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ENGINEERING SUPPORT OF COMBAT OPERATIONS OF TROOPS: TRANSFORMATION OF TASKS

In modern conditions, engineering support for the combat operations of troops (forces) must be carried out taking into account the knowledge and experience accumulated by the Armed Forces of Ukraine during the repulsion of armed aggression Russia against Ukraine, NATO recommended practices and standards for the safety of the use of troops, which are summarized and consolidated as theoretical foundations in scientific works, statutes and guidelines.

The article is devoted to the systematization of the tasks of engineering support of combat operations of troops, the study and supplementation of their content, and particularly based on the study of NATO doctrinal publications concerning engineering support and the combat experience of the Defense Forces of Ukraine.

Engineering support of the troops' combat operations in the conditions of full-scale armed aggression of the Russian Federation against Ukraine not only did not lose its importance, but, on the contrary, showed an urgent need for it, while changing and improving the methods of performing its tasks. The appearance on the battlefield of new effective means of armed struggle, high-precision weapons, and increased maneuverability of combat operations expanded the content of tasks engineering support (IP) and complicated the organization of their implementation during the Russian Ukrainian war.

Changes in the methods of conducting operations (combat actions) and in engineering weapons

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emphasized the need to generalize and further develop the theory of engineering support and the tactics of engineering troops.

The introduction of NATO standards requires the creation of a modern model of Support Forces that will be able to reliably perform tasks to support the actions of troops in various conditions, and to develop the necessary capabilities to have a powerful set of troops (military units, subdivisions), and to ensure their development and interoperability with the armed forces of NATO member states.

The above circumstances have necessitated the study of the transformation of engineering support tasks for combat operations of troops, their generalization, and their systematization. Based on the results of the study, a division of engineering support tasks divided into groups was proposed. The content of engineering support tasks was supplemented taking into account NATO standards, as well as knowledge and experience accumulated by the Defense Forces of Ukraine.

Keywords: Combat operations of troops; Engineering support tasks; Engineering weapons; Engineering troops; Engineering support; Engineering intelligence, Defense Forces of Ukraine.

1. INTRODUCTION

Problem statement. During the Russian Ukrainian war, engineering support (hereinafter - IP) of military operations acquired new features, and units and subdivisions of engineering troops (hereinafter - IB) gained combat experience, received new means and capabilities, which influenced the tactics of their application. The relevance of research on IP of military operations is determined by the needs of the present. Analysis of the implementation of tasks to repel a large-scale invasion of Russian troops shows that IP of military operations sometimes plays a major role in the success of operations.

It can be noted that the theory and practice of the IP of combat operations of troops develops in close dialectical relationship and interdependence with the development of means and methods of armed struggle, the requirements of military art, in particular general tactics and operational art. The engineering support (IP) of combat operations of troops occupies a high place in the rating of types of support due to the whole complex of tasks inherent to it, the implementation of which has a significant impact on the mobility of its units and subdivisions, while increasing their protection and survivability and contributing to the effective use of all types of weapons, and also limits the maneuver capabilities of the enemy and causes him losses.

This necessitates the theoretical understanding of the role, significance, and place of the engineering support (IP) of combat operations of troops in modern military science.

development of the system, which should be reflected in guiding documents, in the practical development of the opportunities it represents for the military defense of Ukraine in the conditions of full-scale aggression by the Russian Federation against Ukraine.

Analysis of recent research and publications. A significant number of scientific works have been devoted to the study of the issues of the engineering support (IP) of military operations of the troops [1]-[3]. In addition, the foundations of the engineering support (IP) of military operations of the troops are reflected in the guiding documents regulating the issues of the engineering support (IP) and the tactics of the engineering support (IP) units [4]-[7]. These studies have made a significant contribution to the theoretical foundations of the preparation and implementation of the tasks and measures of the engineering support (IP) of military operations of the troops. Despite the sufficient number of scientific works and documents on this issue, the study of the engineering support (IP) of military operations of the troops, the systematization of the engineering support (IP) tasks and the addition of their content taking into account the modern experience of conducting military operations of the troops, in particular in accordance with the guiding documents of the NATO member states, are open to a more detailed consideration of both the engineering support (IP) system and the structure of the engineering support (IP) tasks, the specification of a number of provisions, and the introduction of certain changes in the content of the engineering support (IP) tasks in accordance with modern requirements.

