

**МІНІСТЕРСТВО ВНУТРІШНІХ СПРАВ УКРАЇНИ
НАЦІОНАЛЬНА АКАДЕМІЯ НАЦІОНАЛЬНОЇ ГВАРДІЇ УКРАЇНИ**

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П'ЯТОЇ НАУКОВО-ПРАКТИЧНОЇ КОНФЕРЕНЦІЇ
для здобувачів другого та третього рівнів вищої освіти**

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**THE APPROACH TO DETERMINING THE POSSIBILITIES FOR
TECHNICAL SUPPORT OF ACTIONS OF THE UNITS OF THE NATIONAL
GUARD OF UKRAINE**

Maksym Adamchuk, Mykhailo Vasechko, Kharkiv

An important condition for successful combat operations is the timely and complete technical support of armament military equipment. Under technical support there is a compatibility of actions on commissioning, preparation (bringing in the established willingness for use on purpose) and its use for appointment, storage, transportation, maintenance and repair. Therefore, the operation of artillery shells, combat vehicles and other artillery weapons begins from the moment they are sent from the manufacturers and ends when the repair of weapons is either impossible or economically impractical.

The maintenance of weapons and equipment is carried out to maintain them in constant technical readiness, timely prevention, detection and elimination of damage. Maintenance includes: refueling (refueling) of fuel and lubricants, checking the serviceability and readiness for usage of weapons, devices, units, mechanisms, their cleaning, lubrication, calibration and adjustment, elimination of minor damage and installation work; charging (recharging) batteries; checking the staffing and replenishment of weapons and equipment with spare parts, tools and accessories, means of increasing traffic and other regular means; checking the availability and serviceability of equipment on cars and tractors intended for the transportation of personnel, weapons, equipment and property. If necessary, during maintenance, ammunition can be replenished with missiles and ammunition.

The analysis of the current system of technical support of formations, units and subdivisions of the National Guard of Ukraine shows that along with certain advantages, it has a number of problems that have significantly worsened with the

change in the nature of combat operations of the National Guard of Ukraine during the anti-terrorist operation joint forces.

The presence of a large number of problematic issues that arise in solving the tasks of technical support of formations, units and subdivisions of the National Guard of Ukraine, indicates the need for intensive research of the existing technical support system in order to further improve it.

Also, one of the main factors influencing the organisation of technical support of military formations is the presence of technical support units, as well as their level of capabilities. The very knowledge of such information makes it possible to determine the number and functional composition of the unit more accurately, which will affect the effectiveness of its application. Nowadays, at the entrance to the formation of the design of technical support to determine the number and functional composition of the unit, the decision-maker enjoys more of his own practical experience, which does not fully give an accurate and sound decision. While determining the capabilities for maintenance and repair calculate the production capacity of forces and means of technical support of the military unit for M&R № 1 and № 2.

This approach makes it possible to determine the level of capabilities of technical support units for M&R of weapons and ammunition more accurately while performing tasks for their intended purpose.

Key words: *technical support, maintenance, weapons, military unit, National Guard of Ukraine.*

IMPROVING MILITARY VEHICLE VIA HYBRID ENGINE

Nazariy Bandura, Kharkiv

The National Guard of Ukraine is a military formation which includes the performance of tasks both in combat and during the performance of daily tasks assigned to it.

For the successful performance of tasks performed by the NGU in everyday activities, light automotive equipment with internal combustion engines is used. Good prospects for the use of this type of automotive technology are the improvement of gasoline engines with a hybrid installation.

A hybrid car is a highly economical type of vehicle that uses two energy sources, an internal combustion engine and an electric battery. The automobile can be used as an electric car, and as soon as the charge falls below a certain level, it is better to turn on a small gasoline or diesel engine and the car goes on charging the drives, after charging the engine shuts down and the cycle repeats.

If this idea is realized, NGU units during the operation of automotive equipment with a hybrid installation will face a number of advantages that apply not only to military formations, but also to society as a whole:

- reduction of exhaust gas emissions, which pollute the environment by releasing a large amount of harmful and toxic substances into the atmosphere;
- increasing the frequency of maintenance through the use of a hybrid installation;
- reducing fuel consumption as one of the main parameters of the car; saving natural resources;
- unlike fully electric cars, a hybrid car is always ready to use, because the battery is charged automatically while driving;

Summing up, we can say with confidence - modern problems need modern ways to solve them.

Key words: National Guard of Ukraine, hybrid engine, improving, electric battery, gasoline engines, vehicle, electric car.

УДК 355.42

ORGANIZATION OF DEFENCE OF THE MECHANIZED BATTALION IN THE URBAN AREA

Maksym Barabash, Kharkiv

In the conditions of development of all-Ukrainian vector, many new problematic issues appear, the daily and social activities of a nation are changing, which creates the need for new approaches to the implementation of various tasks. The military sphere is no exception. The growth of urban infrastructure creates new opportunities, but at the same time causes new challenging issues.

Currently, armed clashes in the urban area are not the prerogative of only police units, setting new tasks before the Armed Forces of Ukraine to conduct full-scale operations in the streets of a populated places. It becomes an increasingly important task, considering the current war of aggression in the East of the country, Donbas, an industrialized part of Ukraine with a large number of settlements, which complicates the implementation of combat missions.

The battalion in a populated place defends one or more quarters, the company – a quarter or several houses. Depending on the characteristics of the structures, the number of objectives to be defended by a military unit may be different. A small settlement can be assigned to the battalion for defense.

The basis of the defense of the battalion (company) is a system of strongholds and firing positions that cover the most important highways, squares and objects of the settlement. For defensive combat, especially strong corner houses with basements are used in the first place, which provide the possibility to shell streets and squares.

In the intervals between the strongholds and on the streets barricades are arranged. To ensure space for maneuvering of units inside the quarters, passages are

arranged, as well as underground communications and collectors are used. Anti-tank vehicles are located in the places that give possibility to fire along the streets and in the squares.

The battalion's fire power is built on a combination of flank and cross-fire of small arms, MBTs, IFVs (APCs), anti-tank weapons, which are allocated for direct-to-hand shooting, as well as artillery fire from closed firing positions. Particular attention is paid to the fire of all means along the streets, at the intersections of roads, squares, bridges.

Based on the analysis, we come to the conclusion that the following points should be considered: the development of general approaches to plan tactical actions for combat defense in the urban area; implementation of new technical means in the NGU units; upgrading the equipment of NGU units; professional training of personnel of operational units, taking into account the specifics of the assigned tasks.

***Keywords:** mechanized battalion, anti-tank vehicles, firing positions, direct-to-surface shooting, the battalion's fire system.*

УДК 629.076.623.426

**DIAGNOSTICS OF THE VEHICLE BY COMPUTER TECHNOLOGIES
IN THE NATIONAL GUARD OF UKRAINE**

Roman Bolyubash, Kharkiv

National Guard of Ukraine uses a variety of automotive equipment to perform its tasks, and maintenance and other types of work are performed to maintain automotive equipment in good condition. Quality maintenance can be ensured by using computer devices that reduce the time to identify a problem and reduce the human factor during this type of work. You can highlight the following benefits of computer diagnostics of the car, such as:

-receipt of data on the efficiency of all mechanisms of the engine of the machine

- reading and processing error codes
- analysis of the main systems of the car and notifies the driver of their failure
- computer diagnostics allows you to adjust the indicators that affect driving while driving

What is car diagnostics? Car diagnostics are measures that are carried out with the car to detect and quickly troubleshoot.

Verification is conducted by connecting of the special scintiscanner to the side systems through intended for this purpose diagnostic. The scintiscanner equipped by modern software reads system that is translated by a car. These data are decrypted by means of the special software. The got information allows to do the detailed conclusion about the presence of present rejections in-process auto. Using devices for car diagnostics, we can check the condition of the following components and units:

- battery charging status
- state of the starter, terminals and supply wires
- brush mechanism
- checking the compliance of the parameters of the breaker-distributor
- work of the Hall sensor
- gas distribution mechanism

Summing up, we can emphasize the relevance of this topic, which allows us to quickly eliminate and detect certain car breakdowns in the shortest possible time for us.

Key words: *computer diagnostics, devices for car, fault check, detect troubleshoot, analysis of the main systems.*

INTRODUCTION OF A DRIVER TRAINING MARCH

Ruslan Bolyubash, Kharkiv

The National Guard of Ukraine performs a lot of transportation in its daily combat activities. The main conditions for transportation are:

- technical condition of the car;
- crew (driver) training.

Consider driver training. Today, the actual issue is the staffing of military units with drivers and their personal training. During the training of drivers, a lot of theoretical knowledge and practical skills are provided on special simulators. Looking at this, we can say that for better driver training it is necessary to introduce march training.

A march is an organizational movement of military units, units by car or on foot. I propose to introduce a march to a distance of 100 km. The advantages of the march are that when overcoming such a distance, drivers will gain better skills in driving special vehicles and the ability to make quick decisions in critical situations.

Marching training should consist of:

- just 100 km;
- off-road driving;
- driving around the city;
- driving on the highway.

During the off-road march, the driver will master complex control elements such as entering the trench for shooting, rapid movement with maneuvers that will help reduce the possibility of destruction of equipment by the enemy, elements for towing and self-extraction of equipment.

During the march on the highway, the driver masters the ability to drive while driving in a convoy at high and low speeds, single movement without accompaniment.

During the march through the city, the driver will master the ability to drive in a large flow of cars, traffic in a convoy and without it, increase knowledge of traffic rules.

The role of the march is to give the driver the ability to drive special equipment to perform official and combat tasks. Each car with a soldier must have a driving instructor who will supervise and train the soldiers during the march training. All marching training points are mandatory and must be within a distance of 100 km.

March training is important for the training of drivers of the National Guard of Ukraine. March training is an effective way to train skilled drivers of special equipment who will perform combat missions in peacetime and wartime.

Key words: *march, preparation, distance, vehicle, NGU.*

УДК 358.1

THE WAYS TO DEVELOP RADAR SYSTEMS OF ANTI-AIRCRAFT WEAPONS OF THE GROUND FORCES

Maksym Bondar, Kharkiv

In the current conditions of the Joint Forces Operation, isolated hostile attacks (mortar, artillery, missile) areas of the location of troops and settlements, important military and civilian objects are an urgent threat. Such attacks are reportedly of a terrorist nature. The enemy resorts to firing using civilian vehicles, carries out fire raids from settlements, crowded places or critical infrastructure to provoke fire in response. The difficulty of separating the attackers, the risks of violating international humanitarian law and inflicting unintentional losses on civilians limit symmetrical measures in the form of the use of artillery of the counter-combat force of the Ground Forces (SV) of the Armed Forces of Ukraine. Therefore, the report considers a new approach to counteracting such attacks, which provides, among other measures, the destruction of missiles, projectiles and enemy mines with anti-aircraft fire.

The report revealed the essence of the concept of counteracting single missile, artillery and mortar attacks, which was implemented in advanced NATO countries and was called C-RAM (Counter - Rockets, Artillery and Mortar) Concept.

The results of comparative analysis of C-RAM tasks with measures to counteract unmanned aerial vehicles (UAVs) are presented. The similarity of the C-RAM Concept tasks with the tasks that solve the forces and means of air defense (air defense) of the JI in the Joint Forces Operation is determined. The characteristics of existing C-RAM weapons samples are given, the main trends in their development are determined. Particular attention is paid to the peculiarities of means of detection, classification and maintenance of RAM-targets and UAVs, which should ensure functioning in a difficult situation, with strict requirements for oversizing ability and small values of the effective surface of goal scattering.

Cognitive radar stations (radar) based on active phased antenna grids can meet such needs. This is the newest direction of improving the capabilities of radars through intellectual adaptation of operating modes and operational parameters in accordance with the properties of the external environment and new knowledge gained during operation. An overview of the main technologies used in cognitive radar is carried out. In particular, the essence of the coordinated goal illumination (Matched Illumination) – which consists in maximizing the quality of radar operations by adapting the sensing signals and algorithms of their processing to the characteristics of the target and radar channel and the coordinated distribution of energy resources (Radar Resource-Management and Optimization Technologies) – which consists in maximizing quality indicators due to the optimal distribution of energy resources and radar search efforts in the middle modes and between them.

It has been shown that the use of the technologies in combination with deep learning algorithms allows processing large data sets in real time and forming feedback circuits at different hierarchical levels of functional subsystems of cognitive radars and choosing optimal control strategies.

Perspective directions of development of methods of analysis and synthesis of functionally necessary components of cognitive radars for their use as means of reconnaissance and targets of anti-aircraft means for combating missiles, projectiles, mines and unmanned aerial vehicles of the enemy in the air are given.

Key words: *unmanned aerial vehicles, coordinated goal illumination, C-RAM.*

УДК 321.7

MODERN TRAINING AND EDUCATIONAL FACILITIES – KEY COMPONENT FOR PARTNERSHIP INTEROPERABILITY INITIATIVE

Viktor Boyko, Boryspil

Ukraine is undertaking comprehensive reform of its defense and security sector, necessitated by conflict in the east of the country. The combat-hardened army now fighting in the Donbas region bears little resemblance to the one that suffered heavy losses when fighting with Russian-backed separatists first broke out in 2014. The country's armed forces are larger and better equipped than ever before, numbering more than 200,000 active-service military personnel.

Ukraine's government has committed to major structural reforms to ensure that its armed forces meet NATO standards by 2020, a crucial step toward the country's goal of NATO accession.

Within a short space of time, Ukraine's defense and security has evolved from a depleted, neglected, and underfunded force to one that has contained a Russian-backed armed rebellion in eastern Ukraine. The transformation has been painful and an enormous amount still needs to be done to reform the Ukrainian military, but remarkable progress has been made since 2014.

Analyzing world best cases, practices and experience, we may conclude that training and educational facilities play one of the biggest role in reforms and positive changes. To establish proper level of collective combat readiness, International interagency multidisciplinary training center of National Guard of Ukraine was

created in July 2017 by the order of the Minister of Internal Affairs. Aim of the project: creating of the background for providing of:

- High level of the readiness of NGU units to perform tasks during different risks both on the territory of Ukraine and during peacekeeping operations;
- Coordinated activities between NGU units and other forces of the Ministry of Internal Affairs of Ukraine and other Ukrainian governmental agencies.

Based on made decision and achieved results we can guarantee that such types of training facilities may support our ideas and initiatives, namely:

- Strengthen defence and operational capabilities of defense and security sector in the current security conditions;
- Achieve military criteria required for NATO membership, including enhancement of interoperability between agencies and forces of Ukraine and Allies;
- Promote reform and professionalization of Ukrainian forces, implementation of the best military standards, practices and procedures;
- Ensure participation of Ukrainian servicemen's in NATO-led operations and missions, as well as in NATO Response Force;
- Support NATO military activities on the South-Eastern flank of the Alliance, including participation in elements of NATO defence and deterrence.

The above allows the units, among other things, to participate in NATO-led operations, training and exercises, as well as in multinational task forces of high readiness (led by NATO, EU, and UN).

