military service members, and members of their families living with them, are provided with office dwellings.

In the absence of an office space, servicemen of ordinary, sergeant and senior officers who are contracted and not in marriage are placed free of charge in specially adapted barracks at the location of the military unit, and family homes in the family dormitories.

Consequently, concluding from the above, it can be understood that the NGU provides servicemen with housing available for that territory. However, the quartering of troops in certain conditions is not always possible, it is hard to meet this issue financially. It is necessary to pay attention to the fact that the work of the NGU troops in general precisely depends on the quartering.

Keywords: *the cantonment, the National Guard of Ukraine (NGU), a military, a servicemen, military service.*

УДК 623.45/46

REPEATED USE OF ARROWS IN MILITARY TIME

Dmytro Radkevych, Kharkiv

Currently, the problem of increasing the effectiveness of the material and technical support of the troops is relevant. One of the ways to solve the problem is the rational use of cartridges due to their reuse.

Manufacturing technology allows to reuse the liner for shots due to the high plastic properties of the material. For example, a brass sleeve can be used to fire a shot up to 6 times, and a steel sleeve - up to 4. During the Cold War, an excessive amount of ammunition of various calibers was produced, which will expire in 2015 ... 2030. For this reason, there is no need to reuse liners in peacetime.

In the case when the country is in a state of war, there is difficulty in ensuring the uninterrupted supply of the conflict zone with various resources, including ammunition. Collection of liners and their subsequent recovery for reuse

can improve the efficiency of the material and technical support of the conflict zone and, as a result, increase the volume of other supply resources. The peculiarity of the liner restoration concept is that the manufacturing complex is supposed to be designed mobile, that is, based on automotive technology. This will allow for the prompt repair of artillery shells and the assembly of shots for reuse, which will have a positive effect on reducing the delivery time for shots to military units and on the overall performance of the logistics system. To reduce the number of personnel involved in the process of restoring sleeves, the authors propose to automate stamping operations and technical control operations.

A promising non-destructive method of controlling the characteristics of the mechanical properties of the finished sleeve, as well as the presence of microcracks, is the use of acoustic emission. This method will allow to quickly identify defective products. In conclusion, it should be noted that further developing the concept and the subsequent design of an automated mobile complex for the restoration of liners for the purpose of their repeated use for the intended purpose.

***Keywords:** efficiency, technical support, conflict zone, delivery time, acoustic emission.*

УДК 355.6

WAYS TO IMPROVE THE CONDITIONS OF BATH AND LAUNDRY FACILITIES IN THE FIELD

Andrii Romaniuk, Kharkiv

The problems related to the current situation with bath and laundry facilities are one of the concerns of the command of the military units in the National Guard of Ukraine. The unit bath and laundry facilities use a lot of equipment to provide appropriate laundry and washing conditions for unit personnel and to keep military uniforms in a good condition. Still, both equipment and the standing procedures that regulate the work of bath and laundry service staff in compliance with sanitary

and hygienic norms in military and during field training, in their majority are outdated. But most of these equipment and regulatory and legal norms are outdated and do not meet contemporary requirements.

Therefore, the command of the military units have to solve the problem how to raise the standards of bath and laundry facilities and ensure compliance with the regulations of the European model. Thus it is necessary to conduct a thorough analysis of the work of clothing supply units to identify faults in the work of bath and laundry facilities of the National Guard of Ukraine and to provide proposals on improving the work of bath and laundry in field conditions.

The main task of the work is to study the technical capacity of the clothing service of military units and to compare the compliance of actual standards to the European ones. The object of the work is a clothing service of the National Guard of Ukraine. The subject of the work is to study the technical and normative basis of the clothing service of the National Guard of Ukraine.

The analysis shows that currently a new strategy has been developed to improve bath and laundry services for personnel in field conditions, namely:

1. development of new regulations concerning sanitary and hygienic norms during bath-washing activities;
2. cooperation with scientific and technical institutions to facilitate improvement of mobile baths for servicemen;
3. improvement of technical equipment – a purchase of new washing machines class A, which economical, low energy consuming, and meet all modern requirements of quality and efficiency.

Keywords: *the National Guard of Ukraine, bath-laundry facilities, sanitary and hygienic norms, mobile baths.*

**EFFECT OF HEAT ENGINES ON THE ENVIRONMENT
AND WAYS TO SOLVE THIS PROBLEM**

Viacheslav Savchenko, Kyiv

One of the global problems of our time, including Ukraine, is the provision of natural resource savings and protection of the environment with increased energy production necessary for the life of humanity.

It is generally known, that the largest amount of mechanical energy (up to 80% of the installed capacity) is produced by internal combustion engines (ICE), which consume the bulk of products for the processing of petroleum and some of the processing of coal and gas.

Therefore, work of ICEs causes the greatest damage to the environment, due to chemical factors contamination of the atmosphere with toxins in the exhaust gases of engines (EG).

As the experience of the best motor-vehicle companies in the world shows, there are a lot of opportunities to finally resolve the problem of environmental engineering of the ICE through the widest implementation, along with improved workflow, effective artificial neutralization of toxic emissions of engines. When working with heat engines, carbon dioxide is released. Carbon dioxide in the atmosphere together with water vapor leads to the so-called "greenhouse effect". An increase in the concentration of carbon dioxide in the Earth's atmosphere will lead to an increase in the average temperature of the planet. There is another reason why the average temperature on the planet may increase. The work of heat engines can not be carried out without releasing some amount of heat into the environment, which also leads to a gradual increase in the average temperature on the planet.

The most promising developments at present are the thermomagnetic motor and the thermal engine with external heat supply. The thermomagnetic engine is favorably distinguished by a simple construction in which the thermal energy of the hot gases derived from combustion of fuel passes into mechanical energy due

to the phase transition of the rotor material from the magnetic state to the nonmagnetic and backward. Exhaust heat transforms the motor into a mechanical work that can be converted into electricity by means of an electric generator.

Scientists from all over the world are working on solving the problem associated with the use of thermal motors. The work is carried out in four main directions: research work on the creation of new types of engines, the search for a new cleaner fuel, the development of filters and converters to reduce the harmful substances in the exhaust of the internal combustion engine, the addition of certain chemicals in the fuel for heat engines for more complete combustion.

Keywords: *heat engines, environmental protection, heat engine.*

УДК 355.6

**THE WAYS TO IMPROVE QUALITY OF NUTRITION FOR
ARMED FORCES AND OTHERS MILITARY FORMATION IN
UKRAINE**

Taras Semeniak, Kharkiv

One of the most important tasks of the armed forces of the world is conducting military operations. But cooking hot food is impossible or almost impossible in field conditions. Then dry rations, Meals Ready to Eat (MRE) or individual diet rations are used.

