

CAMOUFLAGE, CONTENT OF RESOURCE PROTECTION, FOLLOWING EXPERIENCES FROM UKRAINE’S ARMED CONFLICT

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Abstract: Resource camouflage is one task that needs to be continuously planned and fulfilled. It is obtained in order to lower own losses, protection of secrecy of the combat forces deployment, hiding activities, real intentions, actions and other planned activities of Army’s units, in order to lower the effect of enemies actions and increasing of own forces protection capabilities.

Camouflage tasks are obtained by applying different means and technics, as well as technologies. Development of modern accomplishments in diverse science branches has found its application in forces protection. Positive – negative experiences from combat operations across the world during closer history considerably can be used as source of knowledge. Aside of current camouflage patterns on scene there are different materials enriched with new types of paints and coatings which reduce reflection during reconnaissance by technical appliances. With goal to diverse to false conclusions, new technically-technology solutions are applied by which the armored vehicles are camouflaged. The achieved effect is reflected in a completely different image on the screen of the means of observation in relation to what is being observed. At the same time with the development and application of new solutions, the analysis of the omissions in camouflaging is carried out, which leads to new knowledge, in the conditions of the application of new technical achievements in various combat utilities and systems. Application of new technical achievements imposed new tactical solutions that undoubtedly require new ways of applying camouflage measures.

Key words: camouflage, resource protection, models, drones

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1. CAMOUFLAGE IN GENERAL

Planning and conducting various combat actions, in modern environment, can't be imagined without taking necessary force protection measures. Force protection, as part of content (influential) combat operations factor, "implicit preserving the combat potential of deployed forces in the combat zone, fighting against all enemy threats, natural and technological disasters and preventing actions" (Serbian Army's Doctrine, 2010). A part of force protection is camouflaging (Serbian Army's Doctrine, 2010). Because of that "it represents an integral and essential part of any operation" (Serbian Army's Operations Doctrine, 2012).

In general, about camouflaging has been written in textbooks (Rkman, 1988.; Saicic, 1971) in Serbian Army. This is an important topic for other countries as well, what the literature is about (Forbes, 2009; Abler, 1999). Besides textbooks on topics of force protection through camouflage, vast number of papers have been published. Milic A. And others (2019) emphasize the necessity of constant monitoring of the level of development of reconnaissance techniques in order to timely harmonize camouflage measures with increasing the level of force protection (Milic, et al., 2019). Ravindran, A., Premkumar, A. (2014), present possibilities of active camouflage or adaptive camouflage that represents type of camouflage which adapts, often quickly, to the environment of the object (Ravindran & Premkumar, 2014). Qiao et al. (2021), present the results of research in the application of biomimetic adaptive materials that change color in stealth technology with the aim of developing a new generation of camouflage coatings for discoloration (Qiao et al., 2021). Ying et al. (2023) present application of infrared camouflage textile material that is soft and movable, which is the ultimate embodiment of infrared camouflage technology for individual soldiers (Ying et al., 2023).

Elias (2015) question of camouflage posts on high debate level of conducting physical, artistic and social camouflage not only in the battlefield but in a society as a whole (Elias, 2015). A., W., Houlbrook (1999), in his paper presents certain considerations about the need to develop capabilities, based on the development of technical means for image processing, in order to detect masked objects and assets in different terrain and environments (Houlbrook, 1999).