Key words: *interoperability, reforms, standards, NATO defense, training facilities, operational capabilities.*

**PERSPECTIVE WAYS OF MODERNIZATION INDICATION
COMPONENTS IN ANTI-AIRCRAFT MISSILE SYSTEMS**

Pavlo Chernenko, Kharkiv

The replacement of the element base is a generally accepted trend in the modernization of anti-aircraft missile systems (ZRK) and their components. A promising direction is the replacement of blocks of indication systems, where monochrome electron beam tubes (CRT) are widely used as indicators, and modern multifunctional indicators. The relevance of this issue is due to obsolete CRT and related radio electronic devices (deflecting systems, specialized high-voltage transformers, voltage multipliers, etc.), their removal from production, the lack of replenishment of their stocks of ZIP. In addition, the indicators of missile launchers are used only in combat operation (display of primary or secondary radar information, information on the number and type of missiles, etc.) and during certain settings of functional systems of the ZRK tool during its maintenance.

Modern technology development allows to significantly expand the functionality of indicator systems. First of all, it is to improve the perception of the displayed information during combat work and display additional information on the indicator without changing its geometric dimensions due to the use of color displays. In addition, the possibility of using these indicators is realized, provided that there is no need to conduct combat work as:

- monitor of the opto-electronic surveillance system (for detection of unmanned lethal vehicles, ground protection of division positions (batteries)), which will create the main (additional) corresponding observation point in the disguised weapon sample;

- means of displaying interactive electronic operational documentation that will improve information support of the processes of maintaining the weapon sample in

combat capable condition, as well as mastering its construction and use for its intended purpose;

– module for conducting tactical calculations with the help of a complex of specialized information and calculation tasks, which will improve the quality and efficiency of making relevant decisions by officials.

A generalized structure of the upgraded device is proposed, which includes the hardware and software component. The hardware of the device contains modules for processing input signals, microprocessor module, microcomputer module, display, control bodies. The software part contains modules for processing signals from the outputs of receiving radar and optical devices, signals about the angular position of antennas, signals from synchronization and maintenance systems, as well as a module for storing, processing data and preparing them for display, specialized software for displaying operational documentation and making calculations.

Key words: anti-aircraft missile systems, color displays, maintenance.

УДК 623.44

**FORMATION ABILITY TO USE WEAPONS BY FUTURE NCO
GUARD OFFICERS IN THE PROCESS OF PROFESSIONAL TRAINING**

Dmytro Chukanivskyi, Kharkiv

On the basis of theoretical analysis and practical experience revealed the features of fire training, which allowed to determine the main criteria for the formation of skills in the use of weapons, and the content of the criteria - as their indicators:

- criterion of physical fitness, which includes the level of strength endurance, vestibular stability, the ability to relax and tense certain muscle groups, the ability to freely control breathing;

- psychological criteria include: motivation for professional training, emotional reactions to actions with weapons and special tools, resistance to the evaluation of

others, the level of willpower (persistence, determination, diligence, etc.);

- cognitive criterion involves the acquisition of relevant knowledge on the use of special tools and weapons by cadets;

- reflexive criterion is the cadets' awareness of their activities, assessment and self-assessment of the use of special tools and weapons.

Taking into account the nature of the professional activity of future officers and the data of the scientific literature, three levels of formation of weapons skills have been identified: high, medium, low.

The following pedagogical conditions are important for the formation of weapons skills: ensuring the unity of fire, psychological and legal training on the basis of an integrative approach; optimization of methods of educational activity of future officers with the use of innovative tools; formation of positive motivation for educational activities in future officers in the process of professional training; application of the complex of information and technological support of fire training of future officers.

***Key words:** NCO, firearms, weapons training, motivation, technological support.*

УДК 355.6

THE WAYS TO REFORM FOOD SUPPLY SERVICE IN THE NATIONAL GUARD OF UKRAINE

Oleh Demyanchuk, Kharkiv

Modern serviceman performs his/her duties in austere environments. They can drive combat vehicles, manage a variety of weapons, put their lives at risk, and are influenced by many different factors of the environment, which causes great mental, physical and psycho-emotional stress. To restore the energy, a serviceman's body requires balanced nutrition, the quality of which depends not only on the norms of

supply or material base, but also, to a large extent, on professional skills of officials of food supply service.

Recently, nutrition and the quality of food have become particularly important issues in the military logistics, as soon as they are supposed to compensate for the impact of specific conditions of military labor. In the last years, after the inspections were conducted and negative conclusions were drawn, the food supply for servicemen was upgraded, and the National Guard of Ukraine switched to a new personnel nutrition system.

As a result, servicemen are currently offered two menus to choose which they prefer. The choice of meals for lunch includes borsch or soup, dry potato or rice with vegetables, even meat is also provided to choose from. At the same time, the cost of menu has not increased, and the variety of food has become more diverse.

Food supply in the army is one of the most important issues in the system of material and technical support of modern military formations. Rational food supply is based on scientific information and discovers and considers routine of military service, increases human resilience to various loads. To meet the challenges of modern combat it is paramount to improve the assortment of products and the material base of food supply service in the National Guard of Ukraine.

***Key words:** National Guard of Ukraine, food supply, nutrition system, menu.*

УДК 159.923.2

SELF-AFFIRMATION OF PERSONALITY AS A PSYCHOLOGICAL PHENOMENON

Artem Dudka, Kharkiv

Dynamic changes in our society necessitate constant work of the individual on himself, self-affirmation in everyday life. The purpose of this study is to carry out a theoretical analysis of the problem of self-affirmation of personality in Ukrainian

psychology, which will contribute to the further development of this phenomenon by scientists.

Self-affirmation, from the point of view of O.Ya. Zhyznomirska, is the desire of the individual to self-disclosure, self-realization of their own potential, self-worth, and the formation of the necessary prestige in interaction with their environment. Personal self-affirmation, according to her research, has two forms - constructive and destructive. According to the first, the individual tries to express himself on the basis of awareness of his own "I", understanding of his own principles, positive self-perception, the desire to feel confident alone with himself and in society. The negative structure is manifested in the fact that the individual realizes his own actions and deeds due to unconscious desires and aspirations, which is manifested in misunderstanding and unwillingness to find and make optimal decisions in difficult situations.

Self-affirmation, in the opinion of scientist V.V. Ivashkovsky, is a process of awareness of one's own uniqueness and uniqueness. It happens when a person asserts him/herself, he/she realizes his/her own purpose, discovers a personal "I", understands the responsibility for self-improvement, the limits and possibilities of their spiritual and physical strength, creative potential. In self-affirmation a person determines the leading values of society and his attitude to them, finds his own place in society.

The given research can identify the main stages of self-affirmation: the discovery of their own "I" (finding in it "new features"), self-awareness of the new; self-assessment, formation of a certain level of requirements and definition of strategies for self-affirmation and different types of behavior; affirmation of "I", one's own identity, one's social rank, self-worth, achievement of important results in one's activity and respect for society. She believes that the main aspects of self-affirmation are self-presentation (management of one's own behavior), self-expression (presentation of one's needs to the interlocutor), self-disclosure (influence on the dynamics of self-esteem).

Based on the study of scientific sources, we can state that researchers link the two main classifications of self-affirmation. The first is the value structure. The second is the requirement of self-affirmation. Together, they reflect the direction of self-affirmation, i.e. the tasks through which the individual intends to assert himself.

***Key words:** personal growth, self-disclosure, self-awareness, society, orientation and motivation.*

УДК 355.1 – 658.7

**IMPROVING WATER SUPPLY IN THE FIELD AND DURING
SERVICE AND COMBAT TASKS USING A MOBILE FILTRATION AND
BOTTLING POINT**

Elman Hasymov, Kharkiv

The main goal of the study is to develop available ways to improve and facilitate the operation of technical means for efficient water supply in the field.

In the field, in the performance of modern combat missions, water supply, especially in summer, plays a very important role. Personnel are required to have high psychological resilience, the ability to act in emergencies and dangerous situations, to withstand severe trials, as well as any physical and moral stress.

Execution of combat missions by personnel of units is accompanied by high energy costs. Complete use of drinking water in combat should ensure the health and physical endurance of servicemen, compensate for high energy expenditure and increase endurance and resistance to the impact of harmful factors. When performing combat missions in areas remote from the points of permanent deployment, water supply of military personnel is organized by supply units.

In order to provide quality and timely supply of bottled drinking water in the field and stationary conditions, there is a mobile filtration point. Based on this goal, it is important to develop proposals for mobile point filtration and bottling of water in different conditions of military service.

The prospect of further research is the need to develop a mobile filtration and bottling point according to new requirements, specifications and quality indicators, we plan on the basis of tractors that will provide full cleaning and bottling based in field food outlets, facilitates rapid evacuation in the event of the use of means of destruction, compliance with sanitary and hygienic requirements, and its implementation in the service - combat activities of units of the National Guard.

***Key words:** water supply, combat conditions, bottled water, mobile filtration point, field food point, the National Guard.*

УДК 357.322

**ANALYSIS OF THE STATE OF LOGISTICS OF SEPARATE
BATTALION IN THE JOINT FORCES OPERATION IN 2021**

Valerii Hladchenko, Kryvyi Rih

Equipping of the battalion with weapons and military equipment is 100% and allows to fully perform the tasks. The coefficient of technical readiness of the battalion's weapons is 92% (defective - 5 units).

Repair of the battalion's weapons in the area of operation of the joint forces is organized in the repair area on the basis of the repair platoon of motor vehicles. Capabilities of battalion technical support units at the appropriate level.

Problematic issues that arose and ways to solve them.

1. Currently, there is a need to replace the car UAZ - 3151 and ambulance UAZ-3962 with car Bogdan-2351 and ambulance Bogdan-2251, respectively, due to the moral and physical obsolescence of UAZ cars, also Russian-made.

2. In order to perform high-quality tasks of technical support, the battalion staff provides 2-wheeled evacuation tractors of the Ural-4320 KT-L type, instead of which trucks (MAZ-6317) are currently used. However, this does not allow to fully perform the task of evacuating damaged vehicles, as in most cases requires a special device for transporting cars at half load, which provides a load capacity at partial load on the rear

overhang of the frame at least 7000 kg. The only way to solve this problem is to obtain from the central storage bases of automotive equipment modern transporters-tractors evacuation wheeled light SKS-KET-LM-EM12PR, 6x6 wheel formula, based on the MAZ-631727 car.

3. The organization of the providing of spare parts for automotive equipment in the Joint Forces Operation at a weak level - the supplying of spare parts for weapons for military units is carried out only once on month, in addition, not in full from the stated reasonable need. This creates the preconditions for an extremely long stay of equipment in repair. In addition, the quality of spare parts that are on the bases after the implementation of the state procurement order on the principle of "the most advantageous offer" (and as you know the cheapest - does not mean quality), is questionable. Thus, there are cases of disposal of new spare parts, obtained from bases, that have factory defects or very low quality (non-compliance with the hardness of the metal in order to reduce the cost of production), which leads to its rapid failure and even to the impossibility of physically installing the spare part due to a defect in the mount.

Solution: it is necessary to supply spare parts in accordance with the submitted applications at least once a week with quality spare parts, which will allow to take measures to restore the defective unit as soon as possible.

4. Rechargeable batteries exploitation.

Currently, there is a problem with rechargeable batteries in Armed Forces of Ukraine, namely, the service life of the battery until it is written off. In accordance with the guiding documents governing the exploitation order and write-off of batteries in the Armed Forces, the following is determined:

- methodical recommendations on establishing and determining the norms of working hours (service life) for the repair of motor vehicles and motor property (telegram №342 / 586 dated 30.01.2017), approved by the Chief of Armaments of the Armed Forces of Ukraine:

norms of operating time (service life) of accumulator batteries

Accumulator batteries nominal capacity	Minimum service life, yrs
Up to 180 Amps inclusive	4,5
More than 180 Amps and type 12ST-85	5,5

- Guidelines for the organization of the armored weapons and equipment exploitation in the Armed Forces of Ukraine in peacetime, approved by the order of the Defense Minister of Ukraine from 25.12.09 №665, Annex 7 to paragraph 6.2 of this guide: service life, operating time and procedure for providing samples of armored weapons and equipment with batteries:

Battery types	Storage life in dry charge, years, not less	Minimum depreciation and service life		Capacity given at the end of service life, %
		yrs	moto/time	
6CT-75	5	4	400	50
6ST-140	7	5	600	70
12ST-85, 12ST-85P	7	5	800	70

At the same time, for example, in accordance with Annex 34 to the Regulations on the organization of exploitation of armored weapons and equipment, other property of the armored service of the National Guard of Ukraine (paragraph 18 of Chapter 8 of Section IV), approved by the Order of the Ministry of Internal Affairs of Ukraine from 19.12.2016 № 1313 , defined ADEQUATE

Accumulator batteries operating time, service life

Battery types	Storage life in dry charge, years	Minimum depreciation and service life		Capacity given at the end of service life,%
		yrs	moto/time	
6ST-75 6ST-90	4	3	400	50
6ST-100 6ST-140	6	4	600	70
6ST-170 6ST-210	6	4	600	70
12ST-85	6	4	800	70

As you can see, the service life of all types of batteries in the Armed Forces is overstated by 1-1.5 years

In this regard, nowadays in the Armed Forces there are no batteries at all, which meet the established deadlines. This has several negative consequences: rechargeable batteries are moved from one machine to another, on which the batteries are no longer working according to their actual condition, but are not subject to write-off according to the established service life. Heads of supply departments have to understand that the exploitation of equipment in the Armed Forces takes place in much harsher circumstances than personal equipment or equipment of private enterprises, as it is not always possible to fully and timely service of certain components, elements (including batteries), especially for units that are in the field. Therefore, the service life must correspond to reality.

In conclusion we can say that military organization and units of the Armed Forces should perform their duties in accordance with their purpose, but not to "fight with windmills" and to invent ways to solve problems that someone deliberately created.

Key words: *battalion, Armed Forces, exploitation, military equipment, supply.*

УДК 629.014

**METHODS OF DETERMINATION OF THE GENERALIZED
QUALITY INDICATOR OF MOTOR VEHICLES OF THE NATIONAL
GUARD OF UKRAINE**

Vladyslav Holovchenko, Kharkiv

Today, the units of the National Guard of Ukraine operate a large number of vehicles of different brands, different manufacturers, with different technical characteristics.

The market also offers other modern vehicles. In such conditions it is rather difficult to be defined with a choice of the most qualitative sample. In turn, the need for an objective assessment of the quality of combat vehicles produced or improved, including vehicles, was not in doubt. Therefore, obtaining reliable information about the quality of the vehicle is an urgent task.

In production practice, there are two main types of quality assessment. The first is the various regulatory procedures that are carried out to decide on the possibility of production, procurement, supply and use (operation) of products. The second type of quality assessment involves obtaining information about the actual quality, the actual values of all or the most important quality indicators of the object. This type of quality assessment is chosen for the study.