Dry rations are designed for one soldier or small groups for a meal for one, two, or three days; or even one MRE package must sustain complex operating conditions and diverse weather exposure. It should be packed in thick plastic made of high-temperature polyethylene soldering, dense and resistant to mechanical influences.

Such meal kits include long-term storage products. It's hard to provide appropriate conditions for long-term storage of meat and vegetables. The cereals are wrapped in packaging made from gas-tight material which consists of polypropylene and aluminum foil. Such material is resistant to the action of alkalis

and acids, can withstand heating up to 140°C without changing the initial characteristics, making it an excellent choice of material for storage, preservation and cooking. Besides, tea, sugar, salt, honey can be preserved the same way.

Individual diets include a certain set of products in a compact package designed for use in severe field conditions. They do not require cooking or adding water, they can be consumed right from the packaging. A similar set of products should provide a serviceman's body with all the necessary nutrients. Usually they include main meat dish, side dish, and a drink.

Based on a thorough analysis of the composition of modern dry rations and individual diets for servicemen in the world, it is determined that there are three methods of their complete set: basic, integrated and combined.

Dry rations and individual diets for servicemen of the Armed Forces of Ukraine are formed by a basic method that facilitates production and has economic expediency, but the disadvantage is:

- a quick nourishment products;
- lack of desserts;
- non-compliance with the quota of essential nutrients the body needs

for the fourth level of physical activities.

According to the recommendations of the Task Force-154, NATO nutrient value in the course of ordinary operations are not less than 3600 kcal / day and 4900 kcal / day - for combat operations.

In our opinion, the list of components of dry rations and individual diet should include dessert snacks that would be wrapped in a comfortable packaging, have long shelf life and high calorie value due to the content of nuts, muesli, chocolate, dried fruits, apple powder, etc. This will give an opportunity to eliminate the deficit of vital nutrients in the diet, to balance and to provide the appropriate energy value for field nutrition of military personnel.

Keywords: *combat rations, individual diets, energy value, field nutrition, servicemen of the Armed Forces of Ukraine.*

**THE PROSPECTS OF UTILIZING CONDITION-BASED
MAINTENANCE OF ARMoured VEHICLES AND THEIR ARMAMENT
UNDER CURRENT CONDITIONS**

Oleh Shatalov, Kharkiv

The analysis of the causes of the failure of armoured vehicles and their armament during the anti-terrorist operation and the Joint Force (JF) operations indicates that technical failures make a vast majority of all reasons in the general list that cause the loss of combat capability of armoured vehicles and their armament.

Considering the situation in the troops due to insufficient training of personnel, lack of demanding commanders and chiefs, insufficient provision of spare parts and maintenance materials in operating units, in a number of cases, a condition-based type of maintenance has to be implemented. This maintenance system is characterized by lower material costs, reduced overall labor complexity of work, which, in turn, reduces the required number of personnel in repair and recovery units. This creates an illusion of the advantages of condition-based type of maintenance before the existing predictive-preventive maintenance system.

However, without a well-developed qualitative diagnostic system, the condition-based maintenance is not able to detect timely the critical parameters of systems and mechanisms, which compromises its advantages, as there is a probability of a sudden failure of the combat unit during execution of a combat mission. Therefore, the official use of condition-based maintenance is currently premature and needs to be clarified.

Keywords: *maintenance, armored vehicles, predictive-preventive maintenance system, condition-based maintenance.*

TRAINING LOGISTIC SPECIALISTS IN THE BRITISH ARMY

Dmytro Sidelnik, Kharkiv

Logistic specialists make the backbone of the army in any country. They are responsible for supplying food, weapons, equipment – the all kinds of supplies on operations anywhere in the world. Besides, logistics, which is referred to as «combat service support», must address highly uncertain conditions. While perfect forecasts are rarely possible, forecast models can reduce uncertainty about what supplies or services will be needed, where and when they will be needed, or the best way to provide them.

Ultimately, responsible officials must make judgments on these matters, sometimes using intuition and scientifically weighing alternatives as the situation requires and permits. Their judgments must be based not only upon professional knowledge of the numerous aspects of logistics itself but also upon an understanding of the interplay of closely related military considerations such as strategy, tactics, intelligence, training, personnel, and finance.

However, case studies have shown that more quantitative, statistical analyses are often a significant improvement on human judgment. The Armed Forces need high quality personnel to perform all the tasks of materially technical support which appear in combat operation and daily activities of the troops. Personnel must be trained and prepared for all the challenges. Training of the personnel support units is not an easy task and requires a special careful approach. Soldiers involved in the logistics of troops must be fully trained and prepared to act.

If you want to become a military logistician in the British Army, you should start with your initial military training to learn how to be a soldier, which covers everything from fieldcraft to how to handle a rifle. Junior Soldiers (under 17 years 5 months) do a 23-week basic military training course at Harrogate. Regular Soldiers (over 17 years 1 month) do the regular 14-week adult basic training.

Then, there's a 4- week course about Supply Chain Operations, to learn how to control and manage the Army's inventory – everything from a main battle tank, to food, ammunition and weaponry. You become a trained inventory and warehouse operator, with basic training on Logistic Supply Chains and Logistic IT systems. Thus, you join the Royal Logistic Corps.

A Logistic Specialist can work as part of a team providing essential equipment that supports the Army in both peace time and on operations, wherever they are in the world. This role is incredibly important as it provides all kinds of equipment quickly, whenever it's required. Getting there on time keeps the Army moving.

Keywords: supply, personnel, combat operations, logistics.

УДК 355.4

THE ORGANIZATION AND MAINTENANCE OF CONSULATES AND DIPLOMATIC MISSIONS PROTECTION

Anatolii Simchuk, Kyiv

The organization and maintenance of a service for the protection of diplomatic missions, consulates of foreign states, missions of international organizations in Ukraine by military units and units of the National Guard of Ukraine is one of the most important issues concerning the implementation of measures necessary for the direct protection of representatives of those institutions.

The effective organization of the activities of the units of the National Guard of Ukraine for the protection of diplomatic missions depends on the level of professional training and the success of the military and combat activities of personnel of special units.

The main measures of protection of diplomatic missions of foreign states units of the National Guard of Ukraine are the following:

- assistance in performing public safety function at objects under protection;

- assistance in evacuation of diplomatic missions personnel, including escorting cargo and evacuated mission staff, and also security of premises after evacuation;
- repelling attacks on objects under protection;
- assistance in apprehension of burglars in the premises of diplomatic missions;
- increasing the checkpoint capacity at protected sites;
- disaster relief operations at facilities under protection, etc.

