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SOME NON-LETHAL WEAPONS IN MILITARY OPERATIONS OTHER THAN WAR

Az elmúlt évtizedben a katonai műveletek témakörében megjelent írások zöme a nem háborús katonai műveletekkel foglalkozott. Ezekben a műveletekben a hagyományos fegyverek mellett jelentős szerepet kapnak a nem halálos fegyverek. A cikk a nem halálos fegyverek NATO meghatározásával, alkalmazási területeivel és speciális körülményeivel. A szerző betekintést ad a nem halálos fegyverek legújabb fejlesztéseibe.

Abstract: In the last decade reports about military operations significantly dealt with those operations which belong to a specific field of military operations; namely the Military Operations Other Than War (MOOTW). Nowadays the non-lethal weapons have become an essential tool for these operations. Non-lethal weapons – beside the conventional, lethal weapons – provide alternative possibility for commanders and soldiers in these operations. This paper presents the definition used by NATO, the application fields, the special environments of non-lethal weapons. Via introduction of certain non-lethal weapons the reader can get an insight into the newest production of these weapons.

Non-lethal weapons and their environment

Today we find ourselves in an extremely complex international security environment. The threat of terrorism, in particular, compels NATO nations to alter their traditional military methods of action. It forces them to consider a wide range of alternative technologies, and tactics, to safeguard their security.

Specifically, the forces of NATO nations are increasingly called upon to operate in urban environments, and to combat insurgents and terrorists who use human shields, violate the laws of war by dressing as civilians, and who hope to promote collateral damage. In confronting this problem, questions of discrimination and proportionality feature prominently in military planning. Nowadays the non-lethal weapons have become an essential tool for modern militaries. For example, the

ability to have the necessary effect upon a terrorist or an insurgent, without harming the innocent civilians in whose midst they frequently hide, is a crucial capability. The ability to take action with minimal risk to friendly forces or intelligence assets who might be operating crucial that key terrorists be captured; this sometimes difficult when only lethal options are at hand.

Having non-lethal weapons greatly expands the range of options available to the military commanders and their forces. It makes them more flexible and responsive. Above all, it denies that which the terrorist desires most – the infliction of further harm and suffering upon innocent civilians.

On the other hand, nowadays the military operations get wide publicity due to the rapid growth of the role of the accelerated telecommunication and mass media. The news and reports relating to combat missions and military operations have become part of everyday life. There is a considerable social and political sensitivity all over the world in connection with military operations. Recently more and more social, political, diplomatic, and economic demands have been formulated which require that military operations minimize the casualties particularly in respect to civilians, non-combatant persons, civilian objects and environment.

In the last decade the reports about military operations significantly dealt with those operations which belong to military operations other than war (e.g. peace support operation, humanitarian assistance, operations against terrorism). Although these operations are not recent; nevertheless it can be revealed that their frequency increased and their nature changed in the last two, three decades.

After the Cold War the participation in peacekeeping operations has become the most important task for European Defence Forces. According to military and political experts beyond the general tasks of collective defence the preservation of peace, handling of crises and prevention of wars and conflicts will be the tasks of NATO forces in the future. One of the essential feature of military operations other than war is that the military missions are generally performed close to numerous civilians and often together with civilian organizations. This feature raises an essential question, namely the question of application of armed forces.

The application of armed forces in military operation other than war is always a sensitive issue and it gives great responsibility for commanders and soldiers alike. It is well-known that the unjustified, maybe exaggerated or unlimited application of armed forces can lead to unpredictable consequences regarding both the authenticity of military force and the success of mission.

A basic problem then and there comes up when the soldiers beyond their conventional — so-called lethal — weapons do not have any other weapons, which can be used efficiently and are able to provide the success of the mission without the risk of exaggerated using of armed forces. In the last decade — mainly based on experience gained in peace support operations — in military circles it has been recognized that there is an „intermediate” possibility in the hands of commanders between the compelling without using armed forces and using lethal weapons that in certain case can be applied with success to achieve the aims. These are the so-called non-lethal weapons.