In the course of the research a method of quality indicator of multi-purpose trucks based on their technical characteristics was developed. The method is based on regression analysis of partial quality indicators of the studied cars (their individual technical characteristics) taking into account the weighting factor of each indicator. The coefficients of weight of partial indicators are determined by the method of expert assessments, which allows to take into account the peculiarities of the tasks within the units of the National Guard of Ukraine. The generalized quality indicator in this case is a weighted convolution of partial indicators, determined taking into

account their correlation with the indicator selected by experts as a determinant for NGU vehicles.

The method allows the level of quality to determine both the most adapted to the tasks of the NGU units vehicles, and those that are soon to be replaced by more modern models of automotive equipment. In addition, the results of quality assessment can be used to eliminate the causes of nonconformities, as well as to find possible areas for improvement of both the vehicles themselves and their operation. control to confirm the conformity of the object of determination of the generalized

Key words: modern, vehicle, quality, technical, characteristics.

УДК 665

**THE INFLUENCE OF MAINTENANCE AND RECOVERY
PROCESSES ON THE EFFICIENCY OF MANAGEMENT OF THE
TECHNICAL CONDITION OF MILITARY EQUIPMENT**

Mykola Hrevtsov, Kharkiv

The problem of maintaining the technical condition of military equipment at the appropriate level and, if necessary, its timely restoration is one of the most important. Therefore, the search for ways to improve the process of managing the technical condition and restoration of military equipment will ensure its further effective use for its intended purpose, both in peacetime and in combat.

The Armed Forces of Ukraine has a fairly large number of military equipment, which includes all technical means designed to ensure combat operations, training of troops (forces). Military equipment also includes machinery, equipment, devices, including rear equipment, means of evacuation, maintenance and repair, military measuring equipment, etc. In addition, as the experience of the anti-terrorist operation has shown, there were very serious shortcomings in ensuring the working condition of military equipment and its timely restoration in the conditions of hostilities.

Thus, the main shortcomings of the management of the technical condition of military equipment at present are the imperfection of maintenance and restoration of military equipment that provides it, namely the following: low efficiency of preventive work, inflated quantity, volume, complexity of maintenance and disregard of technical condition the moment of maintenance in the conditions of hostilities; failure to take into account the structure and, as a consequence, suboptimality and inconsistency of service modes of various functionally related subsystems included in one model of military equipment; significant non-production losses of time and resources in repair and restoration units of the tactical level due to irrational composition and method of their application; low indicators of maintenance and recovery due to insufficiently substantiated composition of forces and means of recovery during the implementation of tasks in the operational unit; difficulties that arise during the need to adjust the frequency of maintenance and determine time reserves for the restoration of military equipment in situations of coincidence in time of these activities with intensive hostilities and the need to meet the need to use the maximum number of samples of military equipment.

1. the search for ways to improve the process of managing
2. effective use for its intended purpose
3. as the experience of the anti-terrorist operation has shown
4. its timely restoration in the conditions of hostilities
5. the imperfection of maintenance and restoration of military equipment
6. maintenance in the conditions of hostilities
7. low indicators of maintenance and recovery due to insufficiently substantiated composition of forces
8. the need to meet the need to use the maximum number of samples of military equipment.

Key words: *unit, maintenance, anti-terrorist operation, Armed Forces of Ukraine, military equipment.*

**CURRENT ISSUES OF INCREASING THE SUSTAINABILITY OF
THE LOGISTICS SYSTEM**

Olexandr Ivanov, Kharkiv

Comparison of the concepts of reliability and survivability, analysis of methods used for their study and evaluation, indicates significant differences between these concepts. They remain similar only in that the analysis of reliability and survivability assesses the performance of the system. The methodology of survivability analysis is fundamentally different from the methodology of reliability analysis in defining the concepts, indicators and models of processes that exhibit these properties of the system. In comparison with reliability, survivability is determined by both external and internal properties of the system.

The purpose of theoretical considerations is to determine approaches to the separation of the concepts of survivability and reliability, finding a functional and (or) logical connection between these properties in specific conditions, as well as forming areas for further analysis of factors influencing the viability of logistics systems of military units) anti-aircraft missile forces.

The report provides proposals for defining the concept of survivability of the military system, namely, proposed and formulated for further application of the concept of survivability of the military system, which means the property of the system to increase or decrease losses due to corrected impact on the processes occurring. survivability Kzh military system.

Also presented is the mathematical dependence of the survivability of forces and means of logistics (logistics) of military units of anti-aircraft missile forces on the reliability of its ground weapons during the operation (combat) and established a functional relationship between these indicators in specific conditions, and also the directions of the further analysis of the factors influencing survivability of system of technical maintenance are offered.

The direction of increasing the survivability of the system of logistical (logistical) support of military units of anti-aircraft missile forces by reducing the time spent on the restoration of damaged samples of weapons and military equipment, namely reducing the duration of the recovery cycle.

Key words: logistics, survivability, recovery cycle, reliability, logistical support.

УДК 4623.4

**PRINCIPLES OF ORGANIZATION AND TECHNIQUES OF
COMPREHENSIVE WEAPON STORAGE IN THE NGU**

Oleksandr Kashyn, Kharkiv

When solving tasks related to the successful completion of combat missions, in particular in today's conditions, the priority is given to efficiency, speed, mobility and cohesion. The implementation of these aspects is achieved through a trouble-free algorithm of coordinated actions, the main requirements for the modern artillery complex that could provide high combat readiness, comprehensive support and comprehensive support of units and subdivisions of the NSU.

Therefore, the relevance of this topic is to justify the requirements for the artillery complex of the operational military unit of the NGU, which would determine the order of its equipment (for example, areas where artillery units are located), is, their ability to organize military operations quickly and successfully. Combat missions in accordance with the guiding documents and the circumstances in Ukraine.

The organization of the activity of bases and warehouses of artillery armament and ammunition of the NGU is directly connected with the creation, accumulation, maintenance and transportation of material means.

At present, a large number of weapons have been accumulated at the bases and warehouses of missile and artillery armaments and military equipment (ART), which are or are about to expire. Therefore, their technical operation ensures the preservation

of their technical characteristics, as well as the necessary characteristics of combat readiness. Thus, the desire to ensure the preservation of the characteristics of weapons requires the creation of appropriate storage conditions. Obviously, such storage conditions do not provide high efficiency, as the transition from storage in these conditions to the mode of readiness for use requires significant costs of human, time and material resources. The survivability of weapons equipment affects the combat effectiveness of NGU troops, and their reserves are the basis for combat operations.

The state of safety of weapons equipment depends on the system of control over the quality and technical condition of stocks of weapons, the conditions for their maintenance, fire protection and strict compliance with the requirements of the governing documents.

Thus, on the basis of the accumulated information present in this work, the alternative version of the complex that could satisfy all the requirements that were imposed on the artillery units and fully ensure its operation, namely the association in one city warehouse of weapons, ammunition and space storage and maintenance of artillery weapons and equipment that ensures its full integrated operation.

***Key words:** NGU, armaments, military equipment, weapons, combat, operations.*

УДК 621.311.25

APPLICATION OF SOLAR ENERGY AT THE TECHNICAL POINT

Serhii Khalep, Kharkiv

Technical point is a collection of damaged vehicles, concentration of damaged samples of weapons. It is equipped with areas for work.

1. Area for receiving weapons and military equipment, which includes checkpoints for radiation, poisonous substances, etc.

2. Areas for the location of weapons that are waiting for repair

3. Areas for repair and restoration of weapons where they are brought to readiness, namely : 1. area of the electric welder. 2. plot of electric shareholder. 3. electric lift section. 4. site on the territory of the technical point with the use of regular floodlights

All electricity is taken from diesel generators, which in turn unmasks the position of the technical point with its noise, pollutes the environment, uses its own engine and consumes fuel, which also costs money. In turn, I offer an alternative option of using energy using solar panels using an investor and batteries.

The risk of detecting the location of the technical point by ground and air reconnaissance forces of the enemy is reduced. The savings in the use of solar panels depending on the generator is manifested in the fact that the generator consumes fuel and uses its own engine resources, as well as the generator in case of failure needs repair, which in turn can not be done in the field . Batteries cost a lot of money, but over a period of time, they pay for themselves and reflect the money spent, and the generator constantly consumes fuel and needs to repair its own parts.

In turn, this is what I propose to improve and enhance the work of technicians, in parallel to put into operation solar panels, or completely replace them with generators

***Key words:** generator, repair, engine, solar panels, equipment, technical point.*

УДК 341.123:327

**INFORMATION CERTIFICATE OF MILITARY UNIT 2260 OF THE
NATIONAL GUARD OF UKRAINE**

Anton Korniienko, Kyiv

In order to improve the image of the National Guard of Ukraine and the military unit 2260, we bring to your attention background information on the activities of the military unit 2260. The military unit 2260 is located in the monument of fortification architecture, namely in the Prozorov Tower (Tower № 3), part of the

Vasylykiv Fortress. The tower was built in 1838-1839 according to the project of the 4th class architect O. Staubert from yellow brick on a granite foundation. It is located in the right wing of the Vasylykiv Fortification at the modern address at 34 Yevhen Konovalets Street in Kyiv.

Structure of 22 separate brigades of the National Guard of Ukraine for the protection of diplomatic missions and consular posts of foreign countries.

Tasks assigned to the military unit, namely the protection of diplomatic missions and consular posts, the protection of public authorities and the protection of the Institute for Nuclear Research.

The service and combat activity of the unit and the main indicators of service and combat activity are briefly described. What documents are used by the leadership and units of the military unit to perform the assigned tasks and logistics.

The state of combat and special training, logistics, moral and psychological support, propaganda work and work to strengthen military discipline among servicemen.

In conclusion, I would like to note that 22 separate brigades of the National Guard of Ukraine for the protection of diplomatic missions and consular posts of foreign countries are ready to perform their assigned tasks.

***Key words:** National Guard of Ukraine, military unit, brigades, protection.*

УДК 629.076.623.426

**IMPROVING THE EFFICIENCY OF APPLICATION OF
AUTOMOBILE AND ARMORED EQUIPMENT IN THE NATIONAL
GUARD OF UKRAINE UNITS**

Maksym Kovtun, Kharkiv

The nature of modern hostilities is determined by the forms and methods of armed struggle, the scale and nature of operations, organizational and staffing

structure and equipment of military units and units with modern weapons and military equipment.

An analysis of the planning and organization of the use of armored vehicles by NGU units was carried out, which showed the need to study the issue of improving the efficiency of combat missions by NGU units. and found that the existing indicators that characterize the efficiency of the use of vehicles need to be improve.

Mathematical modeling of the efficiency of the use of armored vehicles by NGU units was carried out, and it was determined that the greatest efficiency in performing tasks within the city was shown by a car patrol on a Bars-8 car with a coefficient $K_{\text{ef.patrol.}} = 0,7$,the lowest rate of efficiency during patrol showed a car patrol on the car UAZ-31512 with the coefficient $K_{\text{ef.patrol.}} = 0,02$, based on this, it is established that the efficiency of the tasks assigned to the purpose is influenced by many different factors, so when planning the use of automotive equipment must take them into account.

Proposals were made to increase the efficiency of the use of armored vehicles in the NGU units, namely:

- improvement of armaments;
- increasing the efficiency of automotive equipment;
- increasing the reliability of automotive equipment;
- quality training of drivers on the procedure for maintenance and repair of automotive equipment;
- improvement of repair base of divisions, updating of the equipment, preparation of experts of repairmen;
- reducing the variety of armored vehicles;

To improve the quality of operational planning and organization of armored vehicles, it is necessary to widely use mathematical programming methods that will find the optimal solution.

Key words: analysis ,armored vehicles, efficiency, mathematical modeling, car patrol.

УДК 358.1

**SOLUTION OF PRACTICAL NONLINEAR PROBLEM OF
MOVEMENT ANALYSIS OF ARTILLERY AMMUNITION**

Vladyslav Kozariz, Kharkiv

One of the actual tasks of modern navigation of elements of the system of high-precision weapons, namely, artillery ammunition (conventional shrapnel-explosive projectiles of 122-203mm caliber), equipped with "intelligent" subversives that have several triggering units and their own system, which uses to guide and correct the trajectory of the space radio navigation system (KRS), is the task of increasing the accuracy of the coordinates. This problem can be solved by applying different variations of the complexion of navigation systems.

One of the solutions to the practical nonlinear problem of analyzing the movement of artillery ammunition is the combination of GPS - navigation with Kalman recursive filter, which assesses accuracy using incomplete and noise-making measurements. The correction scheme with the evaluation algorithm should be applied in conditions of correction of the inertial navigation system (INS) from the external sensor of navigation information. Various modifications of the Kalman linear filter are used as an evaluation algorithm, and for high-precision correction, modifications of the Kalman nonlinear filter (NFK).

Currently, two main areas of research are developing abroad: the study and analysis of Bayes' theory and the use of modern evolutionary algorithms, namely neural networks, the approach of self-organization and their combinations for the modification of traditional Kalman filters. Based on the analysis of the work of specialists on this issue, we can conclude that the direct modifications of the Kalman filter - adaptive algorithms - work quite efficiently in the absence of reliable a priori

information on incoming noise, as well as in the conditions of inaccurate information about incoming and measuring noise.

The implementation of high-precision correction of navigational information requires a more accurate description of the ins error values, namely the nonlinear model and, accordingly, the NFC. Practically, a priori nonlinear models of INS error are inadequate for real processes, so the implementation of the NFK for ins correction has certain difficulties.

The most complete take into account all the features of the nature of changes in the error of navigational information and, most importantly, a specific navigation system in the conditions of each specific trajectory movement can be by constructing a nonlinear model using evolutionary algorithms (for example, genetic).

Thus, the solution of the practical nonlinear problem of analyzing the movement of artillery ammunition when determining coordinates by applying various variations in the complex of navigation systems (combining GPS navigation with modifications of traditional Kalman filters) makes it possible to create the necessary models for the functioning of a multifunctional subversive, which in turn can be used in the development of artillery weapons of the Armed Forces of Ukraine.

***Key words:** artillery, ammunition, Kalman factor, navigation system.*

УДК 355.67

THE PROSPECTS FOR DEVELOPMENT THE MAIN DEPARTMENT OF PROPERTY AND RESOURCES IN 2022

Viacheslav Kravets, Kharkiv

Prospects for the development of the Main Department of Property and Resources of the Ministry of Defense of Ukraine for 2022 and housing construction in 2022-2027 were discussed during a meeting held on September 26, 2021 at the Ministry of Defense of Ukraine.

Among the main directions of development of the Main Department of Property and Resources in the next 5 years are further optimization of the organizational and staffing structure of governing bodies according to NATO standards, technical re-equipment of units and creation of mobile mechanized recovery complexes, increasing the number of contract servicemen. Vitaliy Haiduk, Head of the Department, praised the draft Program. The working group will continue to work on its preparation, taking into account the remarks made at the meeting.

The main focus is on the most acute problems that currently exist in the Armed Forces of Ukraine. In particular, rearmament of the Ukrainian army with the latest (modernized) models of armaments and military equipment, staffing of motivated and highly professional personnel, introduction of a new personnel management system in the Armed Forces and, accordingly, housing for servicemen and their families, introduction of a new monetary system.