To perform the tasks, the units of the National Guard have the following rights: to demand from citizens and officials observance of the order guaranteeing security, and fulfillment of obligations by military outfits; in the case of involvement in carrying out tasks for the protection of public order and the fight against crime to detain and deliver to the bodies of internal affairs of citizens suspected of committing crimes and those who committed administrative offenses; delay and transmit the administration of the protected object, persons who violated the established through put regime.

The security of premises of diplomatic missions is carried out by the host States, as a rule, through the use of special police or military units. This function is performed by the National Guard of Ukraine.

Keywords: *the National Guard of Ukraine, diplomatic missions, consulates, effective organization, professional training.*

УДК 355

FIELD FEEDING EQUIPMENT: ADVANTAGES OF THE FIELD KITCHEN KP-125

Oleh Simchuk, Kharkiv

Today's battlefields demand ration support systems that adequately provide for the needs of warfighters in all types of scenarios. The army's field feeding systems must provide acceptable and nutritious meals to warfighters.

That is why the army is seeking new means of providing fully integrated combat rations and improved field feeding equipment, one of which is a marching field kitchen vehicle trailer KP-125, one of the brightest representative of its genre.

The field kitchen KP-125 is designed for cooking and boiling water and their transportation in the field conditions. It may be towed by a cargo GAZ-66, or tow trucks.

The field kitchen operates on solid (firewood and peat) and liquid (kerosene and diesel) gas. It can operate at a temperature from 50 degrees above zero to 40 degrees below.

The field kitchen KP-125 is capable of containing two dishes and hot water for 125 men in one cycle. It is additionally provided with the field plate of software, which expands the range of possible application even more.

Rather small weight and availability of the mobile chassis makes field kitchen KP-125 mobile and compact, and allows to transport it on long distances.

There are 3 coppers. The time to boil water in coppers makes:

- on liquid fuel - 55-65 min
- on solid fuel - 80-95min

Overall dimensions are the following: the kitchen is 3700 mm long and 1810 mm wide. Its height makes 2328 mm, and it weighs – 1110 kg empty and 1515 kg loaded. There are 2 fuel tanks with the capacity of 48 liters. The consumption of fuel makes 7-10 kg per hour (liquid fuel), and 28-32 kg per hour (solid fuel).

Small dimensions, high performance of work of coppers, mobility and compactness of field kitchen KP-125 makes it an excellent choice for feeding the force in the 21st century.

Keywords: *military, provide, field kitchen, KP-125, the National Guard of Ukraine*

**ANALYSIS OF ARMoured VEHICLES FUEL CONSUMPTION
AND WAYS TO IMPROVE ITS COST EFFECTIVENESS**

Vitalii Skral, Kharkiv

The study of fuel efficiency of armored vehicles was determined alongside with the degree of the influence of main constructive and operational factors on fuel efficiency.

In the National Academy of the National Guard of Ukraine, scientific research was conducted on the improvement of combat effectiveness of special automotive equipment, armored vehicles and armored personnel carriers. Today not much attention is paid to fuel economy.

However, the ATO experience shows that combat vehicles must be upgraded for certain field conditions such as long distances or long working time at combat positions with the engine on.

In such situations their fuel efficiency especially in the presence of logistical problems can impose restrictions on the combat effectiveness of military armored vehicles. Moreover, it is not possible to take into account the cost-effectiveness of the use of armored wheeled vehicles, an essential component of which is costs for fuel and lubricants.

It is relevant to taking into account the improvement of fuel economy at the stage of development of new machinery and during the operation of existing models of armored wheeled cars.

The indicators of fuel economy are strongly influenced by the following factors: engine power and its technical condition, transmission characteristics, mass and dimensions of the car, technical conditions of the car chassis, road and climatic conditions, operating mode of the vehicle (load, speed), aerodynamics, driver qualification.

Keywords: *engine, fuel, economy, speed, technical condition, climatic conditions.*

**SERVICEMEN PREPARATION FOR THE UNITED NATIONS
INTERNATIONAL PEACEKEEPING MISSIONS**

Roman Smitiukh, Kharkiv

Ukraine considers participation in international peacekeeping missions as an important component of its foreign policy. A high level of professional training is one of the main criteria for selecting candidates for service in UN special units. The mismatch of candidates for the United Nations requirements has a negative impact on the image of the country. Orientation on needs of society, the necessity to improve the level of candidates' preparation affirms the actuality of the topic of this research.

Among the main United Nations requirements for International Peacekeeping Missions candidates are the following: a candidate is supposed to be morally and physically sound and meet the requirements set forth in a special UN memorandum; a candidate must be at the appropriate level of the mission working language; a candidate must have high professional and ethical qualities; a candidate has to be well-versed in weapons; a candidate is supposed to have the following knowledge: the constitution and laws of the country; criminal, administrative and other kinds of legislation, that is related to the work of law enforcement agencies of the state etc.

The improving of the level of candidates for International Peacekeeping Missions preparation requires the development of an effective model of the candidates training. The training is supposed to included such modules as: physical training, English, basic information about the UN, NATO, EU, stress management, self-organization and time management, marksmanship, radio communication, vehicle driving, practical work on the tasks of International Peacekeeping Missions, international law and legal systems.

This paper has highlighted the importance of improving the level of preparation for UN peacekeeping missions candidates. The improvement needs the

development of an effective model of professional training for International Peacekeeping Missions candidates.

Keywords: foreign policy, peacekeeping, UN, requirements for candidates, model of professional training.

УДК 355.213

ADVANTAGES OF CONTRACT MILITARY SERVICE IN UKRAINE

Stanislav Sokolovsky, Kharkiv

Today the Armed Forces of Ukraine still retain conscription, and at the same time are intensively moving towards contract military service, which has a lot of advantages for servicemen.

The contract military service provides volunteer who serve in combat units with monthly cash allowance:

- for privates and non-commissioned officers (NCO): from 11500 to 17000 UAH;
- for commissioned officers: from 14000 to 20000 UAH.

Contracted military personnel are granted career growth opportunities. NCOs who are on military service by a contract or military personnel drafted during mobilization in a special period, or belong to a military reserve, have an academic degree of higher education not lower than a bachelor's degree, are placed on a course of military training in the field that corresponds to the military occupational specialty of the service activity. Depending on the overall need in officers of particular specialty, they may be appointed to positions designated for junior officers, with follow-on commissioning into an officer rank.

Next is opportunity to study. Volunteers who are contracted to military service are eligible to study without a break from military service in higher military educational institutions, military educational divisions of higher educational institutions, and in case when those higher educational institutions do not train in

required specialties - in other higher educational establishments with the purpose to obtain higher education.

Besides, servicemen, who signed a contract, are entitled for an annual leave with the leave allowances provided in the amount of monthly cash.

Another attractive factor that works well for contract military service is housing allowance. All categories of military personnel, who are not provided with living quarters, get reimbursed for rented apartment.