The purpose of the article is to systematize the tasks of engineering support (ES) of military operations, to study and supplement their content, taking into account the experience accumulated by the Armed Forces of Ukraine (AFU) during the repulse.

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Russia's armed aggression, as well as NATO's recommended practices. 2. RESEARCH RESULTS In the period 2014-2017, the goals and objectives of engineering support were transformed in accordance with the requirements of the time, in particular: - ensuring the successful completion of the tasks of its troops in increasing the mobility and overall operational capability of its troops; - ensuring the protection of its troops and facilities - increasing the survivability and safety of troops; - inflicting losses on the enemy and complicating his actions; limiting the mobility of enemy forces and assets [4]. By order of the Chief of the General Staff - Commander-in-Chief of the Armed Forces of Ukraine dated 06/25/2019 Number 230, the "Temporary Instruction on Engineering Support of the Armed Forces of Ukraine" was put into effect [8]. The instruction states that the main tasks of engineering support are: - engineering support for the mobility of its troops; - engineering measures to limit the mobility of enemy forces and equipment; - engineering measures to increase the survivability and safety of the use of troops and facilities; general engineering support for troops. After the introduction of this guideline, a number of guiding documents were introduced regarding the IP of combat operations of the troops, in particular: Doctrine on Engineering Support of the Use of Troops, 2020 [7]; Combat Regulations of the Support Forces of the Armed Forces of Ukraine "Engineering Troops" Part II (battalion, company), 2021 [6]. The Doctrine [7] states that engineering support is one of the types of support for troops, which constitutes a set of measures for the engineering preparation of troops, facilities and areas, which are carried out with the aim of timely and covert deployment of troops, maneuvering them, creating the necessary conditions for the successful completion of assigned tasks, increasing the level of protection of troops and facilities from enemy weapons, inflicting losses on the enemy and complicating his actions.	According to the Combat Charter [6], a feature of the engineering support (IP) for the use of troops is engineering activities, which are carried out regardless of the type of operation or mission in order to provide engineering support to troops. NATO doctrinal documents [9]-[11] address the issues of synchronization and coordination of capabilities, actions and resources of the IP during the preparation, execution and completion of the operation. The key theme underlying these documents is that the engineering support (IP) exists at all levels of command, in any mission, campaign or operation, at all stages and is coordinated by military engineers. Engineering support is focused on the preparation of engineering support (IP) units and units, their application and interoperability. Changes in the approaches of NATO member states are focused on conducting force actions. Adaptation included a reorientation to confront a possible potential adversary, as well as adaptation of all aspects of their activities to combat various threats. Resources allocated for rearmament and re-equipment are redistributed in favor of the forces and means of engineering weapons at the tactical level. According to the NATO standard [7], the engineering support (IP) is defined as "the support function for operations to create the physical operating environment". It is an integral part of the joint functions. Engineering support exists at all levels of command, in any mission, campaign or operation, at all stages and is coordinated by military engineers. Military engineers must achieve the required goal (creating the physical operating environment) by contributing to the joint functions of the engineering support (IP). The operational environment is shaped by constant factors: political, military, economic, social, information, infrastructure, physical environment, and time. In addition, the combat environment is influenced by variable factors: the specific task, the enemy, terrain and weather, the composition of subordinate and attached units and subunits, the time to complete the task, and the population in the area of operations.
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The terrain throughout the history of mankind has played an important role during wars. The histories of wars testify to numerous examples of battles, operations and battles in which the skillful use of the terrain and landscape of the area, the natural and climatic conditions of the combat area contributed to the defeat of a stronger opponent. Knowledge of the characteristics of the terrain and the ability to use them was a key aspect of the successful activities of the troops. The influence of the terrain on the conduct of combat operations by troops (forces) is twofold: on the one hand, it contributes to their success, and on the other hand, it reduces their effectiveness. The organization of the implementation of IP tasks requires understanding and knowledge of the formation of the operational physical environment, its impact on the conduct of combat operations, and also requires special knowledge of the use of the physical environment for military operations. The need to form the physical environment requires the troops to have the ability to preserve, adapt or equip the terrain in an engineering sense for military operations under any conditions. This requires consulting, implementation, control and integration of IP capabilities into military operations. The physical environment of the combat area affects the composition of the troops involved in combat operations, their weapons and methods of application. The engineering equipment of the terrain creates favorable conditions for its troops and also complicates the actions of the enemy and causes him damage. Providing conditions for the formation of the operational physical environment is a long process at all stages of operations. During the formation of the operational physical environment and the implementation of the tasks (measures) of the engineering support (IP), military engineers can positively influence the survivability and mobility of their troops, limit the mobility of enemy forces and equipment, and also create favorable conditions for the successful implementation of the assigned tasks by their troops (forces). The use of the engineering support (IP) forces and equipment to form the operational physical environment contributes to the implementation of the tasks and the success of the operation.	