Non-lethal weapons — beside the conventional, lethal weapons — provide alternative possibility for commanders and soldiers in military operations when the forces have to:

- accomplish military missions and tasks in situation and conditions where the use of lethal force, although not prohibited, may not be necessary or desired;
- discourage, delay, prevent or respond to hostile activities;
- limit or control escalation;
- improve force protection;
- repel or temporarily incapacitate personnel;
- disable equipment or facilities;
- help decrease the post-conflict costs of reconstruction

Non-lethal weapons, which not only supplement but also extend the diplomatic and military options, have important role in such cases when the avoidance of casualties is of particular importance but at the same time the „hard” behaviour is necessary.

Briefly, the roles and importances of non-lethal weapons there and then come to the limelight when using of conventional, lethal weapons is not possible, not justified, not practical or/and their possible usage would be exaggerated or would result in unpredictable consequences.

NATO SAS-040 Working Group summarised the application fields of non-lethal weapons in its Technical Report made for NATO political and military leaders. These are as follows:

- crowd control/channelling;
- separating groups of individuals;
- rescuing of individuals/groups;
- removing individuals from crowd;
- marking individuals and groups in a crowd;
- dispersion of a crowd;
- denying persons from accessing an area;
- denying ground, air and sea vehicles from accessing an area;
- protection of individuals/groups;
- neutralisation of individuals and groups;
- neutralisation of ground, air, airspace, sea, underwater vehicles;
- neutralisation of infrastructure and facilities;
- protection of facilities and equipment;
- neutralisation of weapons and military equipment,
- clearing a facility;
- neutralisation communications.

The literatures regarding the definition of non-lethal weapons are not unified. There are many versions which either are too simplified or too complicated in many cases they are unmanageable or inaccurate.

According to NATO policy the Non-Lethal Weapons are those equipment, material and procedures which are explicitly designed, developed and applied to incapacitate or neutralize personnel, technical equipment and infrastructure facilities and to limit their application possibilities. The Non-Lethal Weapons — except in some extreme cases — cause low probability of fatality or permanent injury and minimal undesired collateral damage or impact on the equipment and the environment.

As it can be seen in the definition the non-lethal weapons shall not be required to have zero probability of causing fatalities or permanent injuries. However, while complete avoidance of these effects is not guaranteed or expected, non-lethal weapons should significantly reduce such effects when compared with the employment of conventional, lethal weapons under same circumstances.

The limitation of this article is not able to introduce all relevant non-lethal weapons being used in military operations other than war. For this reason, only some of them are going to be introduced. These weapons or ongoing research programmes have already gone beyond non-lethal weapons of low technological level, which are widely spread today e.g. batons, non-lethal rounds, sponge grenade, tear gas and so on.

X-net Vehicle Arresting Device

There is both a military and police need to stop vehicles in a non-lethal manner in a variety of scenarios – whether joyriders, serious criminals or the worst case scenario of a terrorist explosive delivery platform.



Fig. 1. X-net

Stopping these vehicles has always presented a serious challenge. Only limited options have been available to date:

- Puncture tyres? — The problem is that the vehicle can still proceed slowly. Conventional vehicle arresting devices rely on puncturing tyres, which however allow the vehicle to continue for some considerable time and distance – occasionally out of control. It can be dangerous if terrorists have placed explosives in the vehicle.
- Entrap full vehicle? — Heavy hardware and time required
- Open fire? — Last resort and unacceptable in nearly all cases

And there are no any other ideal solutions. Or maybe there is one after all? The X-net, developed by British QinetiQ Co., is the only non-lethal vehicle arresting solution available today, which is able to bring the vehicle to a complete standstill, under control, independently of standard or flat run tyres.