Finally, pension provision. Contracted personnel are entitled for pension for length of service, which is significantly higher than in the civilian sector, and is attributed before the official retirement age is reached.

Keywords: *contract military service, servicemen, career growth opportunities, annual leave, housing allowance, pension provision.*

УДК 623/1

STREIT GROUP SPARTAN 4X4 LIGHT ARMOURED PERSONNEL CARRIER

Serhii Stepanenko, Kharkiv

The Spartan is a 4x4 LAV (Light Armoured Vehicle) designed and manufactured by the Company Streit Group. The vehicle is based on the FORD F550 with fully re-designed and chassis-mounted body by Streit design and development. The Spartan is a new generation of Light Armoured Vehicle (LAV) which can be configured in various models to support a wide range of military, counter-terrorism and police operations and has the off-road capability to cope with some of the most difficult terrains.

Designed to accept a large crew compartment – armoured to CEN Level 7 – for up to 12 personnel, the Spartan is STANAG Level 1 certified, built to withstand ballistic attack and provide advanced protection against anti-personnel mines and grenade blasts. Field-proof, low maintenance and with superior off-road performance, the Spartan can be configured with a range of weapons platform

options – including a manual or electric rotating turret – making it the ideal vehicle for mission roles ranging from command and control and military tactical operations to SWAT, riot control, counter terrorism and counter surveillance. Being the leader in cutting-edge armoring technologies, the Company Streit Group can customize the Spartan 4x4 LAV to exact operational environment of any customers, making it one of the most valuable vehicles in any operational commander's fleet.

The Streit Group Spartan 4x4 APC can be fitted with an armoured open top glass turret. The turret can be mounted with a 7.62mm or 12.7mm machine gun or 40mm automatic grenade launcher. The glass turret provides 360° view for the gunner's position, while offering all round protection from enemy fire. The Spartan can also be equipped with a remote weapon station which allows the troops to operate the weapon from inside the vehicle with a high degree of precision to protect the gunner from being exposed.

Keywords: *armament, Spartan, LAV, Streit, machine gun, off-road, operations, turret.*

УДК 621.4

ON THE PROBLEM OF IDLING TIME INFLUENCE ON THE ENGINE DURABILITY

Pavel Stepanov, Kyiv

Now the turbine is equipped with a host of gasoline and almost all diesel engines for passenger cars. Its impeller spins from hot exhaust gases coming from the engine. This part spins horribly fast, at speeds up to 250 thousand rpm. Just imagine: 4000 rpm! That is, the temperature regime in the turbine is about as in hell. It rescues the supply of oil under high pressure from a special oil pump - oil, besides performing the main function of lubrication, is a coolant. Some models also provide water cooling with a separate water pump in the system.

At the same time on the branch pipe thin blades with complex geometry. If this hot part is sharply cooled down, blades can "lead". How to try to make a sharp cooling? The algorithm here, in fact, is the only one: you twisted the engine at high speeds, and then drowned it sharply.

On modern motors a turbine joins in work already from the small turns of engine. Look at external speed description of any modern turbo motor – practically there is no delay after work of turbine.

So, the engine just twisted, and then stopped abruptly. But the impeller continues to rotate under the influence of forces of inertia. And the oil pump no longer works! Oil starvation in this case - is, firstly, the lack of normal cooling and, secondly, the intense work of bearings, which turned into semi-dry friction.

You remove the key from the ignition lock and go home, and the engine continues to work at a given time. Or, the device itself decides how much time to give the engine work. Such a timer focuses on engine characteristics, turbine type and tachometer readings. And of course, do not forget that in this case the gear should be put on neutral and, in any case, tighten the handbrake.

Keywords: *turbine, engine, lubrication, blades, speed of rotation, bearings.*

УДК 623/1

PERSPECTIVES OF THE DEVELOPMENT OF AERODROME- TECHNICAL SUPPORT ASSETS

Serhii Svidnytsky, Kharkiv

An important component of the combat readiness of the Land Forces aviation of the Armed Forces of Ukraine is the condition and development of aerodrome-technical support assets of flights (ATSAF). Nowadays, in Ukraine, the quantity and technical condition of ATSAF covers the minimum its requirements of providing maintenance support for military aircrafts. The reason for this is lack of financing of the Armed Forces of Ukraine. Land Forces aviation units are equipped with morally and technically outdated ATSAF, which requires immediate

modernization and substitution. Especially critical situation is with rolling park. The main chassis for electro-gas service is the truck ZIL-131, the production of which has been finished long time ago.

ATSAF don't have an internal self-control system of its technical condition, what significantly reduces its reliability, requires up to 40% of unnecessary maintenance operations and increases labor and maintenance costs.

Along with this, in the leading NATO members, pay more attention for modernization of the aerodrome maintenance facilities, which have a significant impact on the effectiveness of combat uses of aviation and the realization of its potential. The structure, purpose and functional features of ATSAF have undergone significant changes and improvement. This is due to the implementation of new technologies, increase its reliability, wide usage of internal self-control systems, which simplifies maintenance system. The perspective way of ATSAF's development is primarily the substitution of the morally and technically outdated equipment, for example – old trucks with gasoline engines should be replaced by modern cars with turbodiesel engines, preferably Ukrainian production, as well as the widespread usage of trailers and electric cars, implementing the experience of European countries. Control and testing equipment is a modern system of technical exploitation of aviation equipment in leading NATO countries, based on the replacing of LRU (Line Replaceable Unit) systems of on-board equipment. Detection of blocks performs with assistance of internal built-in sensors or specialized aerodrome facilities (programs), which also provide general diagnostics of on-board systems. Diagnostics of LRU is carried out on special equipment at service centers at large airbases. According to European experts, ATSAF will continue to play their important role in the combat actions of the Air Force of NATO countries and their development requires specific efforts of both parts - military and industry.

Keywords: Armed Forces, modernization, aviation, reliability, engine, aerodrome.

PERSPECTIVES IN USING AIRLESS 3D TIRES

Artiom Tabak, Kharkiv

Most vehicles are driven by inflatable rubber tires. Pneumatic tires have proven themselves as smooth roads and off-road, however modern technology presented a completely different tire concept - airless 3D tires. Unlike conventional tires, they are made by 3D printing from recycled organic materials, including sawdust, straw, offal, sugar and orange peel, creating the appearance of a cellular network instead of an airbag. This design reduces the risk of rupture or punctures.

The tread design is optimized and its depth is reduced to reduce its thickness and make tires more efficient in terms of materials. The tread pattern adapts to the external environment, and also which can be changed at will, without wasting resources, time or money in turn protecting the environment for future generations.