Accordingly, the engineering support (IP) of the use of troops has two main functions [6]: - the first combat engineering support (IP), which includes activities related to direct support of current or imminent combat actions (operations), which are carried out with an emphasis on speed and with the aim of fulfilling short-term tactical tasks; - the second general engineering support (IP) of the troops, which covers deliberate, early, long-term preparation and indirect support of current or future operations, as well as military-technical tasks related to supporting the troops at all stages of the operation. Taking this into account, a prerequisite for improving both the efficiency and, mainly, the quality of the organization of the engineering support (IP) is the generalization and further development of the theory and practice of the engineering support (IP). The results of the analysis of the guiding documents [6]-[8] showed that for the further development of the theory of the engineering support (IP) and the tactics of the engineer troops, it is necessary to form a more flexible engineering support (IP) structure for various types of combat operations. The tasks that belong to the function of the combat engineering support (IP), in accordance with NATO standards, can be combined into groups that have a direct impact on mobility; limiting the mobility of the enemy's forces and means; survivability and security of troops and facilities. Improving the structure of the engineering support (IP) also requires specifying the purpose of the engineering support (IP), determining the list of engineering support (IP) tasks and their distribution by groups, as well as supplementing the content of engineering support (IP) tasks (measures) taking into account the experience of combat operations and NATO standards in order to achieve interoperability and interaction when performing joint tasks of the Armed Forces of Ukraine with the relevant forces of NATO member states. So, it is necessary to determine what is the difference between a goal, a task and measures? Let's consider these concepts as separate terms that can be found on Wikipedia pages: "A goal means a state in the future that can be changed relative to the present and is worth, desirable or necessary to achieve. Thus, a goal is the desired end point of a process." A goal expresses a desire for a specific end state and helps to build some
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consistency in work, analyze the result. It has the following characteristics: the specificity of the final result; is a direct consequence of the subject's need; has a share of uncertainty. That is, the goal is something unique that you can and strive to achieve (therefore, there is no plural). Task - a problem situation with a clearly defined goal that must be achieved. A task always proceeds from the goal and is a means of its implementation. A combat mission is an order from a commander to a subordinate formation, unit, subdivision or individual soldier. A measure is a set of actions or means to achieve, carry out something. In our opinion, the engineering support (IP) of military operations of troops is one of the types of support, which constitutes a complex of tasks that are carried out with the aim of increasing the mobility and survivability of one's troops, limiting the mobility of enemy forces and equipment, and creating favorable conditions for the successful performance of certain tasks by troops (forces). To determine the list of tasks of the combat operations of the troops and their distribution by groups, the method of expert assessments was used - this is	solving the problem by experts, their argumentation, formation of quantitative assessments and processing the latter by formal methods. Expert assessment methods allow, relying on the experience, knowledge and skills of specialists in this field, to make the most appropriate and justified decision. The commission method involves holding a discussion by a group of experts to develop a common opinion on the future behavior of the predicted objects. A group survey method was used, which uses the exchange and familiarization with the opinions of other experts. During the group survey, the options for the tasks of the engineering support (IP) of the combat operations of the troops were adjusted, and the points that individual experts missed were taken into account. The priority was the constant convergence of the opinions of the experts, as well as the analysis of the most extraordinary or opposite in content options for the tasks of the engineering support (IP) of the combat operations of the troops. Throughout the entire stage, experts, based on a discussion of problematic issues among themselves, reached a joint decision and proposed the distribution of tasks of the combat operations of the troops by groups, which are given in Table 1.
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Table 1

Distribution of engineering support tasks for combat operations of troops by groups.