The X-net system, which looks like a carpet (Fig.1.), can fully arrest a range of vehicles using a unique spiked net design. The system is man portable, can be deployed in a matter of seconds and causes minimal damage to target vehicles. X-net is manufactured from polyethylene

fibre ‘Dyneema’ netting which is both lightweight and extremely strong. Unique barbed spikes in the leading edge of the net pierce the front tyres, the net then envelops the front tyres and is pulled tight under the vehicle to stop the wheels and bring the vehicle to a stop (Fig.2.). The spikes are made of high carbon steel.

X-net can arrest a vehicle within a similar distance to an emergency stop (Table 1).

Vehicle	Weight (kg)	Speed (km/h)	Distance (m)
Mazda 323	1090	55	15
Renault 19	1130	80	53
Rover 820i	1450	80	57
Ford Transit (RWD)	1590	64	56
GM HMMWV	2454	48	37
Reynolds Boughton RB44	3000	56	32

Table 1. X-net arresting capability

Aircraft Arresting Barriers

Not a lot of people know that there are much more stronger nets that have already been employed. Here is for example the UOTILA-24 Barrier Net installed at an Airport in Finland.

X-net has been successfully used by military and police forces in service worldwide. The retardation force is less than 1G, which provides a low risk to occupants. The system also provides that a larger vehicle can be arrested up to even a 4 tonne truck. Due to the ability to set up and deploy easy and rapidly X-net can be very effective in:

- setting up a mobile checkpoints to control vehicle flow – specifically for peacekeeping operations and states of high terrorist alert;
- cordoning off areas or roadways to stop vehicles entering or leaving defined locations;
- pursuit management – where specific vehicles can be targeted for arrest;
- building/areas/asset protection.

The use of this system is highly limited by the weight and the speed of the vehicle.



Fig. 2. X-net during operation

The width of net is over 60 meters and the weight is about 500 kilograms. It is constructed of 24 structurally independent nets, having a vertical tape located each 2.4 meters. When each individual net is shifted 0.1 meters horizontally from its neighbouring net, the result looks like a net having vertical tapes at each 0.1 meter intervals. The reason for this arrangement is to provide a smooth and even grip on the aircraft wing, which is the strongest part of the aircraft. Namely, when entering the net, the nose of the aircraft slips through the vertical tapes and the arresting forces of the net act on the wings only. The theoretical breaking strength of the system is 480 tons. After 5 years of outdoors service this system was capable of capturing safely a Russian MiG-29 aircraft. The UOTILA-24 has been added with the braking units of 30 MJ capacity plus other necessary apparatus to make a complete portable Aircraft Arresting System UOTILA-30. The MiG-29 made an unsuccessful landing attempt during an airshow at Kuopio Airport in August 1989 (Fig.3.). The plane did not suffer any damages and it flew next day back to Russia.



Fig. 3. UOTILA-24 Barrier Net installed at Kuopio Airport in Finland

The whole system is built into a truck container. The system requires concrete anchoring to ground plus apparatus for mast support, brake unit force anchors to ground and such. The textile brake units for this use have progressive forces for smoother deceleration of smaller aircraft/lower entry speed. After a certain braking distance the braking force increases to facilitate also arrests of larger aircraft/higher entry speed safely within the specified arresting distance.

Long Range Acoustic Device

Nowadays, in the United States of America many, non-lethal acoustic programs are going on. The basic aim of these programs is to provide an effective, rheostatic crowd control and/or area denial capability. Options include a crew-served or vehicle mounted weapons as well.

The acoustic weapons which are very promising technologies could repel or distract an enemy or a crowd. Some of these can cause physical discomfort or nausea by making parts of the body vibrate.

For the maximum effectiveness the acoustic weapons could be mounted on helicopters, military vehicles, armoured personnel carriers and UAV/UGVs. U.S. soldiers in Iraq had new gear for dispersing hostile crowds warding off potential enemy combatants. The gear blasts earsplitting noise in a directed beam. The equipment, called Long Range Acoustic Device – LRAD (Fig.4.), developed after the 2000 attack on the USS Cole off Yemen as a way to keep operators of small boats from approaching U.S. warships. The devices have been used on some U.S. ships since 2003.