While traditional rubber tires gradually lose its relief due to friction, this prototype uses 3D printers to retread a tire as it wears, and this allows to save on the cost of replacing the entire tire. This mechanical design is strong enough and also flexible enough to absorb the impact of external environment and pressure. There are also tires designed for low-speed cars, golf carts and construction equipment, which are already using similar airless structures.

Airless tires reduce fuel consumption, as they never are blown away and do not lose their shape over time and also increase the safety. A series of sensors embedded in the tires track the tread wear and provide real-time performance information and service.

The wheel is environmentally friendly as it is made from recyclable materials, which means that after the end of the term. Tires are recyclable and recyclable.

The biodegradable tire material performs the same functions and corresponds to those same standards as regular protectors. Despite the fact that the

data bus structure is not at all like typical tires, during the operation they feel as confident and reliably.

Keywords: friction, pneumatic tires, rubber tires, 3D tires, mechanical construction.

УДК 629.7

UNMANNED AERIAL VEHICLES APPLICATION: FROM GUIDANCE TECHNOLOGY TO ENHANCED SYSTEM INTERACTION

Anton Taranov, Kharkiv

Coordination in emergency situations, monitoring public or private urban infrastructures, crowd control and traffic control, logistics, or support of intelligent transport systems are some of the areas in which UAVs may become key method in the city in the future. In addition, these antenna platforms will become an important element of urban sensor network, so there is a need to combine their information with the stream coming from traditional sensors through existing platforms, such as quadcopters with increased flight range.

In addition to legislative steps in order to make these operational scenarios feasible it is necessary to ensure efficient and safe operation of UAV fleets in a restrictive and complex operating area, for example, in Pripjat or in the EP environment. It is also necessary to ensure accurate collection, safe transmission and correct interpretation of information received from unmanned aerial vehicles to ensure the success of the mission. This second aspect, which takes into account the integration and use of mission information in city data and infrastructure, becomes critical for the implementation of new applications and information missions in Ukraine.

At the beginning of 2018 in Ukraine, finally, a decision was made, allowing to equip the armed forces with a large number of unmanned systems. The General Staff identified the needs of the Ukrainian Armed Forces with 500 unmanned aerial vehicles. 500 drones are lower than the needs of the army, drones are needed

in much more numbers, both in reconnaissance and attack versions. But 500 drones are a new level of quality for the army. At the front line, there are still some examples of new weapons. First of all, the critical lag is precisely in equipping with drones. Until now, most of the combat tasks of reconnaissance on the front are performed by volunteer drones.

Keywords: aviation, logistics, mission, technology, transport, UAV.

УДК 623.1

PERSPECTIVE METHODS TO IMPROVE PROTECTION OF LIGHT-ARMORED VEHICLES

Serhii Tarasenko, Odessa

Modern combat actions are characterized by intensive dynamics. Therefore, there is a need to create stationary and moving protective devices for the protection of light-armored military vehicles (LAMV). Various types of fortification structures are used to protect permanently installed objects. Considerable attention is paid to the construction and equipping of stationary objects, whereas the mobile ones are much less studied. Therefore, the protection of strategically important mobile facilities, certain types of military equipment of mass production, personnel, and the appearance of damaging factors requires further development.

The experience of using of LAMV during ATO in the East of Ukraine and analysis of their losses showed that the existing armored protection does not always ensure the performance of combat missions in modern conditions. Shells of armored vehicles are not sufficiently protected against kinetic ammunition of small caliber, namely from the fire of antitank grenade launchers and rocket grenades. One of the possibilities to solve this problem is to install additional protection in the form of two combined screens. The tests showed a significant increase in the protection of armored vehicles against 7.62, 12.7 and 14.5 mm small arms from a distance of up to 150 meters, from anti-tank grenades at any course/angles of attack with a probability of 60%. Since the domestic military industry did not

product such additional means of protection at the beginning of Russian aggression on the East of Ukraine, this problem was solved at the expense of technical support units and volunteers. But the installed screens were not optimal, considering that they were manufactured from improvised materials without taking into account their influence on the general technical characteristics of the vehicles. With increasing security, the weight of the combat vehicle increases (the weight of the hinged set is about 1400- 2300 kg) the mass-inertial characteristics worsen, the load on the hull elements, on the suspension and on the engine increases. Considering that up to 75 percent of the available combat vehicles consists of samples obtained from the storage bases after major repairs, the parts and units of which have used out their resources, it is impossible to predict all changes in the tactic-technical characteristics after installation of additional protective equipment, not provided for in the vehicle design.

We propose a method, which consists in carrying out multivariable calculations based on parametric and physical models built in Computer aided design/Computer-aided engineering (CAD / CAE)-systems. It is necessary to synthesize constructive schemes, develop mathematical models for research and evaluation of the level of security armor, analyze the behavior of units and aggregates of the machine, and carry out complex many parametric calculations. At the final stage, to develop recommendations for the construction of grating screens, according to the results of calculations, to manufacture the elements of screens and means for their installation on the machine, to conduct practical tests of LAMV. The solution of the issue of providing LAMV with additional means of protection at the industrial level is greatly demanded, accounting for the positive experience of application of protective screens during military operations in the East of our country.

Keywords: *combat actions, armed combat vehicles, military equipment, personnel, tactic-technical characteristics, armored defense, military industry, volunteers, ammunition, existing armored protection, multivariable calculations.*

**IMPROVED ACCURACY OF SATELLITE AND TERRESTRIAL
POSITIONING MOVING MILITARY FACILITIES**

Maksym Telepa, Kyiv

The last years are characterized by significant progress in the area of augmented reality technology and expansion of the areas of their application. The development of the navigation technologies and navigation equipment has a huge impact on the daily activities of a person, provided the provision of the new services in the traditional areas of activity, such as transport, geodesy and cartography, military field, environmental measures and many others.

Is the ubiquitous distribution of device positioning in cars or in smartphones is the basis for several innovative context-dependent services that are currently available. However, we only at the beginning of the journey: in the coming years we will see the emergence of a number of high-resolution programs that are able to determine the location of the the precision of less than a meter and are available for use even in conditions that worse the spread signal, e.g. inside buildings. The number of new offered services is limited only by imagination and will grow exponentially along with the corresponding income.

However, the path to that goal is still hard. Some of the modern technologies of positioning is mainly designed for different applications (for example, management of communication networks), and they are not optimized to provide accurate and accessible information about the location. In addition, none of the used or are in development technology positioning does not provide coverage for services in a variety of heterogeneous environments (for example, outdoors, indoors, on the sea and on the road) and high clarity and precision positioning. In addition, the integration of the different positioning technologies is a central aspect for the future of seamless positioning systems-a key that will open a new era of global knowledge about the location.

Keywords: navigation technologies, navigation equipment, global navigation satellite systems, technology positioning, communication.