2. THE MATTER OF CAMOUFLAGE IN CONTEMPORARY CONDITIONS

Combat operations around the world in past decades point out all destructiveness of human creativity. The application of all technologies was not absent in situations where it is necessary to destroy human life or human assets. Modern technologies (and one of segments was presented in optoelectronic reconnaissance devices) affected the needs of developing camouflage assets focused on specific techniques and technologies. Movement represents greatest danger for camouflaged personnel and assets. To this end, a step beyond was taken and innovative performances were undertaken, presented through the development of modern technological and electronic means for deception during the movement of military equipment. The best example was given by British multinational company by the name of „British Aerospace – BAE“ (British air force). In 2011, at an exhibition in London, she presented her project in which she developed adaptive camouflage for combat vehicles that reduces the thermal signature and makes them invisible to infrared night vision devices. The technology "Adaptive" (<https://newatlas.com/adaptiv-ir-invisibility-cloak/19748/> accessed 17.07.2023. at 23:30) consists of hexagonal metal panels that are individually heated or cooled, allowing operators to completely blend in with their surroundings and imitate natural objects or other vehicles such as harmless cars. The company announced plans to use "Adaptive" for air and maritime vehicles. If succeeded, this camouflage technology will revolutionize the art of war with new tactics and infiltration operations behind enemy lines. Although "BAE" has taken the lead, it is not the only company focused on development of adaptive camouflaging systems.

Izrael also experiments with “OIRAP” system for protection of invisible armor developed by the “ELTECH” (The red fox). Military research and development centers in USA and “DARPS” agency also work on similar projects (<https://www.youtube.com/watch?v=QKfVYVuxiQ8> accessed 17.07.2023. at 21:10).

The matter of camouflage can be interpreted from different aspects. This is also shown by looking at the degree of masking of the vehicle by removing the shadow created by the vehicle during movement (Yangpinget al., 2017). The degree of achieved camouflage and its influence in conducting war is always under close observation (Pomerleau, 2017) and assumptions are given of application of modern technical innovations in battlefield (Rayment, 2011). Current camouflage possibilities by standard issued assets are continuously analyzed with the tendency of their improvement (Michalis et al., 2017), and performs an analysis of the capabilities of existing assets in relation to the impact of the environment and technical assets (Fennell, et al., 2018; Lin et al., 2019; Talas et al., 2018; Ershadi et al., 2018).

The available published content indicates that the issue of camouflaging is approached very studiously and constant analyzes are carried out with the tendency of constant development and application of various means and techniques. The last examples indicate that in the recon tasks mini and micro drones are used that are equipped with high sensitive optoelectronic add-ons for collecting information from environment.

3. EXPERIENCES ON CAMOUFLAGE TASKS DURING COMBAT OPERATIONS IN UKRAINE

Special military operation in Ukraine and its consequences gave entirely new dimension in matters of camouflaging units. When one tries to look at the reality, one encounters a great wall of silence due to the strong blocking of sources on the Russian side. It is precisely for this reason that it is necessary to look critically at the presented contents that are available.

From analyzing of available materials (footages, videos and printed materials) conclusion can be made that there have been many failures in conducting camouflage precaution measures. One of the reasons relies on a fact that some of the senior staff disobeyed basic tactical principles.

Regardless on existence of forest terrain and constant pointing out on possibilities for camouflaging units in a way to enter the woods and park under the trees, the results show the opposite. It is forgotten to avoid grouping of assets. It is forgotten that we are in 21-st century, the era when reconnaissance is conducted by unmanned aerial vehicles - drones and from a height of several tens to several hundred meters. Recorded material is transferred in real time to the required addresses. Therefore, large number of destroyed techniques is not surprising (Figure 1).



Figure 1. Destroyed armored combat vehicles on a bank of Siverski Donec river 12.05.2022.
Source: Ukrainian Airborne Forces Command/Reuters, <https://www.voanews.com/a/russia-takes-losses-in-failed-river-crossing-officials-say-/6570694.html>

Forced water obstacle crossing is combat operation that is conducted in extreme need. In case it is necessary to implement this activity, it is necessary to ensure a strong anti-aircraft defense system or air superiority. If the mentioned items have been complied with, the planned activity can be started. What is forgotten in modern conditions is the necessity of applying camouflage discipline, which also relies on respecting the plan of crossing the water obstacle. The consequences of not complying with the above are catastrophic. With disrespect of camouflage measures comes the reveal of point of crossing over water obstacle. In this situation it is not important if the water obstacle crossing is forced or not. An additional aggravating circumstance that led to huge losses is failure to follow the plan for crossing the water obstacle. Due to the unplanned bringing of units to the boarding ramp and crossing area, there was a larger number of units and assets than planned. Again, thanks to acquired information in real time, a strike was made from a distance and the effects are visible in Figure 2.