Engineering support for the mobility of its troops	Engineering support to limit the mobility of enemy forces and assets	Engineering support for the survivability and security of troops and facilities	General engineering support
1. Engineering reconnaissance			
2. Preparation and maintenance of troop movement routes. 3. Equipment and maintenance of crossings and arrangement of passages through narrow obstacles. 4. Making and maintaining passages in engineering barriers and destructions. 5. Demining of areas and objects. 6. Helipad equipment	7. Installation and maintenance of engineering barriers. 8. Destruction and strengthening of natural obstacles	9. Fortification equipment of positions and areas of troops. 10. Implementation of engineering measures to camouflage troops and facilities	11. Equipment of field water supply points. 12. Engineering and technical support

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Engineering reconnaissance of the enemy, the terrain and objects is one of the main tasks of the engineering support (IP) in all types of military operations [5]. Engineering reconnaissance is important in order to concentrate the main efforts of the engineering support (IP) units where the desired effect can best be achieved and to allow timely commencement of the implementation of engineering support (IP) tasks. The main goal of engineering reconnaissance is to provide commanders and military engineers with updated and accurate information about the environment, composition, position and intentions of the enemy's engineering forces. The secondary goal of engineering reconnaissance is to contribute to general intelligence. When organizing combat operations, commanders and staffs need to assess the terrain (area of combat operations) in terms of its positive or negative impact on the dynamics of the battle, the use of types and branches of the armed forces, the operational and tactical construction of combat formations of troops in the offensive and defense; concentration of main efforts; pace of the offensive; engineering equipment. In the operational environment, engineering information supports both the traditional intelligence process and the process of expanding intelligence information. It plays an important role in the successful planning of military combat operations of troops. Engineering information can be collected and presented by all troops / units, intelligence collection services, as well as special engineering intelligence. The received engineering information is collected and used by military engineers. Many pieces of engineering information are of interest to other troops / units, intelligence services and departments, which requires the need to exchange information within the headquarters and between headquarters. Reporting on engineering information must comply with the requirements of governing documents [6]. A structured sequence or process is needed to determine intelligence requirements and gather information, process it, and deliver it to those who need it. This need for a structured approach is met by a sequence of four steps:	directing, collecting, processing and proving. The so-called intelligence cycle is the basis for all intelligence activities. These stages are separate operations and they end with the proving of the required information. The integration of engineers and engineering information into this intelligence cycle is vital. Military engineers support the expansion of intelligence information, which may include operational capabilities of allies and adversaries, terrain, weather, geographic information, as well as information about infrastructure, available civil engineering assets and their potential for use, and resources required for operations. This can be viewed as both an outcome and a process that supports the following functions: force generation; reconnaissance of the combat area; situation assessment; joint target selection process; and troop protection. Timely and effective engineering reconnaissance is critical for effective planning and execution of IP tasks. Mobility is the quality or ability of armed forces that allows them to move from place to place while maintaining the ability to perform their primary mission. The military doctrines of many armies of the world emphasize that ensuring mobility is important for achieving an advantage at the right time and in a given place. To ensure mobility, any enemy can use the necessary forces and means for this. Enemy engineering units are organized and equipped to assist in maintaining high rates of movement through demining and maintaining routes for the advancement of their troops, including overcoming minefields and other obstacles [1]. Mobility support tasks directly affect the ability of troops to maneuver and move in a timely manner. Troops (forces) need to move quickly and freely in the area of operations to fulfill their primary mission. Mobility is necessary to achieve concentration of effort and rapid