УДК 62:61

**SPECIAL TECHNICAL MEANS FOR HEATING WOUNDED SOLDIERS
IN MEDEVAC TRANSPORTATION**

Andrii Todosov, Kharkiv

The relevance of the research topic is due to the incompleteness of the military conflict in Donbas, as well as the fact that types and extent use weapons, nature and degree of its protection, determine the size and structure of losses of troops. For military doctors, it is important to know the damaging properties of weapons – both conventional and mass destruction to provide timely and complete primary health care to wounded soldiers. Therefore, there is a need to know how to use modern weapons, the requirements for the prospects of its development for the proper planning of the organization of medical troops support, improving the organizational structure of the medical service, determining the direction of development of its technical and medical equipment.

The aim of the work is to study the ways of effective medical care organization for the wounded (affected by the damaging elements of certain types of weapons) and the prediction of possible options for action in various injuries and the study of the possibility of using an electric heated rug to provide heat to the wounded in the provision of pre-hospital care.

The objectives of the scientific work are: formulation and justification of the main stages of effective pre-hospital care organization for the wounded and the study of possibility of using an electric heated rug with carbon threads to provide heat to the wounded in the provision of pre-hospital care.

During the research and development of technical solutions theoretical and experimental approaches were used, which allowed combining theoretical research with experimental research. The scientific basis for the assessment of the level of

the medical service readiness to perform tasks is: the theory of the effectiveness of weapons use, the theory of medical troops support organization, the theory of probability and mathematical statistics.

Keywords: *evacuation, heated rug, medical losses, military personnel, weapons, wounded.*

УДК 623

CONCEPTION OF MILITARY VEHICLE CLASSIFICATION

Oleksandr Tymchenko, Kharkiv

The study presents the conception of military vehicle classification in the Polish Armored Forces.

In the army vehicles used as carriers of weapons, combat and logistics equipment and means of transportation and protection of sub-units of infantry. The main characteristics of military vehicles are maximum acceptable total weight, ability to overcome obstacles, level of resistance to fire and others.

There are many classifications of military vehicles for various reasons. So it is possible to classify them for different groups and reasons. In the Polish Armored Forces the armored forces is used as common for classification. In this way, vehicles are classified as combat vehicles and technical combat support vehicles.

The main combat vehicles are tanks, armored personnel carriers, infantry combat carriers, self-propelled armored guns, tank destroyers and self-propelled anti-aircraft guns. The main technical combat support vehicles are armored recovery tractors, artillery tractors, supply vehicles and special armored vehicles.

In relation to effectiveness of protection, armor military vehicles can be divided into armored and bullet-proof.

Infantry fighting vehicles are divided into light (up to 20t) and heavy (above 20t). Another criterion is the level of modernity of construction. Tanks and infantry fighting vehicles are divided into generations: first, second and third. Military vehicles can be amphibious and nonamphibious.

So the authors of the article propose new classification for military vehicles used in the Polish Armored Forces.

Keywords: military vehicle, classification, Armored Forces, armored vehicle, combat vehicle, Polish Armored Forces.

УДК 623.1

HOW TO UPGRADE APC-60

Volodymyr Ulyanych, Kharkiv

In modern conditions, the role of military armored vehicles is very important, especially for those which are widespread in local conflicts, peacekeeping operations and in Joint Forces Operations (JFO).

During special operations that are carried out according to the liquidation of illegal armed groups these APCs are used.

Particularly relevant given the task of accepting with modernized armored vehicles. One of the most famous is modernized APC-60 with a changed power train.

Modernization of the APC-60 made more improvements, which included the installation of APC-80 power train with transmission. The power train requires one diesel V-sub 8-cylinder engine KamAZ-7403 with a capacity of 260 hp, which allows to reach 100 km/hour and can drive 600 km. Application of diesel engine not only increases the technical characteristics of the armored vehicle, but its also has higher fire safety and lower fuel consumption.

During the modernization, in the design of the armed vehicle, serious signs are introduced. The APC takes the power train instead second gasoline engine GAZ on an armed vehicle and a diesel engine YMZ-236 of the Yaroslavl Motor Plant is installed there. There by installing diesel engine is high to mileage from 500 to 800 kilometers.

Keywords: APC, engine, power, modernization, transmission, fire safety, power plant.

**WHY IT IS NECESSARY TO FORM PSYCHOLOGICAL
IMMUNITY FOR SERVICEMEN OF THE NATIONAL GUARD OF
UKRAINE UNDER CONDITIONS OF THE RUSSIAN-UKRAINIAN
INFORMATION WARFARE**

Artem Vasylykiv, Kharkiv

Modern mass media electronic facilities, space systems of information transmission and multiplication as well as other techniques in combination with scientific and journalistic literature allow to effectively influence the mind, consciousness and psyche of millions of people. Today's information and propaganda are powerful enough to trigger the emerging, course and final result of political events, moreover the global problems of peace and war.

The topicality of the issue is determined by the necessity of: an integrated and systematic identification of effective mechanisms for the management of information security of the defense sector of Ukraine in the context active information war; the formation of strong psychological immunity as a prerequisite for the strong spirit formation and the ability to realistic creativity; the formation servicemen' sense of patriotism and love for the country.

Russian-Ukrainian information warfare is a complex of activities that are constantly carried out by governmental and non-governmental organizations of Russia and Ukraine in the information space of Ukraine, Russia and other countries and international organization with the aim of obtaining strategic and political advantages by demoralizing or misleading the enemy and counteracting the other party's actions in the global confrontation between Russia and Ukraine. It began at the time of the USSR collapse and is still in progress.

Today we see that professionals of the enemy psychological operations units do not lose the chance to make play ideologically and psychologically with such events and facts as: defeats and losses of our troops; disadvantages in their material and technical provision; presence in the units of inexperienced commanders; low

level of training; facts of desertion, betrayal; national, religious, property and other types of real or fake contradictions.

Among the most important preventive measures are blocking of possible channels of psychological influence on the personnel; the personnel awareness about basic means, techniques and technologies of the opponent's negative informational and psychological influence; explanation for servicemen their personal responsibility for the storage and distribution of hostile printed and other types of materials; detection of mentally unstable military personnel and conducting of individual psych prophylaxis; organization in the units the system of mutual support and psychological assistance; increase of material and technical base of informational and psychological influence on the troops; patriotic education, as a professional quality of servicemen of the National Guard of Ukraine.

Negative informational and psychological impact on servicemen is increasingly used by our enemies as a kind of weapons. Therefore, effective work of personnel in modern conditions is impossible without the formation of stable psychological immunity for military personnel.

Keywords: information warfare, psychological influence, patriotic education, psychological immunity.