Figure 2. Destroyed pontoon bridge on bank of Siverski Donec river 12.05.2022.
Source: Ukrainian Presidential Press Office via AP, <https://www.timesofisrael.com/ukraine-inflicts-huge-losses-on-russians-during-failed-river-crossing-officials-say/>

Organized units movement during combat operations always represents high risk activity. Precisely because of all the experiences during combat actions, it is necessary to approach the organization of this activity extremely seriously. Failure to take all necessary measures of camouflage discipline leads to results that are represented by the consequences on Figure 3.

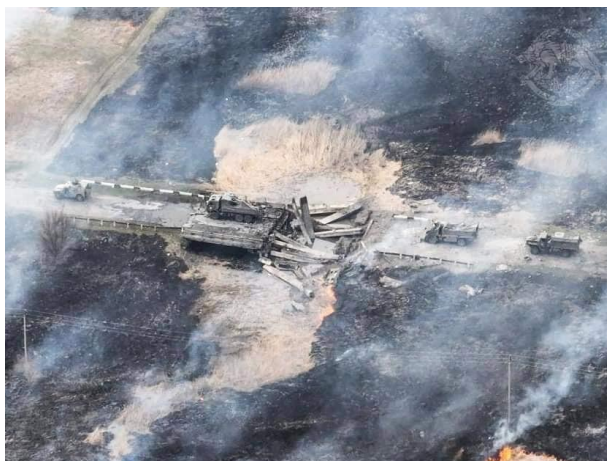


Figure 3. Destruction of assets in line

Source: Ukraine Military Claims It Blew Up A Bridge Destroying Russian Convoy, Amit Chaturvedi, 14.04.2022., <https://www.ndtv.com/world-news/ukraine-military-claims-it-blew-up-a-bridge-destroying-russian-convoy-2888420>

It is pointless to talk about the consequences. The photo clearly shows that there was no camouflage of the vehicles, no account was taken of the distance between the vehicles, the movement was organized without prior planning of potential hiding places to protect the vehicles. Experience from combat operations dictates that movement in the operation zone must be carried out in conditions of low visibility, in jumps or adjusted to terrain conditions in order to create masking conditions. An additional example of not learning about possible consequences from examples is also shown in the Figure 4.



Figure 4. Failure to comply with prescribed measures of camouflage discipline and consequences

Source: Specialist Ukrainian drone unit picks off invading Russian forces as they sleep <https://www.thetimes.co.uk/article/specialist-drone-unit-picks-off-invading-forces-as-they-sleep-zlx3dj7bb>

The layout of the marching column was copied from school textbooks. It is the non-observance of the measures that leads to the situation that the stop is made in an open area, without removing the vehicles from the road and masking them. Therefore accomplished success of the opponent and suffered casualties (in manpower and material goods) is no surprise.

It is to be expected that more attention is paid to the issue of camouflage during the possession of firing positions. Especially when it is known that there are artillery or artillery-rocketry

units. The positions of the mentioned units, due to their sensitivity to the action of aviation or artillery (through contrabattling), must be very well protected and camouflaged in order to make it difficult to spot them. The required works were not complied with, as evidenced by Figure 5.



Figure 5. Artillery positions established in Talakivka, north of Mariupol, Ukraine,
Source: Satellite image ©2022 Maxar Technologies. <https://www.businessinsider.com/how-russia-is-waging-its-war-with-artillery-in-ukraine-2022-7>

The material just presented indicates all the recklessness and audacity of those who should take care of entrusted human lives and technology.