Regarding the housing construction program, this year it is planned to put into operation four residential facilities. These are, in particular, the reconstruction of a soldier's barracks for a 23-apartment residential building in Chop (1 joint unit), the construction of a 24-apartment residential building in Dnipropetrovsk (26 units), a 48-apartment building in Konotop (36 units). and a 32-apartment building in Novomoskovsk (194 pontoon-bridge detachment).

Summing up the results of the meeting, its participants came to the conclusion that a lively and constructive discussion of the problems of the modern army allows to quickly and effectively find ways to solve them.

Key words: *Main Department of Property and Resources, Ministry of Defense of Ukraine, barracks, residential facilities.*

**PROVISION OF MILITARY TRANSPORTATION
IN THE ARMED FORCES OF UKRAINE**

Dmytro Lisnyak, Dnipro

The general management of military transportation is carried out by the General Staff of the Armed Forces of Ukraine. Direct organization and management are carried out by commanders of military units in cooperation with military communications.

The main types of military transportation are operational and supply transportation.

Planning of operational and supply transportation is carried out by military units on the basis of applications submitted by the Chiefs of Staff of the Armed Forces, military authorities, heads of structural units of the Ministry of Defense of Ukraine and the General Staff.

Planning of military transportation by modes of transport is determined in accordance with current legislation.

Transportation of military units is carried out on the basis of agreements with government agencies, enterprises, institutions and transport organizations.

Each military echelon, military team and military transport is assigned a number by the military services, which does not change from the point of formation to the point of destination, including during reloading from one mode of transport to another.

In case of transportation in one train, on one ship of several military echelons each of them keeps the organization and the given number.

Before loading the military unit is assigned the source area, waiting area, and after unloading - the area of collection, concentration and the main and spare areas of loading (unloading).

Loading, unloading and unloading areas, as a rule, include several stations with loading and unloading devices, highways leading to them. The source area before loading is appointed at a distance of 10 - 15 km from the loading area.

Waiting areas are assigned in load areas near stations. Their distance is determined by the need to ensure timely advance to the place of loading, as well as the possibility of dispersal and camouflage of troops and can be 3 - 5 km. Where military units are located in close proximity to loading stations, waiting areas may not be assigned.

Key words: military communications, military transportation, military echelon, military transport, military team, load area.

УДК 629.076.623.426

**FORMATION AND JUSTIFICATION OF REQUIREMENTS FOR
AUTOMOTIVE AND ARMORED EQUIPMENT OF NGU AND WAYS OF
IMPROVING THEIR OPERATING PROPERTIES**

Ruslan Lysak, Kharkiv

Automobile transport is the most important vehicle for providing the mobility of forces. Therefore, the task of generalizing the experience of using motor vehicles in the army, studying the most characteristic conditions of car use becomes very important. This makes it possible to make reasonable demands on newly created or upgraded car models that will ensure the performance of service and combat missions.

Preparation of forces and means for the performance of combat missions is almost impossible without the use of vehicles that optimally ensure mobility, survivability, security of personnel and the cost of transportation. Vehicles in the National Guard of Ukraine are used not only to address the supply of ammunition, fuel, military property, rapid transportation of units to the area of concentration, but also used in special operations. Therefore, the failure of vehicles can not only complicate but also disrupt the task.

The use of special vehicles in the performance of combat missions involves the failure of equipment not only for technical malfunctions, but also for combat damage. In this regard, for special vehicles the issues of research of their operational properties in the performance of combat missions are relevant.

It should be noted that the main achievements in the field of control systems and active safety have been implemented in passenger cars. Trucks usually do not have such facilities. At the same time, the existing information is general and does not give an idea of how to create real vehicles with front and rear steered wheels, as well as those that allow you to avoid overturning the car on a turn under the action of centrifugal force. Therefore, work aimed at developing modern control systems and active safety of trucks, including protection against overturning, is important, which determines the need to solve the problem.

All of the above indicates the relevance of the study, which aims to substantiate the parameters, indicators and criteria of operational properties of military vehicles.

Key words: National Guard of Ukraine, use of cars, special operations, research, safety of trucks.

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DEVELOPING READINESS IN THE USE OF PHYSICAL FORCE IN THE LAW ENFORCEMENT: GENDER ASPECT

Artem Lytovchenko, Kharkiv

The results of analytical and statistical reports on the effectiveness of the educational process of future officers of the law enforcement units of Ukraine indicate that the organization of practical classes on special physical training in the direction of physical action individual psychophysiological features, which reduces their professional level. Given to above, it is important to make appropriate changes to the vocational education programs of future officers of the law enforcement units of Ukraine, which will ensure the formation of the necessary applied professional

competencies that will promote reliable and effective performance of tasks in different conditions of service and operational activities.

The main purpose of the study is to determine the nature and structure of readiness of women officers of law enforcement units of Ukraine in applying measures of physical influence, force in various conditions of service and operational activities. Research methods: generalization of results of scientific-methodical, special and reference literature, system analysis, expert assessment, monitoring of analytical reports on cases of application of measures of physical influence with the participation of women officers, instrumental research methods, own experience of combat activities, etc.

According to the results of theoretical and methodological analysis in the chosen area of scientific intelligence, members of the research group determined the essence of “readiness of future female officers of the law enforcement units of Ukraine in applying measures of physical influence, force” – stable personal education, which is formed by a specific pedagogical influence on the formation of women's readiness to fight hand to hand different opponent in extreme conditions of service and operational activities and ensures their coordination of knowledge about the content and structure of official activity and requirements of this activity to the level of development of skills of service-applied hand-to-hand combat of women and their psychophysiological condition, formed competencies of official-operational activity with opportunities and needs formed and realized by them in the process of development. In addition, we have defined the structure of such readiness for motivational, functional, applied and stress-resistant components.

Key words: *gender equality, readiness, officers, women, Police, educational process, hand-to-hand training, physical training.*

**FUNCTIONAL APPROACHES IN THE LOGISTICS OF THE
NATIONAL GUARD OF UKRAINE**

Mykola Maifat, Kharkiv

Trends in the development of forms and methods of application of the armed forces of the world's leading countries, their comprehensive support in the course of operations, logistics as a type of support, is becoming a priority. The experiment on the transfer of logistics support powers from the center directly to the military authorities is one of the important stages in the formation of the logistics system in the National Guard of Ukraine according to the principles adopted in NATO countries. As a result, it is planned to introduce appropriate changes in operational commands, as well as in other governing bodies of the National Guard. At the same time, the regulatory framework for logistics is being developed in accordance with NATO standards and principles and taking into account the experience of the anti-terrorist operation (ATO) / Joint Forces Operation (JFO).

Logistics - the science of planning, organization, management, control and movement of material and information flows in space and time from their primary source to the final consumer.

Analysis of historical experience has shown that in ancient times the issue of providing material resources of armies was given a special place and role. They were considered one of the most important factors on which depends the level of combat readiness and combat capability of the National Guard, the course and outcome of combat, operations and war in general.

For most military experts today it has become an axiom to say that the success of the operation (combat) depends primarily on the full and timely provision of troops with material and technical means (MTZ), missiles and ammunition (RBM), fuel and lubricants (fuel), military technical property (VTM), food, etc.).

Topicality. In the context of European integration and new tasks of the National Guard of Ukraine related to Ukraine's participation in ATO / OOS, in peacekeeping activities under the auspices of NATO and the UN, there is a need to reform troops (forces), logistics, technical and medical support in accordance with standards NATO.

The National Guard needs to create a single efficient, economic system of troops (material, technical, transport, engineering, infrastructure and medical support), the introduction of logistics as a management system compatible with the logistics system of NATO armies.

In a market economy, the tasks of the logistics of the National Guard are: to achieve the adaptation of the defense sector and its individual components to the changing market environment; creation of an integrated effective system of regulation and control of MTZ; material and technical products for the components of the military organization of the state; ensuring mutual compliance of material and information flows; determination of strategy and technology of physical movement of MTZ; establishing a form of standardization of packaging and determining the volume of production.

In addition, the use of logistics of the National Guard in the system of MTZ allows to solve: the study of demand (needs) of the NG of Ukraine and supply (production opportunities); conducting a balance sheet assessment, creating an MTZ and gaining experience to develop further MTZ management strategies.

Conclusion. Thus, the analysis of conditions and factors that determine the policy and strategy of the system of material resources of the National Guard of Ukraine, indicates the need to create an effective logistics system of the National Guard of Ukraine as a management system of material, information and human flows based on their optimization. Mechanisms for the implementation of research will improve the system of military service of the National Guard of Ukraine.

Key words: logistics, defense, technical support, operation, troops, material and technical means.

**THE WAY TO INCREASE THE MATTER OF THE EXERCISE
MACHINE REAL COMBAT TRACK MACHINE**

Olexandr Maistrenko, Kyiv

The analysis of the design of the existing dynamic simulators used in the modern system of training mechanics-drivers of combat tracked vehicles and multi-axle chassis, showed that the main method the design of such simulators is a rigid center of gravity method. The main advantage of this method is the relative simplicity of the design of the most dynamic platform, which allows you to simulate the linear movements of the operator's position relative to the stationary center of gravity of the machine. This design provides a sufficient adequate simulation of the rectilinear motion of the machine on the terrain of any profile, which is sufficient when obtaining a future driver-mechanic initial driving skills.

However, the use of such training systems during adjustment of existing driving skills in the implementation and training of mechanics-drivers of combat tracked vehicles from among the suits of trucks leads to the formation of learners of the wrong conceptual model of driving, significant deviations in which can lead to distortion not only of the steps in the algorithm of actions of the driver, but also to the acquisition of incorrect skills and bad habits, which will need to be corrected directly during the performance of practical exercises of educational driving. This can lead to a significant increase in the number of repetitions of a single exercise required to develop the necessary management skills combat tracked vehicle. The elimination of these shortcomings is possible by providing a simulation of the behavior of the machine during skidding, skidding and heading, when making turns or hitting an obstacle, when removing from obstacles or getting stuck in the car. Such machine movements can be represented in the form of three degrees of freedom: translational movement of the operator's seat along the longitudinal and transverse axes of the machine and rotational - relative to the vertical.

Preliminary analysis has shown that these movements are possible by improving the existing three-stage dynamic platforms.

The additional mobility system of the dynamic platform can be obstructively integrated both in the form of an additional intermediate module between the existing dynamic system and the location of the simulator operator, and in the supporting structure of the dynamic platform. Development of operation algorithm

An advanced dynamic platform adequate to the real impacts experienced by the driver when driving the machine will provide a significant expansion of the existing fleet of simulators and improve the quality of training of mechanics-drivers of combat tracked vehicles.

This is especially true when practicing dangerous exercises that are accompanied by skidding or demolition of the machine. Accordingly, the direction of further research is to build appropriate mathematical models that will simulate the behavior of the machine in different modes of movement, and to form appropriate effects on the simulator operator, taking into account the peculiarities of human perception of individual signals. And further experimental confirmation of the adequacy of these models to real processes.

Key words: simulator, combat vehicle, tracked vehicle, mechanic driver, operator, multi-axle chassis

УДК 623.44

REQUIREMENTS FOR TACTICAL AND TECHNICAL CHARACTERISTICS OF KINETIC NON LETHAL WEAPONS

Volodymyr Marchenko, Kharkiv

In recent decades due to the humanization of society the ways in which tasks have been carried out by law enforcement agencies and military formations have undergone significant changes. Since the mid-70's of the twentieth century movements for humanity with the support of the United Nations were intensified in

the world. The desire not to cause human suffering as much as possible has become significant. This affected the actions of law enforcement agencies in the most developed countries. For example, in June 1981, in the city of Liverpool, for the first time in the UK, the police had to use the tear gas.

During the termination of mass racks in Belfast (Great Britain), the police for the first time applied against violators of public order the rubber bullets. Thus, in the 1980s, the transition from combat weapons to non-lethal weapons took place in the implementation of law enforcement tasks.

Increasingly, law enforcement agencies use other means of influencing the offender instead of firearms, such as non-lethal kinetic weapons, which cause shock and temporary pain but do not inflict penetrating injuries or damage to internal organs, making them relatively safe.

To date, there is a situation when law enforcement agencies and military formations accept samples of weapons and military equipment developed by the manufacturer on their own initiative, tactical and technical characteristics are determined without the participation of the final consumer. As a result, a large number of weapons which differ significantly in basic tactical and technical characteristics were adopted. At the same time, the scientific and methodological apparatus of forming requirements for the technical characteristics of non-lethal kinetic weapons is not sufficiently developed today.

Thus, there is a need to form scientifically sound tactical and technical characteristics for non-lethal kinetic weapons, which will take into account the specifics of the tasks performed by law enforcement agencies and military formations.

Key words: *non-lethal kinetic weapons, law enforcement agencies, tactical and technical characteristics, scientific and methodological apparatus.*

УДК 621

**DEVELOPMENT OF NATIONAL UAVS IN CONDITIONS OF
ANTITERRORIST OPERATIONS IN EASTERN UKRAINE**

Olexandr Markov, Kharkiv

Nowadays, there is an urgent necessity for both the Armed Forces and the National Guard of Ukraine in the airborne prospecting, the observation of the battlefield, as well as in target purposes, other manned and unmanned aerial facilities.

At the moment, the field of development and production of UAV is very promising. UAVs can detect piloted combat aircraft as a high-risk vehicle for pilots while the individual combat operations are held. The absence of a pilot and pilot cabin with all the equipment significantly reduces the dimensional characteristics of the UAV and, accordingly, the cost and vulnerability of the UAV. Another issue to be mentioned is the training of highly skilled personnel for managing such a complex technique as well as for its maintenance.

In 2014-2015, the first privately owned UAV companies appeared in Ukraine. They were founded by people from the air-model sport, entrepreneurs and some military volunteers. At present, at least 11 Ukrainian enterprises are developing and producing unmanned aerial vehicles. Nine of them work on drones of military design, it is about the collection of dozens of articles in a few months.

In order to achieve high performance in the development of UAVs, our developers should take into account the experience of such countries as Israel, the United States, etc., that skillfully use them to plan and conduct military operations against the enemy's superior forces.

In conclusion, we can say that the development of the UAV in Ukraine requires not only the improvement of technical means, but also the studying of the activities of UAV control operators, the development of programs for their preparation, professional selection.

Key words: unmanned aerial vehicle, production, operator, drone, development.

УДК 623.002.6

**THE PROCEDURE OF TECHNICAL SUPPORT OF THE MILITARY
UNIT IN THE NATIONAL GUARD OF UKRAINE ON DETERMINATION
OF TIME FOR MAINTENANCE OF VEHICLES**

Serhii Matsapura, Kharkiv

According to the results of the analysis of the functioning of maintenance and repair (M&R) systems of military vehicles in the armies of the world's leading countries, the analysis of scientific research carried out in this field both in Ukraine and abroad. It is proved that the M&R system determination of the actual technical condition of the equipment by the method of diagnosing and performing during maintenance or repair only the necessary operations, and not the entire regulatory list. Such a system "according to the condition" provides different strategies for M&R, depending on the specific factors that cause the deterioration of the technical condition. But as the analysis of relevant scientific research shows, it is not entirely expedient to take only the experience of technical operation of foreign cars and other technologically advanced equipment as a basis.

