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OPINIONS REGARDING THE WAYS OF ENSURING EFFECTIVE MAINTENANCE OF LAND FORCES MILITARY TECHNIQUE IN PEACETIME

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In the present article will deal in detail with the role of maintenance, one of the most important areas of logistics, in maintaining and restoring military machinery and equipment, which is achieved through the continuous development, in peacetime, crisis or war, of two main activities, namely maintenance and repair. Maintenance is represented in the logistics system, in large units of the ground forces, in the management structure, by the technical deputy chief of logistics, and in the execution structures, depending on the echelon, by maintenance platoon structures, SMEM or SMME, from line I to level II logistical support. The arrangement of the execution elements is done with the observance, indicative of the tactical norms regarding the surfaces and the distances, so that the missions can be fulfilled making the most of the land and the local possibilities regarding the accomplishment of some maintenance works.

Keywords: maintenance; upkeep; repair; military equipments; areas.

"You won't find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics"[1], said general Dwight D. Eisenhower, supreme commander of allied forces in Europe during the second world war and the 34th president of United States.

We started the article with this quote precisely to draw attention to the particularly important role that logistics has in winning or losing a fight, regardless of the level at which it is carried out (tactical, operational or strategic). Without all the material resources/equipment provided by logistics, you cannot take any action regardless of the degree of preparation and well-executed plans.

Moreover, maintenance, as a functional field of logistics, plays an important role in ensuring the state of operation of military equipment and technique. In this material we have detailed those aspects considered by us to be essential that need to be analyzed in order to streamline activities specific to the functional field of logistics, maintenance of military equipment and technique.

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The conceptual approach of maintenance

Starting from the definition of maintenance in the Explanatory Dictionary of the Romanian language which stipulates that maintenance represents "the totality of maintenance and repair operations of a technical system"[2], we deduce the two essential components of maintenance activity, namely: upkeep and repair, which makes us aware that maintenance is an activity that is planned and carried out continuously.

Going to the military field, maintenance is seen by specialists in the field as "the totality of principles, rules, human, material and financial resources, interdependent and forming a unitary whole, designed to carry out all actions taken to maintain and restore technical equipment to specific technical characteristics of operation"[3]. We also deduce from this approach the two main activities, namely maintenance and repair, which aim at maintaining and restoring the military technique and equipment in operation.

In the conception of the allies, maintenance means "all actions taken to keep equipment in or to restore it to specified conditions until the end of its use, including inspection, testing, servicing, modification(s), classification as to serviceability, repair, recovery, rebuilding, reclamation, salvage and cannibalization"[4].

Studying and analysing the main provisions in the field, we can say that the maintenance of military technique and equipment in the land forces has two specific objectives, namely:

• permanent maintenance and restoration of the state of operation of the technique and equipment already in the endowment of the land forces;

• implementation, for the technique and equipment introduced in the endowment, of the product management process, throughout its life in order to facilitate the development and integration of the following elements of logistic support for the acquisition and support of weapons systems:

- the requirements of technical-engineering personnel for operation / maintenance;
- training staff for operation and maintenance;
- providing a package of information, such as the product technical book, repair manual, spare parts catalogue, packaging documentation, preservation and operations required for its storage / preservation, technical data, operating parameters and operational reliability sheet;
- providing testing and diagnostic equipment;
- supply of spare parts and accessories;
- elements regarding the capitalization and scrapping of decommissioned equipment;
- ensuring a package of "feedback" information on monitoring the reliability of the product in the operation process.

The planning of maintenance works is carried out based on a maintenance program. Depending on the state of the military technique and equipment, as well as the time of the works, maintenance is: preventive, corrective, predictive, planned or postponed.

"Preventive maintenance includes a set of activities undertaken to maintain the technical systems in normal operating conditions, by periodically replacing consumables and performing periodic overhaul, adjustment, diagnosis and control, planned at regular intervals, depending on the duration of use or service"[5]. These works are mandatory, are established by the manufacturer or by experts within the structures that have the equipment in operation and are approved by the maintenance structures within the land forces.

Corrective maintenance includes a set of complex activities carried out to "restore the normal capacity of defective systems, which aim to restore the operation of defective and/or damaged equipment due to normal wear and tear or participation in military action"[6]. These include operations such as: testing/diagnosis, small, medium or large-scale repairs, checking and executing settings, etc. Depending on the size and costs, it can be performed at the place of deployment, by specialized structures subordinated to the logistics base or by economic operators.

Predictive maintenance is maintenance performed in response to a signal given by a sensor that shows a possible degradation of the material.