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deployment, maneuver, withdrawal. High mobility can compensate for the enemy's superiority in forces and means. Maintaining mobility is the most important task of intelligence units. Mobility is vital to the success of an offensive, and the engineering support (IP) will therefore play a key role in maintaining the pace of the offensive. In the event of successful completion of the engineering support (IP) tasks of offensive operations, the commander (commander) can seize the initiative and achieve suddenness of action by choosing the time and direction of the attack. The mobility of troops is affected by the nature of the terrain, weather conditions and enemy actions. The greatest negative impact on the mobility of troops is the destruction of crossings through obstacles, as well as the use of engineering barriers by the enemy, especially mines and explosives and remotely installed. Natural obstacles and damaged infrastructure can also be reinforced by the enemy in order to create effective obstacles to limit the mobility of troops. In order to maintain mobility (task completion rate) and minimize the impact of obstacles on troop actions, commanders must: predict the presence of obstacles and their nature; plan the procedure for overcoming possible obstacles; ensure early receipt of information about obstacles with the involvement of all types of intelligence; constantly conduct obstacle overcoming training. Supporting the mobility of troops, military engineers organize the implementation of the following tasks of the engineering support (IP): preparation and maintenance of troop movement routes; equipment and maintenance of crossings and arrangement of passages through narrow obstacles; development and maintenance of passages in barriers and destructions; demining of areas and objects; equipment of helicopter landing pads. To successfully solve the tasks of ensuring the movement of units at high speeds, it is necessary to develop new means of reconnaissance and overcoming mine and explosive obstacles. The growth of the maneuvering capabilities of the troops requires further development of means and methods of overcoming water and other obstacles.	obstacles, preparation of paths in different terrain conditions. The performance of the tasks of the engineering support (IP) to limit the mobility of the enemy's forces and assets affects his ability to maneuver freely and is carried out with the aim of selectively depriving the enemy of the advantage of the terrain, which, in combination with his combat forces and coordinated direct and indirect fire, can deprive him of the necessary mobility and inflict losses on the attacking forces. They can also reduce the effect of the numerical superiority of the enemy conducting the offensive and direct him to areas or keep him in areas where he can be defeated [6]. When limiting the mobility of enemy forces and equipment, the following tasks of the IP are organized: installation and maintenance of engineering barriers, both explosive and non-explosive; destruction and reinforcement of obstacles of artificial and natural origin. This includes a wide range of options in the case of combining various barriers to achieve the desired effect depending on the situation. Military engineers have the main tasks of operations to restrict access (containment, blocking, changing the direction of movement, undermining): supporting the defense of their forces using systems to protect a fixed location (base camp, key infrastructure, checkpoints, etc.); restricting access to the territory by using measures to impede enemy movement, detaining it in a certain area in order to increase the effectiveness of direct fire or fire from closed firing positions; restricting (prohibiting) access to routes 3 using measures to prevent enemy movement along or through routes (roads, tunnels, bridges and other road structures). The massive attack by the Russian army did not force the Defense Forces of Ukraine to retreat. Thanks to the resistance of the Armed Forces of Ukraine and the Self-Defense Forces, the Russian
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The army suffered significant losses in manpower and equipment. During the first month of the war, the Defense Forces of Ukraine were able to repel attacks in many directions and inflict significant damage on the enemy. Thus, by destroying (blocking) bridges over rivers, it was possible to delay the enemy's advance and force him to equip crossings [5]. Blockade and movement are competitive elements in operations. Balancing mobility and mobility restriction is a constant task for personnel. When planning measures to restrict the mobility of enemy forces and assets, commanders must necessarily take into account the need for maneuver of their troops. This is especially important when planning possible tasks for the reserve. To ensure that the right balance is achieved between influencing the enemy and preserving their own mobility, tactical commanders at all levels must clearly determine: the priorities of the efforts of engineering and other forces / units when carrying out mobility restriction tasks; the directions and routes that may be necessary for the accumulation and deployment of reserves; the areas and routes that are at least necessary for a certain period for movements and replenishment of supplies. Barrier restriction zones may be established to maintain the necessary freedom of movement. The restrictions may relate to the time, location, type, and number of barriers within a designated area. Within these zones, barriers may not be established, activated, or created without the authorization of the commander in control of the area. The declaration of barrier restriction zones may introduce certain risks to the defense plan that should be carefully considered by the tactical commander. The acceptable level of risk that can be accepted will be determined by the commanders' ability to respond promptly to changing conditions in these areas, take the necessary measures, and employ appropriate systems and methods for controlling the barriers.	