It is known that ensuring the appropriate level of willingness of the fleet of military vehicles is possible by technical or organisational and operational methods. The first one is a significant renewal of the car fleet or their modernization, which is impossible at this stage in the real difficult economic situation of the state. Therefore, the second method remains - organisational and operational, which namely works by improving the M&R systems.

The crucial stage of planning the maintenance of vehicles is to determine the time of maintenance activities, which will provide such opportunities:

- distributing working hours between repairman by trade and working time

of the equipment according to the classifications previously named

- establishment the optimal sequence of technological processes and the actual cost of working time for various elements of the operation
- revealing losses and non-productive expenses of the workers and reducing them through more time of use of physical, psychophysiological, intellectual experts, possibilities of means of maintenance of vehicles
- studying the best methods and techniques of work, best practices for the efficient use of working time
- finding out organisational and technical, psychophysiological and socio-economic conditions in which the production process is carried out
- justifying regulated breaks during work, personal needs and workplace maintenance

The main point of studying the cost of time for maintenance is to find available reserves to save time, which directly determines the increase in productivity of activities. Achieving this is possible by the usage of certain methods, techniques, approaches. The obtained data are necessary for:

- establishing scientifically sound norms of workload on repairmen by trade
- establishing staffing standards for the optimal number of support staff
- improving the organisation of maintenance of vehicles
- the analysis and revealing of the reasons of non-fulfillment or unreasonable overfulfillment of norms of loading and development of measures for their elimination

Key words: maintenance, breaks, repair, vehicles, economic situation, NGU.

УДК 355

**FIVE NEW SEPARATE BRANCHES IN THE ARMED FORCES OF
UKRAINE**

Hennadiy Murashkovskiy, Kharkiv

Changes in the structure of the Armed Forces of Ukraine are provided by the Law of Ukraine "On Fundamentals of National Resistance" adopted last year, which amended Article 3 of the Law of Ukraine "On the Armed Forces of Ukraine", which entered into force on January 1, 2022.

The Armed Forces will continue to have a three-tier structure: the Land Forces, the Air Force, and the Navy, but in addition to the existing separate types of troops (forces): Assault Troops and Special Operations Forces, five other types have received special status.

In particular, the separate branches of the Armed Forces of Ukraine are now the Special Operations Forces, the Territorial Defense Forces, the Logistics Forces, the Support Forces and the Medical Forces. Separate branches of the Armed Forces are the Assault Troops, as well as the Communications and Cyber Security Forces.

Let me remind you that the Command of the Medical Forces, Support Forces, Communications and Cyber Security Forces was established in February 2020, and the Logistics Forces Command in 2018, but they did not have the status of a separate type of troops.

Territorial defense developed in the system of the Land Forces and by 2020 did not have its own governing bodies. At that time, the Territorial Defense Command was created within the structure of the Land Forces Command, headed by Major General Anatoliy Barhylevych. The total number of personnel of the Territorial Defense Forces of the Land Forces at the end of 2021 was 580 people. However, from January 1, 2022, a separate Command of the Territorial Defense Forces was established, which in January should take over all military units of territorial defense from the Land Forces, which are simultaneously moving to new enlarged states.

By Decree of the President of Ukraine № 1/2022, Brigadier General Yuriy Galushkin was appointed Commander of the Territorial Defense Forces.

Key words: Ukraine, logistics, Cyber Security, Armed Forces, law.

УДК 355

**TECHNO-TRENDS FOR THE ARMY OF THE FUTURE:
WHAT THE ARMED FORCES OF UKRAINE LACK**

Oleksandr Naumov, Kharkiv

The paper analyses the techno trends for the army of the future in the context of the Ukrainian Armed Forces, identifying weak points, current challenges and perspectives for development. The following terms are considered: artificial intelligence in the field of defense, cybersecurity, military Internet of Things, analysis of large data sets in the field of defense, blockchain technology in the field of defense, robotics, application of 3D-production in the field of defense, use of new materials for defense purposes, autonomy in defense, readiness for biological threats.

- The term «artificial intelligence» is becoming increasingly popular. Artificial intelligence (AI) can be understood as the creation and development of computer systems or algorithms capable of performing tasks that typically require human intelligence. Defense agencies in leading countries are also exploring the possibility of using AI algorithms in the field of defense, based on the very successful results obtained in the civilian field by companies such as Google, Apple or Facebook.

- The potential of AI is closely related to the effectiveness of cyber defense, which with the development of automation is becoming increasingly important for the Armed Forces of Ukraine as an urgent need. This opens up new ways to strengthen the security of communication and information systems by ensuring network resilience, preventing and protecting against cyber threats.

- The Internet came from the world of defense. Web protocols and website addresses in 1989 allowed the Internet to become a global phenomenon. A new concept of the so-called Internet of Things (IoT) is now gaining momentum. The rapid pace of technological change in this area necessitates increased research in the defense sector.

- The new approach created by the blockchain may lead to new discoveries suitable for use in the defense industry. In particular, in such areas as information security, authentication, data integrity and stability, and others. Given its high breakthrough potential, blockchain technology is a promising topic for research.

Key words: Ukrainian Armed Forces, artificial intelligence, techno-trends, Internet of Things, Additive Manufacturing, future capabilities.

УДК 364.7

**INFORMATION AND PSYCHOLOGICAL SECURITY OF FUTURE
OFFICERS OF THE NATIONAL ACADEMY OF THE NATIONAL GUARD
OF UKRAINE**

Mykola Nikiforov, Kharkiv

Today is a time of global changes in digital technologies and in the principles of mass media operation. In the conditions of digitalization of society, every person becomes not only a consumer, but also a producer and a translator of information. The problems of information and psychological security of the future officers of the National University, whose professional activity is aimed at revealing real information and cyber threats to the national security of Ukraine, are of great importance. In Ukraine there are a number of threats to information and psychological security, connected with attempts of certain forces to use information opportunities of social networks, messengers, mass media and Internet-sites for formation of public opinion, influence on people with the purpose of achievement of certain interests of interested persons.

Equally important is the problem of information protection of individual person, since the information influence of the aggressor country on citizens of Ukraine remains very high. Lack of media literacy skills (ability to recognize information and propaganda, distinguish facts from appellatory judgments, use verified sources, etc.) leads to the use of low-quality information content and loss of information and psychological security.

We will take an example of Israel as a country that is constantly in a state of war. Based on this fact, it should build the "Mannerheim Information Line" in order to exclude any informational and psychological influence. It is not important that it will be either post in social media or propaganda news in the media, or just as the expression of one of the "experts" at the political talk show. This country at the state level is concerned with the protection of every citizen and the state as a whole. During the war, no liberal methods of protecting the person in the information aspect will be effective, because the aggressor country is applying more cruel measures to influence the consciousness of people. In our opinion, such measures are adequate to protect their citizens from the information impact.

A person should take care of his own information security and filter the information flow. In order to form sustainable competence in media literacy, it is necessary to conduct training sessions within a separate discipline or through the course of studying professionally oriented and humanitarian disciplines. Future officers of the National Academy of the National Guard of Ukraine should develop critical thinking, know key concepts of media literacy, understand how the media work and what journalistic standards should be observed to be able to make informed decisions, be protected from propaganda.

Key words: information, Ukraine, protection, war, security, country.

UPDATING THE LEGAL SUPPORT OF NAVAL ACTIVITIES

Svitlana Oksenchuk, Kharkiv

Modern treaties to Ukrainian statehood are significant update the issue of updating legal support of the navy activities. The Naval Forces of Ukraine begin their history from the time of Kievan Rus. Cossack's naval campaigns belong to the most glorious pages of our national history. The modern independent Ukrainian state has 2,759 km of the seacoast and more than 72 thousand square kilometres of exclusive (maritime) economic zone. More than a quarter of the national GDP is generated by regions, economies of which are connected to the Black and the Azov Seas.

In 2014, the Russian Federation violated international agreements and regulations, and through hybrid aggression has established control over Crimea. Ukraine has lost most of its Navy, including 75% of personnel, 70% of ships and key infrastructure. By construction of the Kerch Bridge, the Russian Federation has substantially restricted the passage of vessels and continues to obstruct navigation in the Sea of Azov. The Russian military grouping has significantly increased in Crimea. The maritime direction has become the most vulnerable for defence of Ukraine. The system of national security of Ukraine should react to these challenges, clearly arrange the interaction between the defence and security forces of Ukraine to protect national interests at sea. Today, Ukrainian navy sailors actively participate in combat actions protecting our country in the East, execute tasks in the Black and the Azov Seas. New challenges and lessons learned require elaboration of the Strategy of the Naval Forces of Ukraine 2035.

The main task of the Navy reform is a restoration of the naval capabilities of Ukraine, reliable defence of the homeland and an ability to defeat a stronger enemy. Reforms are conducted in line with the NATO standards, principles and values.

Strategy of the Naval Forces of the Armed Forces of Ukraine 2035 is the first attempt to look into the future. This document was developed by the Naval Forces

Command, together with Ukrainian and foreign experts, according to the Law on National Security of Ukraine, the National Security Strategy of Ukraine, and in support of implementation of the Strategic Defence Bulletin of Ukraine, taking into account experience of NATO the European Union member states. The goal of this Strategy is to create a vision for the development of the Naval Forces of the Armed Forces of Ukraine by 2035. It is envisaged to gradually build up Navy capabilities, including force generation, their education and training for naval and joint operations, the provision with armaments, military equipment, other materiel and assets, taking into account forecasted threats, economic possibilities and development priorities.

Development of existing and future capabilities of the Naval Forces of the Armed Forces of Ukraine will influence protection of economic interests, ensure sovereignty and territorial integrity of Ukraine at sea and facilitate return of the temporarily occupied territories.

Key words: the Armed Forces of Ukraine, Navy, capabilities, strategy, reform.

УДК 159.98:316.62

THE CONCEPT OF COMMUNICATION BARRIERS BETWEEN SERVICEMEN IN PROFESSIONAL ENVIRONMENT

Artem Ponyrko, Kharkiv

The problem of organizing communication in a military institution is extremely important in connection with the performance of professional duties related to the need to establish favorable psychological relationships in military teams.

The main communication barriers are:

- barriers to relationships;
- barriers to understanding;
- socio-cultural barriers.

In turn, barriers to understanding are divided into:

- phonetic barrier (slurred speech, language with a large number of word-parasites);
- semantic barrier (use of jargon, slang, difference in understanding of meanings by communication partners);
- stylistic barrier (for example, critical remarks, official report using informal vocabulary, unjustified use of imperative style, too categorical statements);
- logical barrier.

The given research demonstrates that barriers to communication arise due to the fact that servicemen who came from different regions communicate differently, i.e. in different dialects, and this simply causes a misunderstanding of some words in communication between them, which creates today's barriers to communication.

Another equally important barrier to communication is the age barrier, which causes misunderstandings in relations between servicemen.

Psychological barriers are the most difficult to overcome precisely because the separation from home and parents greatly affects the moral and psychological state of a military serviceman who is just starting service in the army.

Based on the above examples, it can be concluded that due to the diversity of personalities of servicemen, barriers to their professional communication will always arise, but this should not be a reason to stop their activities. preventing the small unit coherence.

Key words: *communication, barriers, servicemen, coherence.*

**ORGANIZATION OF COOPERATION OF THE NATIONAL GUARD
WITH OTHER ARMED FORMATIONS OF UKRAINE IN THE FIGHT
AGAINST ILLEGAL PARAMILITARY OR ARMED GROUPS**

Denys Prokhorenkov, Kharkiv

Tasks to combat illegal paramilitary or armed groups will be carried out, as a rule, by heterogeneous groups of law enforcement agencies, in the absence of a clear front line, in separate, often isolated areas, separating units from the main forces. High level of independence, in conditions when the enemy uses guerrilla means of struggle, ambushes, night actions, inflicts sudden blows.

The set tasks will be solved by separate detachments and groups, which, as a rule, are formed according to the purpose, mainly by non-traditional methods. The organization of tasks and management of units are significantly complicated in connection with the simultaneous implementation of tasks in several areas (sections). Currently, almost all groups of the National Guard of Ukraine, which take part in the joint forces operation in the east of the country, perform combat tasks related to the resistance of the illegal paramilitary or armed groups. The main tasks of various law enforcement agencies are to promptly respond to changes in the situation, provide assistance in the event of an attack and commit terrorist acts in warehouses with weapons and ammunition of groups of the Armed Forces of Ukraine.

In the course of the struggle against the illegal paramilitary or armed groups, the issues of organizing the interaction of various power structures deserve attention. The main task is not to achieve formal subordination of various forces and means, but in a clear understanding of each of the interacting commanders, officers of the headquarters of the role and place of their group, unit (unit) in the operation, and personal responsibility for the task.

In other words, the coordination of efforts of units of different law enforcement agencies in the performance of a common task is gaining a unique and

most complex form of interaction, which requires special tact in the relationship, the ability to determine common (mutual) interests. This requires detailed elaboration and coordination:

- ways to solve problems together;
- the composition of forces and means that will participate in the implementation of tasks;
- duration and sequence of planned tasks;
- areas, boundaries, objects (goals) of action;
- conditions, methods and time of joint use of means of destruction, as well as restrictions on their use in settlements, relevant facilities;
- issues of management and communication organization, comprehensive support, notification, recognition.

One of the most important features of the organization of cooperation is the need to coordinate with the Armed Forces of Ukraine on issues such as assistance, exchange of information on the actions of the illegal paramilitary or armed groups, notification, communication, protection of warehouses, maintaining the martial law, the establishment of commandant's offices (regime, restriction and regulation of motor traffic, escort of convoys, delivery of goods, cessation of riots, etc.).

Thus, from the experience of joint operations in the east of the country, one of the important elements of action in the fight against the illegal paramilitary or armed groups is the close cooperation of various security forces.

Key words: *Armed Forces of Ukraine, security, attack, law enforcement.*

УДК 629.1

UPGRADED BMP-1 - BMP-1UMD

Andrii Prystynskyi, Kharkiv

The state-owned enterprise Zhytomyr Armored Plant has developed a modernization of the BMP-1 - BMP-1UMD, increasing firepower, improving the fire

control system, and improving the ergonomic and functional characteristics of the vehicle.

Ukrainian gunsmiths paid special attention to the implementation of a complex of camouflage means in the visible and infrared ranges.

Various combat modules can be installed on the BMP-1UMD; in 2016, in the presence of representatives of the Ministry of Defense, comparative tests of the Shkval and Stilett combat modules were carried out. The Shkval combat module is equipped with a 30-mm ZTM-1 cannon, an automatic grenade launcher, a 7.62-mm machine gun, as well as guided missile weapons, which are designed to destroy enemy armored vehicles at a distance of up to 5 km.

The combat module stylet is equipped with a ZTM-2 cannon, reinforced armor and a similar set of weapons. The new digital sighting systems OTS-20.04-01, on the Shkval and Trek-2-01 combat module, and on the Stilett combat module are responsible for the accuracy of the combat modules. Both sighting systems are equipped with a laser rangefinder and a thermal imager, but use different fire control algorithms.