If an attempt were made to find "some justification" through the size of the position and the extent of camouflaging works, the question arises as to what happens to smaller positions that do not require extensive camouflage works. We come to a devastating fact that no one bothers with this issue. Pictures available on the internet show that demand in camouflage is not even considered (Figure 6).

It imposes question if the participants of combat operations are aware of danger that carries the fact that the units' positions in the 21st century MUST be camouflaged with outmost care and dedication. Any revealing sign can lead to diminish large number of personnel (entire unit).



Figure 6. Fortified positions of infantry units

Source: Russian forces in Crimea brace for possible Ukraine counteroffensive;
<https://www.pbs.org/newshour/world/russian-forces-in-crimea-brace-for-possible-ukraine-counteroffensive>; 11.04.2023.

That attention must be paid to the issue of masking military interesting objects during their construction is a hard to understand fact. Especially for those who haven't faced the terrible of war. In recent decades, there is no mention of reconnaissance by satellite. The attention is focused on unmanned aerial vehicles and drones. However, it is not always so simple to ignore. The fact is that military interesting objects are often indepth of countries territory, so satellites are used for reconnaissance of such areas. Therefore, it is not surprising that images of objects that represent very interesting targets have emerged. Military industry facilities that "should" be highly secured (Figure 7).



Figure 7. Works on the construction of a facility for portable rocket launchers

Source: Hans Kristensen <https://fas.org/blogs/security/2021/02/plarf-jilantai-expansion/>

Modernity is very useful. However, of its dangers are only to be heard. It is precisely the desire to organize life more easily and enjoy the benefits offered by the modern world, which is often identified with the use of mobile phones or global positioning systems, that can be a great danger. Those appliances leave digital fingerprint or location where they have been or if they are on the move. Such data can reveal informations that can be used usefully.

It is a common craze to use mobile phones during running (to maintain fitness) to listen to music, monitor certain health parameters. Noone is asking what is happening with collected data and where are they sent. Precisely such data helped to locate and draw area of a base camp of a unit stationed outside of its own country (Figure 8).



Figure – 8. The footprint of the mobile phone's movement in space

Source: Fitness app Strava lights up staff at military bases, 29.01.2018.
<https://www.bbc.com/news/technology-42853072>

Clearly the traces are marked to where some phones were moving and picture for itself points that it is some sort of camp which includes runways and appropriate facilities. Also, conclusion can be made of boundaries of the camp, because it is not logical that no cell phone has moved outside the outlined circle.

This example that demonstrates “the danger” of applied GPS devices that are installed in vehicles lately for safe tracking are best shown in Figure 9.



Figure 9. Reading the vehicle's marching route during reconnaissance
Source: Fitness app Strava lights up staff at military bases, 29.01.2018.
<https://www.bbc.com/news/technology-42853072>

In the picture, you can clearly recognize the march route that the vehicle took during the reconnaissance of a certain area. The trace of movement is what shows the routine and therefore enables planning of actions over units that move on that track. Therefore it cannot come as a surprise the frequency of applying various explosive devices on certain parts or traces of roads.

4. CONCLUSION

Camouflage, as part of force protection, proves its importance every day. It is impossible to divide matters of camouflage to the times of peace and times of war. Data are being collected constantly, so therefore it is necessary to constantly apply measures of camouflage discipline. Besides applying camouflage measures it is necessary to constantly monitor development of reconnaissance appliances and their capabilities. It is the only way for creating the possibilities for adequate solutions on how to protect one's resources.

Development of paints, coatings, materials and technologies indicate that it is necessary for the man to change. To begin with, it is necessary for the members of the army to wake up and understand the limits of human irresponsibility and stupidity. By comprehending the reality conditions are made for lowering casualties.

As a possible solution, the possibility of using models to mislead the enemy arises. The next possibility is to consciously change certain tactical principles and clichés of behavior (that the assets are parked in the meadow in a line). Changing principles of units' engagement is conditional to contemporary reconnaissance assets and long range operations.

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