At the current stage, changing forms and methods of conducting armed struggle, the use of the latest means of destruction requires the search and implementation of ways to increase the survivability and security of troops and facilities. Survivability is a characteristic that characterizes the ability of units to avoid or counteract enemy influence or environmental conditions, while maintaining the ability to perform combat missions [12]. Troops (forces) must carry out measures to increase survivability within their capabilities. Survivability can be improved using various means and methods. An example would be changing the physical environment (terrain) to provide or improve cover, concealment, and camouflage by conducting engineering measures. In the course of the Russian-Ukrainian war, experience was gained in the fortification equipment (hereinafter referred to as the FO) of positions and areas of troop deployment; practical skills were acquired in the construction of military fortifications (hereinafter referred to as the VFS) in combat conditions; the professional and general levels of military personnel were increased in the application of new forms and methods of fortification equipment (FO) of the area, improving its nature and solving new tasks to ensure the protection and safety of the use of troops. The experience gained confirms that, when organizing FO, unit commanders must provide for their constant readiness to perform combat missions and continuously increase the degree of protection of personnel and special equipment of units from modern means of destruction, as well as compliance with camouflage measures [5]. Engineering support to increase the survivability and safety of troops includes all aspects of protecting personnel, weapons, and military property from the effects of enemy weapons and their detection systems, as well as engineering measures to mislead the enemy. During offensive operations, the enemy tries to inflict maximum losses on the defending troops (forces) by using powerful firepower and
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to deprive them of the ability to resist the attack. It also uses surveillance and target detection systems. Commanders must constantly take measures to reduce the level of damage to subordinate forces and assets. In order to strengthen combined arms units (subunits) to increase their survivability, intelligence units may be involved within the limits of available resources and in accordance with their combat use. Measures to reduce damage begin with the use of all available means of camouflage and shelter objects of natural and artificial origin and continue with the equipment of combat positions and the construction of defensive structures. While increasing the survivability and security of troops and facilities, the following tasks of the IP are organized: fortification equipment of positions and areas of troops; implementation of engineering measures to camouflage troops and facilities. In conditions of time constraints for the fortification equipment (FO) or when the nature of the terrain and enemy actions allow the use of earthmoving machines or explosives, engineering units, in accordance with the priority of tasks determined by the command, may be involved in the FO of areas (positions) of troops. In this case, their main tasks are: the arrangement of defensive structures at control points; participation in the preparation of firing positions for artillery, tanks, trenches and communication passages (mainly at cut-off and reserve positions), the possession of field warehouses; providing recommendations and assistance in the arrangement of the VFS; providing troops with materials for the arrangement of the VFS; providing assistance in clearing areas (sectors) of shelling; methodological and practical assistance to troops (forces) in the arrangement of fire and defensive structures and the selection of infrastructure elements for conducting combat operations and defense. General engineering support of troops involves providing troops with engineering equipment and property, other resources, and the application of engineering and technical knowledge and skills when performing the following tasks of the IP:	arrangement of field water supply points; engineering and technical support. Engineer troops are the front-line troops. They go into battle simultaneously with mechanized and tank units, and often even earlier than them. Engineer troops play an important role in fulfilling the most complex tasks of the engineering forces. Neglecting the tasks of the engineering forces always leads to unjustified losses in personnel, weapons and military equipment. The large volume of engineering forces tasks in modern combat conditions and the short deadlines for their implementation require the skillful use of engineering forces and means, involving units of all branches of the armed forces and special forces in their implementation. 3. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH Engineering support for the use of troops as one of the components of general support is carried out regardless of the type of operation (combat operations) and has a decisive influence on their successful conduct. It exists at all levels of command, in any operation (combat operations), at all stages and is coordinated by military engineers. Individual tasks of the IP for each type of operation (combat operations) have the most significant impact on their success and therefore must be performed as a priority. IP tasks are resource intensive. This can slow down the pace of combat operations of the troops if the sequence of their execution is not planned in advance. Based on the results of the study, the main changes that were implemented in the guiding documents related to the combat operations plan were analyzed. To substantiate the structure of the combat operations plan of the troops, the method of expert assessments was applied, and a number of provisions were specified, and the content of the combat operations tasks was supplemented, taking into account the experience of combat operations and HATO standards. Theoretical understanding of the role, significance and place of the IP of military operations in modern military art should find its reflection in the practical development of the opportunities that it presents for the military defense of Ukraine (liberation of occupied territories, repelling armed aggression against Ukraine).
