

TARGET ACQUISITION AND TARGETING IN THE ENEMY'S DEPTH

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ABSTRACT

Achieving effective fire support during modern operations is an imperative condition that consist in coordinated actions of indirect and direct fire from field artillery, aircrafts and naval artillery with other lethal and non-lethal systems available, command and control centers and target acquisition system which provide input information for decision makers in deciding, detecting, delivering and assessing cycle of targeting process.

In all modern operations, the aerial and land maneuver is present and the actions of field artillery allow to the joint army commander to gain important tactical and operational effects. In all situations where the field artillery is used in the operations, three subsystems compete effectively in gaining the planned effects. These are the command and control subsystem, the target acquisition system and the striking system. A standard C3i system is without doubt important in gaining the optimal reaction, processing the information of the communication and information subsystems in order to act unitarily and coherently.

KEYWORDS: *targeting, target acquisition, artillery sensors, reconnaissance, drones*

1. Introduction

Military actions in enemy's depth aim to annihilate firepower, disrupt C2 system, deny logistic activities, destroy artillery systems, electronic warfare, ISR systems, interdict actions and defeat enemy will to fight [1]. These actions facilitate the shaping operations at contact, reduce enemy's capabilities and affect coherence and enemy battle rhythm.

A NATO standardized C3I system is most important to ensure optimizing

reaction, processing information about CI subsystems of striking and target acquisition subsystems that are to operate in a timely, unitary and coherent manner.

According to the military analysts, the coercion of the enemy forces and the conduct of the military actions within the battle space are the two operational modes during the military operations, where the armed forces can deal with different risks and threats.

2. The Analysis of the Current Operational Needs of the Modern Artillery

During the process of the enemy forces oppression, the artillery should be used according to their engagement. Before engaging the forces, the artillery takes part into the disruption of the enemy and their maneuver, during the operation planning. During the operation development, the artillery actions aim the fulfillment of the traditional tasks: fire support for the contact units, high pay-off targets engagement in order to reestablish the forces report, target acquisition in the enemy depth.

In the operational depth, the artillery creates the conditions in order to assure the freedom of action for the combat forces, fire supporting the maneuver of the joint task forces. The artillery aims the disruption of the enemy disposition, to strike the decisive points and the weight point of the enemy. This leads to gaining the fire superiority and permanently obtaining critical information needed for the operation.

Targeting is a vital component of the operation execution, being complementary for the military decision making process. Targeting process [2] is developed by stages, operational phases and starts in the same time with operation preparation.

In order to have more possibilities for enemy target acquisition in contact it is necessary to maintain a great number of teams of forward observatories. There are also needed independent acquisition teams equipped with radars that can regroup different complementary sensors of a great joint unit that can act up to 20 km away from the contact line.

In terms of close scout means, the artillery can use the acquisition capabilities of the combat units in contact (forward observers, mini-drones, acoustics and seismic assets, improved optoelectronic systems, identification systems equipped with high resolution cameras, day and night vision

cameras mounted on scout armed vehicles that can search on the move and from a steady point.

The independent scout teams have the possibility to accurately detect, track, localize and determine the data about the targets on tactical level. They have radars to watch the movement routes and different alignments of mix units development. This surveillance can be done from scout platforms with optoelectronic systems (up to 8 km from the contact line), mini-drones flying under 15 m height, multiple sensors infiltrated in the enemy disposition.

In order to target acquisition in the enemy depth there are scout teams on armed vehicles or mini-drones that act up to 30 km from the contact alignment, optoelectronic assets of high resolution, search radars, surveillance and counter-battery, radios, sonar, drones.

C3I systems have to use the technical protocols of communication/signal and message procedures, operational procedures of artillery.

3. The Main Sensors of the Artillery of Modern Armies

The scout and search subunits equipped with communication and signal assets, day, thermal and infrared cameras. These subunits of Special Forces can be enforced with the data structures of the data acquisition artillery.

The artillery scout teams search with accuracy the targets with an electron-optical equipment, especially the laser telemeters and video cameras, can undertake search actions, correct the fires and assess the effects on target.

The fire support team of the artillery is usually used by the combat unit commander, takes part to the close contact actions, is integrated into the artillery leading systems and is equipped with fast armed assets to conduct the maneuver.