The device is also used by American troops in Fallujah and other areas of central Iraq where they in particular often deal with crowds in which lethal enemies mixed with non-hostile civilians.

The 20 kg dish-shaped device belongs to the arsenal of non-lethal technologies. If crowds or potential enemies do not respond to the verbal messages, the sonic weapon, which measures 84 centimeters in diameter, can direct a high-pitched, piercing tone with a tight beam. Neither the LRAD's operator nor others in the immediate area are affected. The loudness of the device is about 150 dB and its effective range is within 90 meters (100 yards).

The device operates in the frequency range of about 2100 to 3100 Hz, and it is recommended for a maximum range of 275 meters. According to the experts sound that loud and of that high a frequency could be dangerous if someone were exposed to the sound for lengthy periods, since the longer the duration, the more serious it is. The device was also used by military police in New Orleans after Hurricane Katrina in September, 2005.

Vehicle Mounted Active Denial System

In 2001 Pentagon unveiled what is supposed to be the perfect non-lethal crowd control device a high-powered beam that can disperse any unruly mob without killing, maiming or harming anyone. The device (Fig.5.) is officially known as a Vehicle Mounted Active Denial System (VM-ADS). This new directed energy non-lethal weapon is said to be more

humane and more effective than the other methods of controlling a large crowd or stopping aggressive intruders.



Fig.4. Long Range Acoustic Device (LRAD)

The system produces millimeter waves at a frequency of 95 GHz and uses an antenna to direct a focused, invisible beam toward the designated subject. The special transmitter fires two-second bursts of focused energy that causes burning sensation on the skin of people up to 650 meters away. But no one gets fried and no burn marks remain on the body because the beam only penetrates just under the skin's surface at a depth of 0.4 mm where the pain-sensing nerves are located. The beam induces an intolerable heating sensation within seconds on an adversary's skin, repelling the individual without causing

injury. The targets experience intense pain and confusion, forcing them to leave the area.

According to the officials, there are no lasting effects and the beam does not cause injury because of the shallow penetration depth of energy at this wavelength and if the targeted individual walks out of the beam, the pain goes away. This electromagnetic weapon looks like a satellite dish mounted on top of an armoured vehicle.

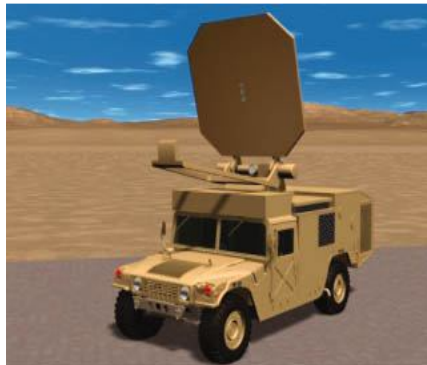


Fig.5. Vehicle Mounted Active Denial System

This capability enables forces to stop, deter and turn back an advancing adversary without applying lethal force.

This technology can be used for protection of forces, peacekeeping, humanitarian missions and other situation in which the use of lethal force is undesirable. Field testing of the system started in May 2004 and

the Pentagon deployed it to Iraq to provide perimeter protection around the “Green Zone”. I must mention that in despite of assurances, there are some unresolved questions about the safety of microwave weapons. For instance, what happens, if somebody falls down while they are trying to run away from the beam? Some scientists warn that using it at close range, could cook a person's eyeballs. Cataracts and cancer are also among the possible long-term negative health effects of this kind of device.

Personnel Halting and Stimulation Response (PHaSR)

The US Air Force has unveiled its first hand-held laser weapons that gives security forces a non-lethal option for controlling crowds and protecting areas like checkpoints. This is the Personnel Halting and Stimulation Response System, briefly PHaSR (Fig.6.).