Planned maintenance includes predictive maintenance, preventive maintenance, as well as the activity of changing the aggregates that reach the life limit.

Postponed maintenance applies where minor defects have been detected during daily inspections that do not affect mission readiness or security of action. It is used only when there is no time, staff and resources to implement the planned maintenance.

Maintenance at the tactical level land forces structures

From our point of view, it is essential that in order to discuss the efficiency of ensuring maintenance in peacetime, we start from what it entails in time of war because we are training as we will fight. The efficiency of these types of activities is closely related to the need to ensure a state of operation of military technique and equipment during the war.

Regarding the tactical structures within the land forces that have their own logistics elements, we find/identify in the combat disposal, the logistic support line that has a different spatial development depending on the echelon and the form of combat that is adopted. In principle, the logistic support line consists of medical elements, maintenance elements and logistic support elements. In the following we approached only the issue of maintenance execution elements, part of the logistic support line and, implicitly, of the logistic system of the tactical structures within the land forces.

The maintenance support of the military equipment of the large tactical units has an essential role in the operation because it ensures the mobility of the troops and their combat capability (firepower). In this sense, we appreciate that the maintenance interventions, respectively the organization, planning and execution of the

maintenance works, contribute to obtaining the maximum efficacity/efficiency of the operations supported by the large tactical units in the battle space.

Depending on the mission received, the commander, at the proposal of the technical deputy of the head of the logistics module, requests maintenance support from the upper echelon and/or calls on the services of economic operators providing services in the area of logistics responsibility.

For the second line of logistic support, the large tactical units usually benefit from a module of execution of the logistic support, from the Logistic Base, of which it is part and a Mobile Section of Maintenance and Evacuation/SMME and sometimes also capacities of territorial maintenance.

In addition, for the large units and subordinated units, it also receives, for the first logistic support line, military equipment maintenance sections/ SMEM and, depending on the existence of their areas of responsibility, some territorial maintenance capacities, which will could work within the collection districts of their damaged equipment/ RAED.

Usually, the SMME works in a RAED, within line II of logistical support.

Planning and organizing the maintenance of military equipment at all large units and units of a large tactical unit is done depending on the quantity, complexity and technical condition and maintenance of military equipment, weather and field conditions, resource reserve, time also available to the mission entrusted to the division, in order to ensure a high level of operability of the military equipment of the large units and units. The responsibility for this lies with the commander, but the direct responsibility for the maintenance of the division lies with the head of logistics and his technical deputy, who must execute the orders of logistical support of the upper echelon and the decision of the commander.

The SMME from the Maintenance Center/ CM of the upper echelon is under the operational command/OPCOM of the Logistic Support Execution Module within the second line of logistic support and mainly executes repairs of low complexity/RC, but also repairs of medium complexity/RM for the restoration of military equipment for the continuation of the missions of large units and units. The level of combat maintenance ensures for the operational logistics a minimum technical condition of the military equipment for fulfilling the mission of the division in operation.

SMME is equipped with repair subunits (workshops) for different categories of equipment (tanks, APCs, cars, artillery tractors, etc.), namely: for armored vehicles, cars and tractors and engineering, armament, missiles, artillery equipment and communications and informatics, CBRN equipment, equipment and fuel-lubricants/ CL, fabrications and special works, a mechanic-energetic group, an evacuation platoon and a station of periodic technical maintenance and diagnostics.

On each axis of evacuation and repair of the infantry division, areas for the assembly of damaged equipment/RAEDs are organized, as a rule, in a former RAED of large unit, in which a module of SMME is carried out for the work or on the other axis. evacuation allocated by the SMME of the upper echelon.

In RAED, damaged equipment is collected and put back into operation, except for those that exceed the actual competence and possibilities (due to the large scale of the works and the excessive volume of labor required and which are handed over/taken over by the SMME of the Logistic Command Jointly organized and constituted within the third line of logistical support. The election of RAED is made according to the provisions of the regulation of maintenance of military equipment or in accordance with the provisions of the logistical support order of the infantry division.

SMME benefits from the operational logistic support provided by the large tactical unit.

For the maintenance flow in the RAED, the standard operating procedures must be followed, based on which the specialized structures in the SEM/maintenance execution structures act for the recovery/disposal of damaged military equipment and their repair.

The repair activities of SMEM and SMME are performed only on the basis of technical documentation of repairs, fabrications, reconditioning, etc. (execution drawings, technological flows of repairs, fabrications, reconditioning, etc., specific consumption norms of spare parts and materials, time norms broken down by operations, illustrated composition nomenclature, supply nomenclature, running-in norms, etc.).