Another feature of the BMP-1UMD is the new German engine of the Deutz TCD2013 L64V machine.

This 4-stroke, 6-cylinder, turbocharged, ECM engine delivers 330 hp, programmable up to 390 hp. The engine from Deutz was also replaced by the Soviet UTD-20, which has a power of 300 hp. In addition, the German engine has a longer resource, it is quieter and more economical.

The BMP-1UMD is also equipped with a Myslyvets digital fire control system. This system is capable of automatically recognizing and tracking targets.

Thanks to Myslyvts, the combat vehicle can be used not only as a means of transportation and fire support for units, but also as an autonomous combat unit with remote control. Thanks to the new digital system, the time for opening fire is reduced, the system can independently recognize the target and guide it on the sight, waiting

for the command to shoot. And thanks to remote control, the operator can be in the depths of the positions, while the combat module monitors the defense line around the clock.

Key words: *BMP, fire control system, cylinder, power, hp, combat.*

УДК 629.076.623.426

**IMPROVING THE ARMORED VEHICLE RESTORATION PROCESS
IN NGU DURING ASSIGNED TASKS PERFORMANCE**

Yevhen Ravliuk, Kharkiv

Vehicles is the most important means of ensuring the mobility of troops. Therefore, the task of generalizing the experience of the use of motor vehicles in the army, the study of the most characteristic conditions of car use becomes very important.

When performing combat missions, automobile and armored vehicles may fail due to combat damage, flooding and technical malfunctions, as well as combat vehicles that are stuck on the ground.

The study analyzes the forces and means of restoring the vehicles of the National Guard of Ukraine.

The concepts of "technical reconnaissance", "evacuation", and "repair" were generalized. Their definition is provided. The essence of activity of divisions of technical units of National guard of Ukraine is opened.

The general provisions on the restoration of automobile and armored vehicles have been concretized and developed.

Examples of mathematical calculation of calculations of evacuation works, for the purpose of high-quality, safe and fast decision-making by chiefs of technical units of the National Guard of Ukraine, and also the educational information for carrying out training of personnel of repair and evacuation groups, and drivers of military equipment are given.

Practical recommendations on technical reconnaissance, evacuation and repair of automobile and armored vehicles are given, namely:

- types and means of technical reconnaissance of weapons and ammunition are determined;
- types and means of evacuation of weapons are identified;
- methods of evacuation are formulated.

Proposals for high-quality and accelerated repair of motor vehicles in combat conditions are provided, such as:

- the need for methodical training of staff;
- organization of practical classes with repair personnel and drivers of military equipment for maintenance and repair of weapons;
- provision of material and technical means for repair groups;
- creation of a repair fund of spare parts based on the brands and types of available automobile and armored vehicles;
- organization of repair and evacuation subdivisions of territorial associations of the National Guard of Ukraine.

Key words: vehicle, armored vehicle, repair, evacuating, technical reconnaissance.

УДК 355/359/.6

FUNDING AS SIGNIFICANT COMPONENT OF DEVELOPMENT OF ARMED FORCES

Vladyslav Roller, Kyiv

Since 2014, hostilities have been taking place on the territory of our state. Since then, it has become clear to everyone that only a well-trained and well-equipped Armed Forces can provide adequate protection for the state. Adequate and timely financing of the Armed Forces is the key to their uninterrupted readiness to perform the functions and tasks of protection and territorial integrity of the state.

The White Book for 2019-2020 states that the financial resources allocated to the Ministry of Defense in 2020 for functional purposes were distributed as follows: armaments and military equipment - UAH 26,269.8 million; staff - UAH 74,557.1 million; infrastructure - UAH 6,554.0 million; operating costs - UAH 14,300.4 million.

According to the Army of Inform, in 2021 the Ministry of Defense of Ukraine receive UAH 117.5 billion. Funds (UAH 116.2 billion) are planned to be distributed as follows: 62.1% of the budget - staff maintenance; 19.5% - for the development, purchase, modernization and overhaul of weapons and military equipment; 12.3% - operating costs; 6.1% - infrastructure rehabilitation and development.

The official website of the Ministry of Defense of Ukraine on the budget for 2022 provides the following information: 72 billion UAH will go to cash and wages, which is 11.2 billion UAH more than in 2021. UAH 7.5 billion will be spent on fuel and property, UAH 4.1 billion on food, UAH 3.5 billion on social security for servicemen, UAH 2.1 billion on the disposal of ammunition, weapons, military equipment and fire protection, as well as UAH 1.3 billion for the construction of housing for the military.

Thus, we can conclude that the budget of the Ministry of Defense is increasing, but not significantly. At the same time, the component of development expenditures is not increasing, which slows down the development of the Armed Forces of Ukraine.

Key words: *Armed Forces, funding, budget of Armed Forces, development, financial resources.*

**TRENDS IN THE DEVELOPMENT OF SMALL ARMS IN LEADING
COUNTRIES OF THE WORLD**

Illia Rylskiy, Kharkiv

In order to increase the capabilities of an individual serviceman in the performance of combat missions, there is a need to conduct extensive experimental and theoretical tests in the field of small arms.

Military operations in recent decades have shown that the development of weapons and equipment in response to the change in tactical techniques, methods and methods of combating irregular units took place in the direction of increasing mortality, protection, mobility and situational awareness. This fully applies to all types of equipment, which varies from small arms and related ammunition to all equipment of the serviceman as a whole.

The development of individual small arms complexes is carried out in the direction of increasing their survivability, firepower and fire density, increasing accuracy and accuracy of shooting, increasing the striking effect of ammunition, reducing weight characteristics, ease of maintenance and ease of operation. At this time, NATO's next-generation individual small arms development programs maintain previously developed tactical and technical requirements, namely: multipurpose use of weapons due to modular design; ensuring reconnaissance, surveillance, detection and recognition of the target; ensuring effective defeat of a single or group target; round-the-clock, all-weather and effective action in conditions of limited visibility; the ability to accompany the target and adjust the fire; reliability and high technical readiness in any conditions; ensuring high mobility on the battlefield due to the small mass and dimensions of the weapon.

Modern assault rifles have a caliber, which at this stage of modernization of small arms is criticized by the military for insufficient ammunition in target. This may be eliminated by an increase in the caliber of ammunition, but industry and military

specialists are lobbying for the adoption of more powerful small arms of 6.5-mm and 6.8-mm caliber.

As one of the promising models, a 40 mm semi-automatic grenade launcher with a laser rangefinder, an electronic sight and a controlling microcomputer is also considered. Calculations show that with the permissible recoil value at the time of shooting, the specified weapon efficiency can be achieved with a grenade weight of 100 – 150 g, diameter 20 – 25 mm and initial speed 115 – 155 m/s. with an initial speed of 152 m/s.

The main directions of development of small arms and melee equipment as elements of the soldier's combat equipment are: increasing the power of small arms while maintaining or reducing the mass of weapons by modernizing the cartridge.

Key words: weapon, ammunition, military, development.

УДК 623.746.2

**FORMATION OF THE DATABASE FOR NAVIGATION OF MOBILE
ROBOTS UNDER THE CONDITIONS OF OPERATIONAL CHANGE OF
THE FLIGHT JOB**

Valeriy Samoylenko, Kharkiv

The principles of autonomous navigation of mobile robots (MR), based on the use of correlation-extreme navigation systems (CESN), are widely used in many industries, medicine and military affairs. However, the implementation of these principles can differ significantly depending on the purpose of the information extraction system and the type of tasks it solves. These principles impose restrictions both on the information retrieval system and on the preparation of reference information necessary for its functioning. An essential feature of MR navigation is the need to re-plan the flight route in real time, which imposes restrictions on the formation of reference images (RI) of the reference regions in time and the associated selection of reference objects on the sighting surface. This makes it necessary to

identify and take into account those information signs, the use of which will provide the required accuracy characteristics of the navigation system, especially in the case of the influence of interfering factors leading to a deterioration in the functioning of the secondary processing system. The complication of the task may be due to the necessity of using combined navigation systems that use different information features (invariants) embedded in the RI, as well as high flight speeds or the need to bind at steep MR trajectories. The combination of these factors significantly complicates the process of preparing a flight task based on information stored in the database on the MR location areas, and makes it necessary to take these factors into account when forming the corresponding databases. In other words, the specificity of the MR flight necessitates the formation of a special database, with the help of which it will be possible to promptly prepare the RI, taking into account the imposed restrictions that do not lead to a deterioration in the accuracy and reliability of the navigation system. In this case, the object composition of the sighting surface with different informative features, which can be unstable under the influence of various external factors, as well as the instability of the imaging conditions, is of great importance. Taking these factors into account leads to the need for research and a search for a rational way to form a database on the sighting surface for MR navigation, taking into account the peculiarities of the construction, functioning and tasks of the CESN. It is proposed to use the invariants obtained on the basis of the correlation analysis of the scene in terms of brightness and allowing the formation of selective images as the information content of the database. It was found that the correlation between the information content of the database and the set of initial images can be in the range of 0.5 ... 0.7, which will allow the navigation system to form a unimodal decision function and provide the required accuracy characteristics.

Key words: mobile robots, reference image, sighting surface.

УДК 355.4

**IMPROVEMENT OF CONTROL OF THE TECHNICAL CONDITION
OF THE INFORMATION SUPPORT SYSTEM FOR THE MANAGEMENT
OF TROOPS**

Oleksii Serduk, Kharkiv

Today, military operations require the effective operation of information support for the management of troops: means of communication, automation and management of units and weapons. Without reliable information about the preparation and course of the operation, it is difficult to formulate management goals, correctly assess the situation, identify problems, predict developments, prepare management decisions, and monitor their implementation. Reliability and efficiency of information transmission and control signals depends on the technical condition of the information support system. That is, from timely control of the technical system of information support for the management of troops.

It is substantiated that the development of the information support system for the management of troops is possible in two directions:

- ensuring minimum operating costs while improving the level of quality and reliability of operation;
- timely detection of failures for the implementation of the necessary levels of failure resistance, the necessary reliability, secrecy of information transmission.

Control of the technical condition of the information support system for the management of troops is proposed to be improved on:

- application of information and measuring devices of high reliability with small weight and overall dimensions;
- use of multifunctional control devices for different types of radio electronic systems;
- increasing the reliability of software and hardware;

– creation of an effective structure for managing the stages of operation of software and hardware.

It is shown that in order to ensure reliable and cost-free operation of the information support system for the management of troops, it is necessary to:

– create specialized information and measuring devices to control the main characteristics of software and hardware during operation on the basis of universal equipment (devices);

– to increase the level of comprehensive data processing from information measuring devices to increase the efficiency of functioning, resistance to failure, the level of suitability for recovery (repair).

These proposals will increase the efficiency of the functioning of the information support system for the management of troops by increasing the reliability and efficiency of obtaining information about their technical condition.

***Key words:** military operations, management of troops, information support.*

УДК 355.61

**PRICE FORMATION FOR DEFENSE PRODUCTS, WORKS
AND SERVICES IN UKRAINE**

Petro Shapoval, Kyiv

General procedures for acquisition of defense products, works and services in Ukraine are regulated by:

Law of Ukraine «On State Defense Procurement Order»;

Decree of the Cabinet of Ministers of Ukraine «The Procedures for Planning, Formation, Allocation, Correction of the State Defense Procurement Order and Execution Control» No. 464 dated Apr 27, 2011 (aimed at detailing and providing follow-up mechanism for the Law of Ukraine «On State Defense Procurement Order»).

These general documents stipulate that prices for defense products, works and services are being formed depending on procedures for defense contract awarding to defense contractors using alternatives: using competitive procedures; without competitive procedures.

1st alternative for price formation. In the event of contract awarding using competitive procedures the price is also being formed using competitive acquisition procedures provided in the Laws of Ukraine «On Public Acquisition» and «On Acquisition of Products, Works and Services for the Guaranteed Addressing Defense Needs».

2nd alternative for price formation. In the event of contract awarding without competitive procedures (e.g. the possible defense contractor is the only manufacturer in Ukraine or registered as a manufacturer of defense products, works and services which require sensitive procurement procedures) the price is being determined during negotiations between the economic entity and the contracting authority.

According to the above mentioned procedures the defense products price for state defense procurement order is being calculated special formula, which use: defense products price for state defense procurement order; input costs; distributed administrative costs (including business trips); distributed marketing costs; direct marketing costs; financial costs; other operational costs; profit.

Defense research and intangible assets price is being calculated using formula, which use: defense research and intangible assets price for state defense procurement order; budget cost of defense research and intangible assets price for state defense procurement order; distributed administrative costs; distributed marketing costs; direct marketing costs; financial costs; profit.

When calculating the price the profit is determined so that to support effective operation of the enterprise taking into account tax payments and interest payments on credits.

Meanwhile the profit share within the price is not to exceed 5 % of costs for acquisition of components (semi-finished products), works (services) from other economic entities, and 30 % of other input costs.

In the event of obtaining credits upon state guarantees for state defense and security programs - the profit is 25 % of input costs (budget cost).

Detailed price calculation is being reviewed by the contracting authority's representatives, namely: contract officer; financial and economic experts of the contracting authority; experts from representatives.

Defense contractor provides detailed price calculation to the contracting authority: when forming estimated (introductory) price at the time of contract conclusion; when forming contract (final) price at the time of final payment for products, works and services delivered by the contractors.

In the event that in previous years the products have been acquired from the contractor without competitive procedures, the estimated (introductory) price in the contract is set at the same level as in the previous similar contract adjusted on the basis of consumer price index for the past years. No detailed price calculation is required, the final price is calculated on the basis of actual contractor's costs.

Monitoring compliance with the law in price formation for defense products, works and services is being implemented by relevant state bodies (Accounting Chamber of Ukraine, the State Audit Service of Ukraine etc.).

Key words: *acquisition, procurement, price, manufacturer, costs; profit.*

УДК 355.1

ESTABLISHING MULTINATIONAL LOGISTICS IN JOINT OPERATIONS: NATO EXPERIENCE

Aleksandr Shcherba, Kharkov

The challenges facing the Alliance in the future (including limited resources) require enhanced cooperation and multinational logistics. Both the need to operate in

areas where there is no conventional logistics infrastructure and the need to integrate the armed forces and logistics of non-NATO countries require the creation of a multinational integrated logistics structure. This applies to logistics in the fields of transport, engineering and support, as well as medical service.

Multinational logistics is an important factor in improving the operational capabilities of temporarily created multinational forces, which optimizes individual efforts in logistics. It includes bilateral and multilateral mechanisms that increase the profitability of individual actions in the field of logistics, as well as their efficiency. The application of these mechanisms significantly affects the planning and implementation of logistics units.