Today, the system is available in prototype form and years away from



Fig.6. Personnel Halting and Stimulation Response System – PHaSR

fielding. The system is about the same size and weight of a fully loaded M60 machine gun — around 9-10 kg —but shoots a low-power beam of laser light instead of bullets. The light it generates is capable of temporarily impairing an individual’s vision, much like the disorienting glare one sees when looking into the sun.

The beam will cause no lingering effects or lasting eye damage once the individual steps out of its reach. According to the designer the system will cause only disorientation long enough to subdue a hostile action or at least provide time to differentiate persons with hostile intent. The officials said that the prototypes will be 100 per cent eye-safe and any effect will be short term. In parallel with this project a new, more advanced system has already been begun that will

incorporate an eye-safe, laser rangefinder. Incorporating the rangefinder is a significant development in overcoming one of the limitations of past similar device; being too powerful at close range to the point of causing lasting eye damage while being ineffective but eye-safe at long ranges.

Using laser rangefinder, the operator can target an individual, determine his distance and the PHaSR will automatically adjust the laser power level so that you get the maximum safe energy on target so that you still cause the dazzle effect, but you are guaranteed not to cause eye damage.

The officials would not provide specific information on the type of laser used in PHaSR other than saying it employs two wavelengths. Nor would they detail its power, range, battery packs or the duration of a laser burst need to disorientate someone.

It can be suspected that the range of the system is within the range of currently fielded small arms.

Summary

In military operations other than war not the lethal weapons have the leading role. The purpose, the features and the applied principles of military operations other than war demand that the military forces have to have such new type of weapons beside their conventional, lethal weapons, which can efficiently be used when the application of conventional one is not possible, not practical or their application can lead to unpredictable consequences. Such new type of weapons are the non-lethal weapons.

The weapons can be put in action without the risk of the exaggerated using of armed forces. They make a multilevel control possible about a certain situation for the military forces and provide the possibility of efficient intervention in the early stage of the situation when it is not so dangerous.

Using the weapons the commanders have the opportunity to enforce the principle of the application of minimum force, on the other hand they also have the opportunity to accomplish the mission when the avoidance of the casualties is particularly important but in a certain situation „hard” behaviour is necessary. They provide flexibility and freedom for the soldiers and increase the options regarding the

application of military force. Non-lethal weapons can provide the possibilities of self-defence and the real deterrent.

The presence of non-lethal weapons does not mean the total waiver of the application of conventional, lethal weapons. During the operations the inalienable right to self-defence and the necessity of the fulfillment of the task make the application of non-lethal weapons necessary.

That is why lethal and non-lethal weapons must be present at the same time in certain missions. Non-lethal weapons do not substitute but supplement lethal weapons. They have to be used beside the lethal weapons and not instead of them.

The non-lethal weapons shall in no way limit a commander's or individual's inherent right and obligation to use all necessary means available and to take all appropriate action in self-defence, among others lethal weapons.

In all cases the forces shall retain the option for immediate use of lethal weapons consistent with applicable national and international law and approved Rules of Engagement

The ongoing research programmes have already gone beyond non-lethal weapons of low technological level which are widely spread today. At new developments the purpose is to achieve capabilities providing an efficient applicability from a long range anywhere and under any circumstances.

At the ongoing research programmes and developments the main purpose — beside the increase of effective range — is to increase the effectiveness and the accuracy as well as to reduce the collateral damages.

The technical designers endeavour to increase the effects of certain non-lethal weapons with the combination of other effects of non-lethal weapons. Relatively dynamic progress can be seen in the field of development and application of chemical and directed energy weapons. The tunable weapons come into the limelight. The effects of these weapons can be better controlled.

The progress is less dynamic in the field of kinetic energy weapons. At the development of new weapons the technical designers endeavour that the lethal and the non-lethal capabilities will be provided in one weapon at the same time.

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