УДК 623-9

**RESEARCH AND METHODOLOGICAL GROUNDS FOR
ORGANIZATION OF MILITARY COLUMN FORMATION TO
PERFORM TASKS UNDER AGGRAVATING SITUATION**

Maksym Veselov, Kharkiv

The aggravating situation at the state borders justifies the need in timely unit arrival at the designated area in full combat readiness, which requires proper marching order formation and depends on the quality of personnel column organization. The particular organization of personnel column formation is

determined by the type of tasks to be performed by the column. The given tasks may be of military, training or logistics nature.

Characteristic functional features of the military column in performing the assigned tasks are the following:

- transportation of personnel, weapons, ammunition and engineering equipment in order to cover or reinforce an area of state borders in the context of aggravation;
- coordination of personnel actions to conduct specific missions or other training tasks,
- delivery of food, clothing, fuel, spare parts, tools and equipment, individual protective means, the other logistics assets.

The quality of column formation defines its effectiveness, which makes safe personnel transportation; facilitates delivery of items to the place of destination within the established period of time; keeps qualitative and quantitative characteristics of items of delivery; minimizes cost of delivery.

The basic data for decision-making process regarding composition of the column formation includes: the task itself which causes the organization of column formation; the vehicle pool; vehicles service life and fuel limits; efficiency criterion; time constraints to organize column formation; an opportunity to prepare vehicles in the pre-departure period; an opportunity to introduce corrections into the primary task.

The decision on organization the column formation is related to the performing the task of optimization of vehicle selection considering time parameters, vehicles technical condition, overhaul life, time between failures characteristics etc.

The identified task belongs to decision-making support and its mathematical model can be introduced to the model base management system of automated decision support system of the National Guard of Ukraine.

Keywords: aggravation, column formation, the National Guard of Ukraine, personnel, vehicles.

УДК 355.6

BULLET-PROOF VEST "CORSAIR MZS 1-4"

Vitalii Yakovchuk, Kharkiv

A bullet-proof vest (body armor) «Corsair MZS 1-4» has been a main individual protection in battle for the Armed Forces of Ukraine and the National Guard of Ukraine since 2014. Body armor saves lives. Many soldiers have been saved from death or serious injuries because they were wearing their armor.

«Corsair MZS 1-4» is made in Ukraine by a scientific production company (SPC) TEMP-3000. The bullet-proof vest «Corsair MZS 1-4» was developed in 2014 for the military personnel of the Armed Forces of Ukraine. Since 2014 bullet-proof vest «Corsair MZS 1-4» has been used in divisions of the Armed Forces of Ukraine, the National Guard of Ukraine and Security service of Ukraine.

The bullet-proof vest cover from inside has the socket in which flexible ballistic packages of from the 1st to 2-C protection, Ukrainian standards, or from IIA to IIIA, US standards, protection are placed. In addition flexible ballistic packages are covered with waterproof fabric, which is hermetically soldered. Over flexible ballistic packages armored plates are inserted into a cap from the 2nd to the 6th class of protection, the standard of Ukraine, or from III to IV class, the US standard.

The bullet-proof vest «the Corsair – MZS» has the increased ergonomics and the increased convenience in operation. The main advantage of this body armor is the system of quick discharge from the human body as well as the ability to change the level of protection by replacing the armored plates. The presence of lighter and more advanced materials and modern inventions will save the life of a soldier.

Keywords: body armor, Corsair MZS 1-4, save the life of a soldier, advanced materials, modern inventions.

ARMED FORCES OF THE UNITED STATES - STATISTICS & FACTS

Yaroslav Yakubets, Kharkiv

The United States Armed Forces are the military forces of the United States of America. It consists of the Army, Marine Corps, Navy, Air Force, and Coast Guard. The President of the United States is the Commander-in-Chief of the Armed Forces and forms military policy with the Department of Defense (DoD) and Department of Homeland Security (DHS), both federal executive departments, acting as the principal organs by which military policy is carried out. All five armed services are among the seven uniformed services of the United States.

The U.S. Armed Forces are one of the largest militaries in terms of the number of personnel. It draws its personnel from a large pool of paid volunteers. Although conscription has been used in the past in various times of both war and peace, it has not been used since 1973, but the Selective Service System retains the power to conscript males, and requires that all male citizens and residents residing in the U.S. between the ages of 18–25 register with the service.

As of 2017, the U.S. spends about US\$610 billion annually to fund its military forces and Overseas Contingency Operations. The U.S. Armed Forces has significant capabilities in both defense and power projection due to its large budget, resulting in advanced and powerful technologies which enables a widespread deployment of the force around the world, including around 800 military bases outside the United States. The U.S. Air Force is the world's largest air force, the U.S. Navy is the world's largest navy by tonnage, and the U.S. Navy and the U.S. Marine Corps combined are the world's second largest air arm. In terms of size, the U.S. Coast Guard is the world's 12th largest naval force

Keywords: *USA, Armed Forces, Air Force, Navy, Marine Corps, deployment, military.*

THE ACTUAL PROBLEMS OF AUTOMATION OF MATERIAL SUPPLY

Yurii Yankovsky, Vinnytsia

On the basis of the Joint Support Center a pilot project was launched in Vinnytsia to implement automation system for accounting needs and stores in the field of clothing supply of the Armed Forces of Ukraine. The main purpose of this project is of very deep concern to every Ukrainian soldier: to work out a clothing supply operating system, which will fully equip all servicemen with proper clothes, linen, footwear and equipment on time, in full volume and of the appropriate size.

One of the main problems of the current clothing supply system is that it takes a serviceman from five to twenty or more days to get issued appropriate clothes and equipment from clothing and equipment supply service. The term is too long, and obviously it makes a serious problem, which directly influences combat readiness.

Another, not less serious flaw of the clothing supply system, in my opinion, is lack of planning on the size chart. It results in the fact that people do not receive the clothes of required size on time. When making an order, the officials are guided not by the real need based on the size of the clothes of a particular soldier, but by standards which ruled in the Soviet times.

As a result, servicemen are not provided timely with proper clothes, while the state orders manufacturers to tailor clothes or shoes of the wrong size. Therefore, the conclusion is obvious - the solution of the problems lies in the automation of needs and existing stockpiles accounting system, created within all the Armed Forces integrated information platform for clothes accounting.

The first stage of the project we offer is being tried out now in Vinnitsa. At the moment we are piloting the test prototype of an integrated automated system. Each batch of clothing stored in the warehouses will electronically take an inventory and will enter a secure automated system. Thus it will be easier for

corresponding specialists to monitor the movement of clothes and their surplus online.

Finally, as the next step, we are planning to provide each soldier within the pilot project with an individual electronic card, which chip will include all the information regarding his/her personal parameters, current status of how complete the clothes supply is, and the follow-on dates of particular clothes supply items issue, etc. This way, we will be able to plan to address the needs in clothing supply.