RAED includes the following main elements: a number of stations for the control of contamination of military personnel and equipment; places for decontamination; places for washing and cleaning military equipment; 2-3 positions for receiving and sorting military equipment by categories/ repair skills; places for the disposal of damaged military equipment that will be handed over to the upper echelons, of those that will be repaired in RAED, as well as of the repaired ones that will be handed over to the delegates of the large units and units; places of disposition and execution of works for repair shops (armored vehicles, automobiles, tractors and engineering machinery; weapons, missiles, artillery equipment and communications and computer equipment; CBRN equipment, equipment and CL; manufacturing and special works), for the mechanical-energetic group; for the periodic technical maintenance and diagnostic station, as well as for the evacuation company; itineraries for road tests; places to store spare parts and materials, ammunition and C-L; space for staff rest in RAED; command point; means of transmission; power supply station; household point; disposal places for means of evacuation and transport; access roads; shelters; firing trenches; masking works; sentry posts and patrol routes.

Studying and analyzing maintenance within the war logistic support line we can identify certain aspects that can be improved since peacetime in order to streamline this field of logistics. We cannot ignore the reality of the modern battle space and the need to provide logistical support for operations when discussing peacetime maintenance.

Efficiency in ensuring peacetime maintenance

Since peacetime, maintenance specific activities must be planned and executed in a unitary way and within certain limits so that the transition from a state of peace to a state of war does not involve many changes in the procedures that will be put in place.

As the analysis shows, as a field of operational logistics, maintenance directly contributes to maintaining and restoring the combat capacity of large units and units playing an important role in the success of operations and obviously fulfilling the missions received.

Currently, specific procedures for peacekeeping, crisis and war are being regulated by updating instructions, regulations and manuals, which are developed based on the logistical doctrine of the Romanian Army and in close accordance with the logistical doctrine of the Land Forces of NATO, in the new concept of restructuring the maintenance system in the Romanian Army.

It is clear that the maintenance of land forces must be organized in such a way as to be able to support the requirements of the forces at strategic, operational and tactical level, as well as in the event of an asymmetric military conflict, taking place in all environments.

Thus, we believe that it is necessary for all maintenance activities to go through a program that has clear objectives and benefits from adequate financial funds.

In our opinion, the achievement of the objectives of the maintenance system of the technique is influenced by the following three groups of quality indicators, as follows:

- indicators regarding the initial general quality of the technical systems, which include the characteristics of performance, reliability, maintainability and availability;
- durability indicators in use, which define the service life of the systems and components and optimal rational strategies for renewing the technical fleet;
- indicators that reflect the efficiency of the application of the maintenance system in the process of using the technique, availability, repair intensity, average repair time, etc.

Studying and analyzing the specific literature, but also the main regulations in force, we can say that in order to implement a viable and effective maintenance system, it is necessary to achieve the following main aspects in the land forces:

- modular and flexible maintenance structures that perform on time and in full volume maintenance works;
- ensuring, at the level provided by the manufacturers of military equipment, the operational reliability based on the experimental one in the conditions of a rational consumption of materials and labor;
- the correct determination of the maintenance support (qualified personnel, means of work, technical infrastructure, documentation and materials for maintenance) in order to guarantee the performance of the necessary works and operations in a minimum time and at a high quality;

• the design of the technological process for the maintenance works, so that the maximum accessibility of the tools, devices, verifiers and of the documentation elaborated in this respect can be ensured;

• ensuring the flexibility of the methods of organizing the maintenance works depending on the conditions of use, construction, quality and reliability of the technique.

The concept of reorganizing the maintenance system in the structures of the land forces creates the legal framework for the achievement of a viable and effective system, leading to the fulfillment of the main objectives of maintenance, such as:

• decrease in the number of failures due to improper use of the technique;

• ensuring the quality of maintenance and repairs;

• increasing the availability, by respecting the immobilization times in repairs and even reducing them. In combat space this goal means maximizing the number of repairs per unit time to increase the number of vehicles that can participate in combat;

• maintaining a high coefficient of technical condition and efficiency;

• ensuring the safety of work during the execution of maintenance, evacuation and repair activities;

• maintaining an optimal ratio between the fall rate and maintenance costs (reliability criterion - costs);

• environmental protection, by creating the optimal conditions for carrying out maintenance operations (collection of used oils and greases, classification of noxious substances and noise levels within the allowed limits, etc.).