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A further direction of scientific research may be the development of a model for the organization of the engineering support (IP), substantiation of requirements for the volume and procedure for performing engineering support (IP) tasks, theoretical and experimental research of new means of engineering weapons, and improvement of methods for calculating the effectiveness of engineering support (IP) tasks, taking into account modern experience in conducting combat operations during the Russian-Ukrainian war. <u>List of used sources</u> 1. Application of measures to reduce enemy mobility based on NATO experience / V. Kotsyuruba et al. Scientific journal "Young Scientist". 2020. No. 2 (78). P. 257-260. 2. Application of measures to increase troop mobility based on NATO experience / D. Okipnyak et al. Scientific journal "Young Scientist". 2022. No. 7 (107). Pp. 1-4. 3. Methodological recommendations to the chief of the engineering service of the border detachment on planning engineering support for combat according to NATO standards / O. Harun et al. Collection of scientific works of the Bohdan Khmelnytskyi National Academy of Military Sciences of Ukraine. Khmelnytskyi: National Academy of Military Sciences of Ukraine, No. 3(92). 2023. P. 232-244. 4. Engineering support of combat according to NATO standards: training manual / O. Neschadin et al. Lviv: HACB, 2021. 317 c. 5. Demidchik F., Dyakov S., Bryzhatiy E. Engineering support of military operations taking into account	Experience of the Russian Ukrainian War. Edition I: teaching manual. Kamianets-Podilskyi: Ivan Ohienko Kyiv National University, 2023. 182 p. 6. Combat Regulations of the Support Forces of the Armed Forces of Ukraine "Engineering Troops". Part II (battalion, company). Kyiv: Command of the Support Forces of the Armed Forces of Ukraine, 2021. 266 p. 7. Doctrine on engineering support for the use of troops. Kyiv: General Staff of the Armed Forces of Ukraine, 2020. 34 p. 8. Temporary Instruction 3 of the Engineering Support of the Armed Forces of Ukraine: Order of the General Staff of the Armed Forces of Ukraine dated 06/25/2019 No. 230. Kyiv, 2019. 151 p. 9. STANAG 2238 Allied join doctrine for military engineering 20 January 2021. NATO standardization office. URL: https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN37985-ATP_3-34.40-000-WEB-1.pdf (Date of Application: 15.12.2023). 10. STANAG 2394 Allied tactical doctrine for military engineering 3 February 2016. URL: https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN37985-ATP_3-34.40-000-WEB-1.pdf (Accessed on 12/15/2023). 11. FM 3-34.400. General engineering. Headquarters, Department of the Army Washington, DC Marine Corps Combat Development Command Quantico. 2015. Pp. 228. URL: https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN37985-ATP_3-34.40-000-WEB-1.pdf (Date of Application: 12/15/2023). 12. Temporary combat regulations of the mechanized troops of the Land Forces of the Armed Forces of Ukraine. Part 1 (brigade). Kyiv: Command of the Land Forces of the Armed Forces of Ukraine, 2021. 110 p.
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In modern conditions, engineering support of combat operations of troops (forces) should be carried out taking into account the knowledge and experience gained by the Armed Forces of Ukraine during the rebuff of the armed aggression of Russia against Ukraine, the recommended NATO practices and safety standards of the use of troops, which are summarized and fixed in the form of theoretical foundations in scientific works, regulations, and manuals. The article is devoted to the systematization of tasks of engineering support of combat operations of troops, their research and supplementation of their content, including on the basis of processing NATO doctrinal publications on engineering support and combat experience of the Defense Forces of Ukraine.

Engineering support of combat operations of troops in the context of a full-scale armed aggression of the Russian Federation against Ukraine not only has not lost its importance, but, on the contrary, has shown an urgent need for it, while changing and improving the methods of performing its tasks. The emergence on the battlefield of new effective means of armed struggle, high-precision weapons, and increased maneuverability of combat operations have expanded the

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scope of engineering support tasks and complicated the organization of their implementation during the Russian Ukrainian war. Changes in the methods of conducting operations (combat operations) and in the means of engineering equipment require the generalization and further development of the theory of engineering support and the tactics of engineering troops.

The introduction of NATO standards requires the creation of a modern model of Support Forces that will be able to reliably perform tasks to support the actions of troops in various conditions, develop the necessary capabilities, have a powerful set of troops (military units, subunits), and ensure their development and interoperability with the armed forces of NATO member countries.

These circumstances caused the need to study the transformation of the tasks of engineering support of combat operations of troops, their generalization, and systematization. Based on the research results, it is proposed to divide the tasks of engineering support into groups. The content of engineering support tasks has been supplemented taking into account NATO standards, as well as the knowledge and experience gained by the Defense Forces of Ukraine.

Keywords: engineering support, combat operations, troops, NATO standards, safety, experience of the Defense Forces of Ukraine.

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