The point is that every sergeant major in the unit will have a standard electronic tablet with the relevant working information on the state of provision of the unit personnel with clothes supply and thus they will be able to address clothing and equipment supply service for required clothes, filing applications as quickly as possible with maximum efficiency.

In fact, everything we plan, offer and do, has demonstrated good results in the armies of our partner countries, so we rely on their experience, rather than start everything from scratch.

Keywords: *accounting needs, field of clothing supply, automation system, actual problems of automation*

УДК 62.3

ARMoured VEHICLES

Yurii Yesypenko, Kharkiv

Military engineering can employ a wide variety of heavy equipment in the same or similar ways to how this equipment is used outside the military. Bulldozers, cranes, graders, excavators, dump trucks, loaders, and backhoes all see extensive use by military engineers.

Military engineers may also use civilian heavy equipment which was modified for military applications. Typically, this involves adding armour for protection from battlefield hazards such as artillery, unexploded ordnance, mines,

and small arms fire. Often this protection is provided by armour plates and steel jackets. Some examples of armoured civilian heavy equipment are the IDF Caterpillar D9, American D7 TPK, Canadian D6 armoured bulldozer, cranes, graders, excavators, and M35 2-1/2 ton cargo truck.

Militarized heavy equipment may also take on the form of traditional civilian equipment designed and built to unique military specifications. Examples of this type of vehicle include high speed backhoes such as the Australian Army's High Mobility Engineering Vehicle (HMEV) from Thales or the Canadian Army's Multi-Purpose Engineer Vehicle (MPEV) from Arva.

Typically based on the platform of a main battle tank, these vehicles go by different names depending upon the country of use or manufacture. In the US the term "combat engineer vehicle (CEV)" is used, in the UK the term "Armoured Vehicle Royal Engineers (AVRE)" is used, while in Canada and other commonwealth nations the term "armoured engineer vehicle (AEV)" is used. There is no set template for what such a vehicle will look like, yet likely features include a large dozer blade or mine ploughs, a large calibre demolition cannon, augers, winches, excavator arms and cranes or lifting booms.

Keywords: *armour, cranes, vehicle, equipment, protection, tank.*

УДК 623

MODERN ELECTRIC CARS

Pavlo Zabolotskykh, Kharkiv

Cars today are one of the most popular and comfortable options for moving. However, despite the huge number of advantages, they have a number of disadvantages. One of the main disadvantages is that motor transport causes great damage to the environment - up to 63%. Also, gasoline cars are quite an expensive form of transport. Recently, oil products are rapidly becoming more expensive. These facts have led developed countries to develop and produce less wasteful and

more environmentally friendly cars. Electric cars have a number of advantages and disadvantages.

The advantages of electric cars:

- Reduced fuel costs. The cost of gasoline is constantly growing and is often spent in large quantities, which devastates the family budget, and the cost of electricity for recharging the battery should be much less than these costs.

- Reduced pollution. A running electric vehicle engine does not emit harmful gases into the environment. Ideally, to reduce the environmental impact, it should be produced from clean, renewable energy sources.

- Noise reduction. Electric vehicles are able to provide quiet and smooth acceleration, with faster acceleration.

- Security. Electric cars go through the same testing procedures as regular cars. Thus, in the event of a collision, the airbags will work, the collision sensors will disconnect the batteries, so that the electric vehicle will stop.

- Actually the cost. Gone are the days when electric cars cost a lot of money. Previously, batteries were very expensive, but when mass-produced, their cost is reduced.

- Reliability. Due to the smaller number of parts and assemblies, the reliability of the electric vehicle increases and, as a result, the cost of repair and maintenance decreases.

Disadvantages of electric vehicles:

- Electricity is not free. It is worth paying attention to the fact that electric vehicles have different power consumption.

- Recharge time. It takes about 8–10 hours to fully charge an electric vehicle.

- In winter, battery consumption increases for heating the cabin, brushes and headlights. This leads to the fact that mileage in winter is reduced by 30–50% compared with the summer period.

Even despite the fact that there are many nuances in the use of electric vehicles, one should believe that they will be resolved in the future. First of all,

you need to think about the main advantage of an electric car. This is a reduction in the degree of pollution. And at the moment you can pay attention to electric vehicle hybrids, which can significantly minimize the disadvantages of purely electric models.

Keywords: *electric cars, disadvantages, advantages, repair, electricity, security, reliability, battery.*

УДК 623.1

**METHODS FOR DETERMINING RANGE AND NUMBER OF
SPARE PARTS USED FOR MAINTENANCE AND REPAIR OF
MILITARY VEHICLES**

Oleksiy Zatserkovnyi, Kharkiv

The experience of using troops in the area of the anti-terrorist operation shows that the problem of the availability of spare parts in repair units has become very acute.

The analysis revealed a variety of methods for determining the nomenclature groups of spare parts for the repair of machines of artificial arms. Today it is of interest to develop a unified methodology for determining the nomenclature groups of spare parts, which uses a set of criteria specific to the current conditions and will allow unify and automate the process of distributing the nomenclature to groups. The need for spare parts can be determined by the nomenclature standards, which establish the average annual required number of specific nomenclature name parts for engineering armaments per year.

The basis of this technique is the data on the reliability of the details and methods for converting them to need, by:

- use of data on the leading function of the flow of failures or replacement of parts;
- application of the approximate estimation of the resource before the first replacement of the part;

- determination of the average number of replacement parts for the life of engineering armament machines;

- additional consideration of the variation of the resource details, for details, the resource of which is comparable with the average annual production of engineering armament machines.

Despite the variety of techniques for forecasting the need for spare parts, the practice of widespread practice has now become widely used to determine the demand for actual spare parts. The main advantages of this technique are the reliability of information on the use of spare parts and the efficiency of the application. However, a significant disadvantage is that fluctuations for spare parts are offset by creating additional reserves in spare parts stores, which in turn is associated with additional risks of illiquid spare parts stock. Thus, as a result of the analysis of the research, it was established that the accuracy of the definition of the nomenclature and the number of spare parts for today is insufficient. No account was taken of excess of the deadlines of operation and the exhaustion of the life of the engineering armament machinery, that is, their actual technical condition. One of the ways of eliminating this disadvantage is to improve the methodology for determining the range and number of spare parts for maintenance and repair of engineering armament machines, taking into account the actual condition of engineering armament machinery and the period of their operation.

Keywords: *armament, engineering, nomenclature, reliability, spare parts, repair.*

ДРУГА НАУКОВО-ПРАКТИЧНА КОНФЕРЕНЦІЯ

для слухачів магістратури

«LANGUAGE OF INTEROPERABILITY»

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