Different approaches and initiatives are used to make multinational forces heterogeneous, such as: distribution of powers; the concept of a leading state; multinational integrated logistics units; multinational integrated medical forces; support from the host country and a third party; creation of a multinational joint logistics center. Effective and timely movement of established groups of troops is a prerequisite for all military operations. Ensuring strategic mobility of troops and equipment Problems of operational and logistical support of the components of the security and defense sector of Ukraine by providing appropriate vehicles is often the main operational requirement. It involves the possible use of civilian resources and may require the deployment of a large number of machinery and equipment. The NATO Advisory Group on Transport and Transport (MAG) plays a key role in matters related to strategic mobility in NATO. This body was established (Meeting of the Heads of National Logistics Services (SNLC) to promote cooperation between military and civilian services and between NATO and member countries in the management of mobility, transport and mobility.

The use of medical corps contributes to the successful conduct of military operations due to disease prevention, rapid treatment of the sick, injured and wounded. The medical forces in the areas of deployment of the multinational force

must correspond to the readiness of the group of troops to reduce and the risk of diseases and injuries in the areas of performance of the assigned tasks.

УДК 355.657.22

LOGISTICS OF AUTOMOBILE KITCHEN PAK-200

Olexandr Sherepitko, Kharkiv

Without the timely and complete provision of food, the soldiers are unable to carry out their tasks effectively, thereby reducing the combat capacity of the entire unit, with consequent negative consequences for the army. The necessity of cooking in the field, far from the bases, has led to the appearance of a large amount of field kitchens. For the past several decades, one of the main types of such systems has been the PAK-200 kitchen.

A soldier has no problem living on canned food and dried fruit for some time, but after a while day there is "war fatigue", frustration and irritability. That is why, warm pit food is a very important element in the morale of soldiers.

The PAK-200 mobile kitchen is intended to provide food to troops in the field. Available equipment allows one machine to feed up to 200 people. The most important feature of this kitchen, distinguishing them from other systems of similar purpose is the possibility of cooking on the march. The van is equipped with all the necessary equipment for independent operation in various conditions.

Inside the van a set of special equipment for various purposes is mounted. The project includes several thermal units, fuel and water systems, process equipment, kitchen equipment, etc. In addition, the machine is equipped with FVUA-100-24 filtration unit, which allows the calculation of tasks even in the contaminated areas. Additionally, the PAK-200 kitchens are equipped with an oven. This machine is built into the general heat unit and receives power from the same systems as other cooking equipment. The fuel for the kitchen heating unit is carried in separate tanks with a capacity of 54 or 72 litres, depending on the modification of the kitchen. The fuel is

fed into the nozzles by the displacement system. There is also a tank for transporting drinking water used in cooking. It has a capacity of not less than 350 litres.

Despite the large amount of special equipment, the calculation of the PAK-200 kitchen consists of only two people, not including the driver. All kitchen and cooking operations are carried out by calculating forces. Depending on the task at hand, the calculator may cook in the parking lot or on the march.

To conclude, the mobile kitchens of the PAK-200 family have been in service since the late 1970s. Over the past decades, the industry has developed several modifications of such equipment, different in basic chassis, special equipment and other features. Despite the development of armaments and military equipment, soldiers still require timely and complete food supplies. The PAC-200 kitchens of all versions successfully meet the set tasks and remain relevant for the troops. Therefore, despite their age, they remain in different units and are likely to continue to do so in the future.

Key words: mobile kitchen, complete provision, logistics, machine.

УДК 629.362

INFLUENCE OF LOW ENVIRONMENTAL TEMPERATURES ON THE STATE OF DIESEL FUEL

Artem Shevchenko,

Volodymyr Demyanyshyn, Kharkiv

Modern diesel engines, including all domestic models, use a separate system of fuel supply to the cylinders. This system involves the installation of one combined high-pressure pump and separate closed-typed injectors on each engine cylinder.

The power supply system of diesel engines consists of low and high pressure lines. The low pressure line supplies fuel from the main tank to the high pressure pump. The high pressure line is used to supply the metered amount of fuel to the engine cylinders in accordance with the order of their operation.

The main consumers of diesel fuel are rail transport, freight vehicle and agricultural machinery. There are so-called winter and summer diesel fuel. Winter fuel production is more expensive, but without preheating it is impossible to use summer fuel at -7°C .

At low temperatures from -7°C to -40°C , paraffin precipitate can form in diesel fuel, which can lead to problems with fuel supply and engine start. The fuel has a higher viscosity at low temperatures and increases the risk of precipitation. The risk of condensation in the fuel tank is reduced when the tank is fully filled.

The process of crystallization of the fuel begins at temperature of -4°C with the release of individual particles of crystals, which are located at a considerable distance from each other. At temperature decrease to -7°C there is an intensive growth of crystals, formation of new crystals. As soon as these crystals combine and reach the diameter of the micropores of the fine fuel filter, they block the fuel supply to the engine. The temperature at which the fuel reaches such an extent that it can no longer pass through the fuel filter and the fuel intake grid is called the pass temperature.

At a temperature of -10°C paraffin crystals are compacted and the fuel is converted into an unusable gel-like substance.

It is important to know that the crucial role is played by the maximum permeability temperature of the fuel because when the threshold of the maximum permeability is reached, the start and operation of the diesel engine becomes impossible.

Key words: *modern diesel engines, fuel supply, diesel fuel, low temperatures, paraffin, maximum permeability temperature, process of crystallization.*

**THE WAYS TO DEVELOP ARTILLERY WEAPONS
TO MAKE THE FIRING LIFE LONGER**

Maksym Shevchenko, Kharkiv

The experience of conducting an anti-terrorist operation in the Donetsk and Luhansk regions (joint forces operation) once again confirmed the significance of artillery as the main means of fire support for mechanized (motorized) units in battle. Up to 85% of enemy losses during the anti-terrorist operation in the Donetsk and Luhansk regions were inflicted by artillery units. At the same time, the results of researches convince that the level of real combat capabilities of artillery systems represented in the combat composition of the ground forces of the Armed Forces of Ukraine no longer fully meets the requirements of time. Analysis of trends in the development of artillery and means of combating it leading countries of the world, puts forward directions of development of artillery systems that will ensure their survivability on the battlefield, namely:

1. Development of new artillery systems by the following:

- increasing tactical mobility by creating self-propelled artillery systems on the wheelbase;
- increasing the autonomy of combat operations by equipping artillery systems with modern means of orientation, means of reconnaissance, navigation and topography, guidance and management;
- ensuring the possibility of transition of artillery systems from the march configuration to shooting (and vice versa) in less than 1 minute;
- increasing the distance overcome by the artillery system from the place in the first minute;
- counteraction to high-precision weapons and unmanned aerial vehicles;
- creation of artillery systems that will have at least 45 shots in the ammunition of the combat platform;

- increase in the maximum firing range to 50-70 km;
- creation of artillery systems with the possibility of firing in the "barrage of fire" mode.

2. Combining artillery systems with means of reconnaissance, control and support in the interests of creation of reconnaissance and fire systems (complexes).

Key words: *artillery, artillery systems, anti-terrorist operation.*

УДК 343.37

STATE PROTECTION OF LAW ENFORCEMENT OFFICERS

Vitalii Shevchenko, Kharkiv

The problem of ensuring security of law enforcement officers in recent years has become special importance in communication with the exacerbation of the criminal situation in the state, the emergence of new dangerous forms of crime, in particular organized, as well as the need to form effective law enforcement institutions in conditions of reforming public administration.

In this regard, it was an urgent need to create such conditions for the law enforcement authorities of their powers, in which they were provided protection against pressure, threats and encroachments for life, housing or property when performing their duties and corresponds to international legal standards in human rights. For this supreme the Council of Ukraine adopted the Law of Ukraine "On State Protection of Court Workers and Law Enforcement", which The system of special measures of state protection of law enforcement officers from obstruction is established the execution of the laws and implementation of the rights provided on them, as well as the encroachments of life, health, housing and property of these persons and their close relatives in connection with the official activity of these persons.

Persons taken under protection have the following rights: to know the security measures that apply to it; require a body that provides security, application of

additional security measures, or canceling any of the exercised events; challenge the prosecutor or to the relevant higher authority that provides security, illegal decisions and actions of officials that provide its safety. The legislator also determines the responsibilities of these persons: to comply with the legitimate requirements of the bodies that provide its safety; Immediately inform the specified bodies on each case of threats or unlawful actions against it; Carefully relate to property, weapons and documents issued to it in temporary personal use to ensure safety; use the gun issued exclusively in the interests of ensuring its protection and execution laid on her law of duties.

The rejection of decisions, untimely acceptance, failure to relevant safety measures of court and law enforcement agencies and their close relatives, entails a disciplinary or criminal liability provided for the current legislation. Despite the existence of an existing law in this area, it cannot be argued that law enforcement officers have real protection. Protection of protection is a guarantor of impartiality and objectivity.

Solutions of these persons, which in case of pressure from third parties can adopt an illegal decision or to commit another illegal action within powers.

Consequently, it can be concluded by considering the issue of service in law enforcement agencies, rights and responsibilities of persons, who carry the service in these bodies and their protection mechanisms that all these issues require an improvement, theoretical substantiation and larger scientific and practical research. Only after that, according to this, it is necessary to improve the legislation, because otherwise changes in laws will not bring positive changes.

Key words: *criminal situation, emergence, State Protection, protection, security, law.*

**STATE MANAGEMENT OF LOGISTICAL SUPPORT OF JOINT
ACTIONS OF SECURITY FORCES IN RESPONDING TO CRISES**

Andriy Shlapak, Kharkiv

In case of crisis situations of peacetime at the regional and national levels, state security forces are used to respond to them. To manage actions to respond to such crises, Unified (Joint) Special Public Administration Bodies (Situation Centers) are created, which, among others, are entrusted with the task of comprehensive support (mainly, logistics). To date, each of the Security Forces have its own characteristics, as well as different opportunities for the organization and management of different types of logistics, which significantly reduces the efficiency of tasks. Therefore, it is expedient to introduce a unified system of state management of logistical support for joint actions of the Security Forces in responding to crisis situations that threaten state security.

On the one hand, crises are acute and destabilizing, they usually do not require the introduction of administrative and legal emergency regimes, can develop on a large scale, while crisis response requires mobilization and involvement of additional forces and means of public authorities and local government, security forces, enterprises, public organizations and associations of citizens, as well as their resources (human, material, financial, etc.) in a limited time.

Thus, public authorities and local governments, as well as each of the security forces, have limited resources due to their practical activities and statutory functions.

First, when it comes to improvement of the regulatory framework, it is advisable to legislate and interpret the concept of “national security threatening crisis situations”. Legislative consolidation of this concept is important, because today the legislation of Ukraine has no definition of a crisis situation that would fully and comprehensively describe this concept, although it is increasingly used in regulations related to the national security of Ukraine.

Another issue of regulatory and legal support of state management of joint actions of security forces in responding to crisis situations is the uncertainty of the status of situational centers. The results obtained during the study together solve an important scientific and practical issue of improving state management of joint actions of state security forces.

***Key words:** logistical support, crisis situation, legislation, security forces, state management.*

УДК 623.455

THE PROBLEM OF SHORTAGE OF AMMUNITION FOR SMALL ARMS

Vladyslav Stus, Kharkiv

During the war with the aggressors, the National Guard of Ukraine faced a shortage of ammunition for small arms. Old Soviet ammunition supplies are running low.

None of Ukraine's partner countries will be able to supply the required amount of ammunition and close all needs if the active phase of the conflict begins.

There are private companies that offer the National Guard of Ukraine their developments in the field of small caliber cartridge production, but they are currently engaged only in small-scale production of ammunition and cannot fully meet the needs of ammunition of the National Guard of Ukraine.

From this we understand that we need our own state production of ammunition for small arms.

The term "production" should be understood as a full-fledged production of ammunition and their main elements in our enterprises, and not "assembly production" of ready-made components produced by other companies from other countries.

The problem of shortage of ammunition could be solved by its own cartridge production. The issue of building a cartridge factory is not the first year. But it does not come to implementation.

If there was an ammunition factory in Ukraine today, it could produce ammunition of NATO caliber for new models of weapons, which are used to rearm units of the National Guard of Ukraine.

Before starting the construction of a cartridge factory, it is necessary to clearly understand what tasks it is intended for.

Currently, Ukraine is in a somewhat unusual situation. On the one hand, units of the Ukrainian army and other security forces are still armed with Soviet-made small arms, the stocks of ammunition for which in warehouses over the years of hostilities in Donbass have significantly decreased and need to be replenished, and on the other hand to think about the future rearmament of the army and the transition to the caliber of the North Atlantic Alliance.

Therefore, the domestic ammunition factory must first of all eliminate the dependence of the army on external sources of ammunition supply, be able to meet the existing needs of the army and in the future to ensure the re-equipment of the army with ammunition for small arms of NATO standard caliber.

***Key words:** for small arms, ammunition, NATO standard, production, army, North Atlantic Alliance.*

УДК 355.1

CURRENT CHALLENGES OF MILITARY LOGISTICS IN UKRAINE

Vladyslav Syvak, Kharkiv

At present, our country is creating a single effective system of logistics for the Armed Forces (AF) of Ukraine, other military formations and law enforcement agencies, both in peacetime and in wartime, which must operate in accordance with NATO standards and be able to cooperate effectively with the armed forces. other

NATO and EU member states. Therefore, the issues of military logistics, as one of the most important and main components of military operations, are relevant and require careful study.

Despite the diversity of interpretations, the main purpose of military logistics is to support military operations and the armed forces (troops) involved. According to military scientists, the main tasks of military logistics are: maintaining military power and promoting the movement of troops; supply of food and other material and technical means to the army; organization of medical care (evacuation and treatment of the wounded); deployment of forces and means. It is worth noting that according to some scholars, military logistics also has a direct impact on strengthening the psychological, fighting spirit of the troops and the unification of military forces (preserves their motivation and strengthens the moral authority of the commander). However, the goal and objectives of military logistics are not easy to achieve in the uncertain reality that is inherent in the TVD. According to research by military scientists who have characterized the combat situation, there is a possibility of chaos due to the presence of several factors that actively hinder the implementation of any previously clearly structured process. Certain difficulties in supporting military operations arise when the logistical assets required to do so are damaged or destroyed by enemy sabotage. Also, a special negative impact is observed in the presence of incomplete information or confusion in combination with a rapid change in the pace, consumption and depletion of resources (military property). This makes it extremely difficult to adequately respond to the requirements and needs of the TVD and maintain the constant combat capability of personnel. Thus, although the purpose and objectives of military logistics are well defined, its implementation faces some risks that have a direct impact on reducing the efficiency of military operations. It should be noted that the potential effectiveness of a military force consists of three components, which of these components is a priority, depending on the goals and

strategy of the commander, but they all need available logistical support: combat power, mobility and range.

Key words: military logistics, military operations, objectives, troops, risks.

УДК 623.1

IMPROVEMENT OF THE OPERATION CONTROL SYSTEM OF AUTOMOTIVE EQUIPMENT IN THE NATIONAL GUARD OF UKRAINE FORMATIONS

Andriy Tkalenko, Kharkiv

Automotive equipment is important in ensuring the viability of units of the National Guard of Ukraine and performing the tasks assigned to it. But not always automotive equipment is used for its intended purpose, or used with significant violations.