In order to achieve the objectives, within the limits imposed by the maintenance support, a unitary and efficient strategy must be promoted throughout the life of the product, which should be the basis for formulating and implementing the decisions of the maintenance system management through planning, organization, command, coordination and control.

Taking into account all these aspects, we consider realistic the opinion of those who claim that highlighting the measured diagnostic parameters and maintenance costs based on mileage/hours of operation, the number of shots fired (for combat vehicles) can contribute to: increasing the quality of the act management in the field of maintenance by making the best decisions, aiming at decreasing maintenance costs and increasing the availability of equipment through proper use and quality maintenance.

From our point of view, all peacetime maintenance activities should be planned and carried out in the same way as in war situations. We consider it appropriate that the techniques, tactics and procedures issued to be applied in time of war be implemented in peacetime so that both training and maintenance specific activities are carried out in accordance with them, and, in this regard, a higher level of training and, at the same time, a maximum level of operability. As mentioned above, the transition from a state of peace to a state of war should not involve many changes, but only those that result from the analysis of the situation and the particularities of the operation in which the units and large tactical units of the land forces participate.

Conclusions

Therefore, in conclusion, we can say that maintenance is an integrated activity in logistics, throughout the life cycle of a product, and refers mainly to the following services to be provided by the supplier: complex level maintenance, supply of spare parts and accessories, delivery of maintenance documentation, updating it and the list of spare parts, training of military personnel through courses of operation and maintenance or provision of means necessary for its preparation, software update, and implementation of changes and upgrades.

We support the idea that maintenance becomes a power factor, a force multiplier if all specific operations are performed in time and quality, especially those of restoring the defective, jammed or damaged products in various situations in peacetime.

In order to adequately meet the fundamental objectives of the maintenance system, we believe that a unitary and efficient strategy must be promoted throughout the operation, which should underpin the management of the system, through its command, regulation and control functions. In our opinion, the following steps should be taken to develop the strategy of maintenance activities: setting the objectives of the maintenance system, collecting and storing information on equipment reliability by monitoring defects and highlighting systematic defects that involve a large volume

of work and materials for repair, processing and analysis of information and assessment of its veracity.

We also consider that the improvement of the maintenance management process can be achieved through the following measures:

- the standardized documents for the maintenance management to be included in a unitary instruction and to be used in the logistic automated information system;
- the management and execution activities to be based on procedures and standards in accordance with those of NATO, but which should take into account the particularities of the technique in the endowment of the land forces;
- the optimization programs based on mathematical modeling to be elaborated by the competent bodies and to be distributed to the operative units and structures.

Last but not least, we believe that an integrative treatment of all activities related to ensuring a high technical condition of the equipment is necessary, for the economic and functional design of the component assemblies, as well as for the most rational financing of all activities in order to maintain them perfectly.

NOTES:

1 *Logistics quotes, Collection of logistics quotes from CEOs, military leaders and logistic experts,* 27.09.2018, http://www.everythingsuppulychain.com/logistics-quotes, accessed on 03.06.2020.

2 http://www.dexonline.ro, accessed on 03.06.2020

3 *** *M 36/2008, Regulamentul logisticii operațiilor întrunite*, Monitorul Oficial, Part I, no. 353, from 07.05.2008.

4 *** *AJP 4 Allied Joint Doctrine for Logistics*, Edition B, Version 1, December 2018, p. Lexicon-5.

5 *** *M 36/2008, Regulamentul logisticii operațiilor întrunite*, Monitorul Oficial, Part I, no. 353, from 07.05.2008.

6 *Ibidem.*

REFERENCES

*** *Doctrina logisticii întrunite a Armatei României*, Bucharest, 2018.

*** *AJP 4 Allied Joint Doctrine for Logistics*, Edition B, Version 1, December 2018.

*** *M 36/2008, Regulamentul logisticii operațiilor întrunite*, Monitorul Oficial, Part I, no. 353, from 07.05.2008.

*** *Logistics quotes, Collection of logistics quotes from CEOs, military leaders and logistic experts,* 27.09.2018, http://www.everythingsuppulychain.com/logistics-quotes

Andronic Benone, Minculete Gheorghe, *Abordări relaționale ale sprijinului logistic al diviziei de infanterie în operația de apărare pe litoral*, "Carol I" National Defence University Publishing House, Bucharest, 2019.

Bălan Carmen, *Logistica*, IIIrd Edition, Uranus Publishing House, Bucharest, 2006.

Minculete Gheorghe, *Abordări moderne ale managementului logistic*, "Carol I" National Defence University Publishing House, Bucharest, 2015.

http://www.dexonline.ro