What are the solutions to this problem? Use of GPS - trackers in control of use of automobile equipment on purpose and expenses of a motor resource. GPS-tracker - a transceiver designed for remote tracking of the position of a mobile object.

The GPS tracker is located on the car, which is monitored and determines the location of the car using a GPS receiver. Location data is transmitted to the GPS monitoring system, or directly to the user's computer. GSM cellular communication and its services such as GPRS, EDGE, SMS or CSD are used to transmit position data. The tracker provides the ability to constantly monitor the movement of the car wherever there is coverage of GSM networks.

Most modern trackers have the ability to store route data in case of temporary absence of the GSM network and transmit the route record after reconnection.

This system will allow you to transmit information about the location of the car in real time at certain intervals or on request, which allows you to control the time and route traveled. The data can also be used to protect the car or search, in which case the data is superimposed on the electronic map of the area to display the route and current

location.

Another advantage of installing GPS-trackers is the observation of subordinates. GPS-control provides constant fixation of routes of movement of cars. Thus, it is possible to monitor compliance with the use of motor vehicles in accordance with the order for the use of cars. All this helps to optimize the workflow, reduce the misuse of working time and control the consumption of motor resources of vehicles.

Trackers also have the ability to connect sensors, such as fuel level, tilt, temperature, clock, and any other sensor that has an interface that allows you to monitor the technical condition of the car, and plan the necessary maintenance in advance.

Key words: the National Guard of Ukraine, GPS, automotive equipment.

УДК 623.4.

**PERSPECTIVE AREAS OF DEVELOPMENT ARMORED VEHICLES
TO ENSURE THEIR SURVIVABILITY IN COMBAT USING THE BTR-4E**

Viktor Trembak, Kharkiv

The experience of the antiterrorist operation and the United Forces operation in Donetsk and Luhansk regions has once again confirmed the importance of armored vehicles as the primary means of fire support for mechanized units in combat. The BTR-4E became the main armored vehicle on the battlefield.

Conceptually, the BTR-4E armoured personnel carrier has combined in its designation the functions of an armoured personnel carrier and an infantry fighting vehicle for engaging the enemy's mechanised units on the battlefield.

The structural difference of the BTR-4E is the complex solution of placing troops in the rear part of the hull with the possibility of dropping them through the rear doors under the cover of the armoured personnel carrier.

Specially for BTR-4E the BM-7 "Sail" combat module was designed and manufactured, which combined the best developments of earlier combat modules with powerful weapons (30 mm automatic gun, 30 mm automatic grenade launcher, 7.62 mm machine gun, PTRK) and stabilized in two planes modern fire control system, which allows to fire through television sights with remote control, both from the ground and in motion, both day and night.

Both gunner and commander can fire fully from his working place. The commander can additionally observe the battlefield through the all-vision panorama and give instructions to the gunner or fire independently by switching the armament control to his workplace.

This version of the armored vehicle was designed for combat operations in Iraq, but with the sharp deterioration of the socio-political situation in the east of our country it was destined to play one of the key roles of fire support for mechanized units in combat.

One of the first combat test of this armored personnel carrier took place in early June 2014 near the city of Slavyansk, Donetsk region.

The BTR-4E's armor and hinged shielding withstood numerous direct hits from large-caliber machine gun bullets and counter-tank grenades and protected the crew and troops from being hit, while the armor glass withstood direct hits from sniper rifles.

A further modernization of the armored personnel includes:

installation of a high-quality automatic wheel inflation system on the armored personnel carrier;

retrofitting lighting and optical devices with their integration into the body of the armored vehicles;

gearbox replacement;

Reduction of engine starting noise;

installation of active armor protection;

installation on the combat module of an automatic mortar.

Key words: armored vehicle, United Forces Operation, combat operations, mechanized units, combat module, modernization, airborne troops.

УДК 355.66

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

Maryna Tsvilovska, Kharkiv

At this time the Armed Forces of Ukraine are actively developing and testing the 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 himself before performing his duties.

Most important element of uniform is combat boots. After all, the right choice of the type of shoes and its quality have an important role in the execution of military tasks by a serviceman. “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 95th 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 this model at the end of the year among those who are actively joining the discussion and dissemination. Experimental summer combat boots has different, unusual design, and it is lighter than usual, with the GORE-TEX membrane, with a new Italian pad, and also has a new modern sole. And I will explain about it more.

The appearance of the shoes is deceptive. The material of it is hard to damage and dirt, dust or water do not fall inside the boots despite the external net, and this

quality is confirmed by good responses of the military. The new soles have an open protector pattern and a trapezoidal spike shape. At the expense of this self-cleaning of the sole from the dirt takes place. According to the developers, in order to clear the protector from the dirt soldier have to hit the boot several times on a hard surface.

The soles have sharp forms of the protector, which are located in different directions. It provides effective adhesion of the boot to the surface in different directions, which is especially true when using shoes in the field.

There are drainage channels on the spike of the protector that provide a stable position of the boot on wet surfaces. In the shin part of the shoes there are additional hooks that keep the boot 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 take of fatigue from legs, for example when serviceman is jumping 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. I remind that except summer boots, the UAF uses winter and demise shoes.

Consequently, on the basis of the foregoing material, I can certainty said that the Logistics of 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 his unit.

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

ONE OF THE REASONS OF THE VICTORY

Oleksandr Tsybulskyi, Kharkiv

The T-34 was by far the best tank design in World War 2. In addition to having an excellent combination of firepower, armor, mobility, and shape, its superb technical design, which emphasized simplicity and durability, made it possible to mass produce it in enormous numbers, and gave it very high field and combat reliability, two critical attributes which the advanced German tanks lacked. It was the main war winning weapon of USSR in World War 2.

The T-34 was a medium tank which evolved from a series of pre-war USSR light tanks, which were designed for very high speed (53mph with tracks, and over 60mph in good roads without tracks!!) and long travel range, features which made them a formidable weapon for fast advances very deep into enemy territory, but they severely lacked firepower and armor, so they were not suitable as main battle tanks. Some modern wheeled military vehicles armed with powerful anti tank missiles and machine guns can be regarded as more successful descendants of this type of fighting vehicle.

As a result of the need for an all-purpose main battle tank, the T-34 was developed as a medium tank descendant of those fast light tanks, gradually evolving from their super technical design, but designed to be a capable main battle tank. The T-34 was lower in height (8ft) than German and American tanks, which was better in using the terrain for taking cover and make it a smaller target to hit. It had sloped armor in both the front and side hull and the turret, which made it harder to penetrate, and of course it had a powerful 76mm gun, which was then a large caliber, and sufficiently thick armor. During World War 2 the gun of the T-34 was upgraded to a more powerful long-barrel 76mm gun and later to 85mm gun, to keep up with the advances in German tank guns and armor.

Since late 1942, in the late stages of the great battle of Stalingrad, and then in the huge tank battle in Kursk in mid 1943, and until the end of the war, T-34 tanks in ever increasing large numbers, outnumbered and crushed the German tanks, and pushed the German invaders all the way back to Berlin, serving as one of the main war winning weapons of World War 2.

***Key words:** main war winning weapon, powerful, design, battle.*

УДК 355.65

**FOOD SUPPLY OF THE ARMED FORCES OF UKRAINE:
CURRENT CHALLENGES**

Hanna Vinnytska, Odessa

Good nutrition are the basis for human physical and mental activity and general condition of human health. As armaments and military machines develop and require considerable physical and psychological input from servicemen, good and balanced food becomes a natural source for recovering these important resources. That is the reason why food supply issues for servicemen gain special relevance, especially considering that the army is intensively developing and growing, learning to handle new modern weapons, and undergoing more and more trainings with relocation of units to other regions.

The food supply process cannot be improved without knowing scientific fundamentals. For purposes of further development and improvement of food supply for the Ukrainian Army, it is necessary to determine, which scientific areas underlie the food supply process of the NATO armed forces. For this, food supply should be investigated as a phenomenon and a process.

Food supply, on the one hand, relies upon the science of nutrition that stipulates standards for reasonable and appropriate organization of food for various troops in line with the specifics of their activity. On the other hand, it refers to the economic

theory of logistics governing the organization, management and optimization of material, information and financial flows, from sources to the final consumer.

Furthermore, food supply for the Ukrainian Armed Forces should be regarded as the major military and economic system, which directly influences the operational availability the Ukrainian army.

Key words: food supply system, servicemen, science of food.

УДК 355.65

**THE USE OF BIODEGRADABLE UTENSILS IN COMBAT RATION
FOR THE NATIONAL GUARD OF UKRAINE**

Maksym Voroshylov, Kharkiv

The constant use of plastic in the world is an urgent problem that is becoming life threatening. This material pollutes the planet and reduces the animal population. Many countries consider replacing plastic with more ecologically friendly organic materials. Ukraine is also concerned with this issue. The government is working out options to ban the use of plastic utensils. Thus, the first steps have been made already – the limit of the circulation of plastic bags.

Following 2019 EU directive on banning plastic utensils, since July the European Union have completely removed disposable products made of plastic out of sale. The ban came into force on disposable spoons, forks, knives, plates, drinking straws, cotton swabs, sticks for stirring and holding inflatable balloons. It is also no longer possible to sell disposable containers for food and beverages made of foam. Entrepreneurs now have switch to alternatives from recyclable materials such as glass and metal.

In the current conditions, daily field filling of products for the Armed Forces and for other military formations uses plastic materials for disposable tableware. Daily field set of products is intended for feeding servicemen of the Armed Forces of Ukraine, other military formations and the State Service for Special Communications

and Information Protection, police, privates and management of operational support units anti-terrorist operation, the State Fiscal Service, members of the rank and file, chiefs of civil defense bodies and units.

The given research paper offers the ways to use biodegradable eco-dishes in biscuits in combat ration for the National Guard of Ukraine. Plastic can be replaced by biodegradable plastic, made of organic materials, such as are corn, wheat, sugar cane and other plants.

Key words: military formations, the National Guard of Ukraine, combat ration, biodegradable, plastic.

УДК 358

PROBLEMS OF STANDARDIZATION OF AIRFIELD-TECHNICAL SUPPORT OF THE STATE AVIATION OF UKRAINE AND WAYS OF THEIR SOLUTION IN THE CONDITIONS OF COOPERATION WITH NATO AND INTERNATIONAL INTEGRATION

Denys Vyshniak, Armed Forces of Ukraine

Nowadays, aviation plays a significant role in the development and status of any country. The developed system of air connections provides communication with the partner countries. Aviation of the Air Force of the Armed Forces of Ukraine - provides protection of the country's airspace, provides assistance on the battlefield to other troops, provides rapid and operational redeployment of units, transportation of cargo and personnel through the air both in peacetime and in wartime. The key to the successful completion of tasks by aviation is the correct and clear organization of aerodrome technical support. Its development, improvement and bringing into line with today's requirements is a relevant and important process.

This paper analyzes the legislative documents of Ukraine and foreign countries on aerodrome technical support (ATC) of aircraft and aerodromes. The organizational measures are given with the help of which it is possible to minimize the lack of

transport aircraft during the transportation of oversized and oversized cargo. The paper presents data on incidents related to ground handling of aircraft, indicates the causes of events during the ATC and considers the layout of special ground handling vehicles, their approach and departure from the aircraft to show the complexity aircraft maintenance. Examples of errors in the organization of maintenance of aircraft and airfields, preparation and conduct of flight changes are given. Based on the analysis, the main ways to eliminate the problems of standardization of ATC in the context of cooperation with NATO and in the process of international integration have been identified. The use of methods of system analysis and modeling to justify specific measures to improve ground handling processes is proposed.

Key words: airfield-technical support, aviation, Air Force of Ukraine, airfield, ground support.

УДК 629.113

**IMPROVEMENT OF METHODS FOR ASSESSING THE STABILITY
OF ARMORED WHEELED VEHICLES**

Hennadiy Yarovy, Ukraine

The National Guard of Ukraine performs the tasks of protecting public order, protecting important state facilities, escorting convicts, participating in the suppression of armed aggression, participating in special operations to destroy armed criminals, illegal armed formations, participating in eliminating the consequences of emergency and crisis situations at facilities.

The efficiency and promptness of the fulfillment of tasks depends on the technical equipment, quality and adaptability for specific tasks of military equipment.

During the initial period of the anti-terrorist operation in eastern Ukraine, the National Guard of Ukraine hastily adopted a large number of armored wheeled vehicles based on passenger cars and low-tonnage trucks. In this regard, the problem arose of assessing the stability of armored wheeled vehicles, since the tactics of their

use differ significantly from conventional automotive equipment. When designing these vehicles, the main focus was on armor and mine protection. The war in eastern Ukraine has shown that the local conflict in XXI is characterized by a high surprise attack, speed of maneuvering by troops, and the participation of small mobile groups. Loss of stability of movement when performing tasks on armored wheeled vehicles can cost the life of the crew, the loss of expensive equipment and, as a consequence, failure to fulfill the task. With modern tactics of conducting hostilities in local conflicts, the appearance of many systems and complexes of weapons, including control systems, communications, intelligence, it can be unambiguously concluded that the National Guard of Ukraine needs armored vehicles with high stability of movement in order to increase the responsiveness to changes in the environment.

Key words: the stability, armored wheeled vehicles, anti-terrorist operation, local conflicts.

УДК 629.076.623.426

**APPLICATION OF SUPPLEMENTARY EQUIPMENT FOR
MAINTENANCE OF VEHICLES AND ARMORED EQUIPMENT IN THE
NATIONAL GUARD OF UKRAINE**

Olexandr Zhdanov, Kharkiv

In today's world, for the successful implementation of the tasks that the NGU performs in everyday activities, aids are used that are made of improvised materials and created to facilitate the use of technology.

When servicing NGU equipment, namely during the installation and dismantling of wheels to facilitate the work, I suggest using a device to support the cylinder key when unscrewing the nuts on the wheels.

Efficiency in the use of the proposed device is:

- ease of installation and reduction of effort spent for this purpose;
- reducing the time of maintenance of the chassis of the car;

- gives the chance to carry out installation works by one expert that increases efficiency of maintenance.

The proposed design is a rack of 25 mm pipe, with 10 hooks, which are located on the pipe, the basis is a plate with angular amplifiers. The product serves to support the cylinder key by preventing its skew when unscrewing the wheel nut with great effort.

The operation of the device is as follows: this design is installed directly next to the wheel to be unscrewed. We throw a balloon key on a nut choosing the hook necessary for support on height and by means of the lever we start to turn a nut and so one after another changing hooks concerning nuts.

The use of the proposed device allows to increase the efficiency of installation and maintenance of the truck.

The existing technological process for mounting the wheels of a truck needs improvement because when unscrewing the nuts there is a skew of the cylinder key and there is not enough support that requires two specialists, one of whom holds the key so that it does not jump, and the other lever turns the nut.

In the conditions of installation in military units, the design to support the balloon key can be used on trucks of all models and groups of operation.

Summing up, the novelty of the proposal is that this technology reduces the time and effort spent by servicemen on the installation of truck wheels, allows installation work by one specialist, which increases the efficiency of maintenance.

Key words: *improvised materials, servicing, efficiency, design is a rack, technological process.*

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