The scout teams in the enemy's depth are at a division level, act independently in

an area of 4-30 km contact alignment, in the enemy's disposition, on armed vehicles, or often on foot. They are equipped with: GPS, laser telemeter, laser illuminator, direction-finding installations, thermal cameras, photographic means, video cameras. They act isolated, in secret, they infiltrate in the disposition, cover their actions, undertake the search and send in real time the information. They can be recovered or they will fight as special forces members until the end of the mission.

The following I would like to highlight the organization and action of the artillery scout structures of the USA, Germany, France and UK.

The British observers are captains and those from USA and France are lieutenants. The artillery scout teams at from the infantry group have a warrant officer and an artillery soldier. The Germans have no depth scout teams, but the Americans use reduces teams (a warrant officer and a soldier) at battalion level and a group at brigade level. They are equipped with field surveillance radars, GPS, acoustical sensors, thermal cameras and touch laptop to send information in real time.

The drones and the UAVs are designed to act at operational-tactical level, are complementary to certain surveillance modern means like: satellites, airplanes, slow drones, radars, information from human sources and electronic war structures. The drones detect and determine the targets in the depth of enemy disposition with a precision up to 30 m, have a flight autonomy up to 400 km, can search a 150 square km area, send information almost in real time and have air-ground missiles.

The miniature drone systems also known as minidrones or microdrones are small models, flying to less than 100 m altitude, are hand lunched or from a vehicle, are capable to search the combat space day and night.

The microdrones are a dove dimension and can search an area of several

square kilometers, are perfectly adapted for the urban actions and deliver information at artillery subunit level.

The Doppler artillery radars have an angle error measurement, search a distance up to 40 km, and allow the detection, localization, recon and automatic track of fix and mobile field targets. But they do not make the difference between own and enemy targets, nevertheless they send information in real time. The artillery radars have the possibility to detect, localize and determine the artillery targets, artillery firing command on targets, the track and guidance of own and friendly helicopters, enemy target acquisition through radars with an angle error measurement and the exploitation of the armed vehicles on the field. A major constraint is met in the on sight and hidden areas.

4. The Need to use New Sensors in the Artillery

a) From the contact point up to 40 km in the depth of the enemy disposition

This area allows the target search and surveillance, but there are enough areas unsearched by the sensors that could be covered with the help of the radars, of audio search systems and communication equipments. The optical and electronic systems assure the complementarity in action with these means providing data and information day and night and the target acquisition to the limit of direct visibility.

b) The influence of technology and the self-guidance of reconnaissance assets

The development of optical, audio and communication sensors and of those on robots is important. The minimization of recon means allows the reduction of recon platforms from tones to grams. The introduction of new technologies will allow the minimization of the presence of optical, audio, infrared sensors and radars.

The automatic surveillance of the research areas can be conducted by improving the acquisition capability and the

sensor platforms have to have a great operational and strategical mobility.

c) The development of the power of data systems

Because the MLRS/LARS systems allow targeting up to 300 km, the sensors have to assure the recon over these borders, and the computerization of combat space at brigade combat team level impose the data and image provision in real time with an high accuracy.

d) New threats

The new types of sensors are the main threats for the artillery. In the contact area the sensors are characterized by the presence of the antennas, computerized assets, radars allowing an advanced target acquisition. The sensors have laser warning devices, FOF recon devices, optical and electronic systems, concealment, EW and communicational and control systems.

As a particularity, in the urban area there are enough limits when using the field artillery: collateral damages, the density of civilians, local infrastructure, industrial and economic areas, hidrotechnical areas where actions could be conducted.

e) Modern firing techniques:

- Fires on the moving files of enemies;

- The artillery ambushes – the mobile targets and hit on the communication axes through interdiction fires;

- Battery fires over the radio means and artillery recon points;

- Laser guided fires – guided by GPS;

f) When firing over the mobile targets, the target coordinates are determined through recon and surveillance radars, counter-battery radars, drones and recon airplanes, and the ammunition is laser or GPS guided.

g) The artillery sensors in the rear area of the forces are made of radars, drones, research systems through sound and communication mounted on armed vehicles.

Because the emissions are temporarily limited at minimum, in order to prevent the detection and the location of these means of

counter-reaction and dissimulation of action, and their dispersion has to avoid the attacks of the special forces and to assure the highly force protection.

The dispersion of the sensors has to adopt principles like: alternative emissions, concealment, dissimulation, deception, encrypted sent of information.

h) The identification of new technical solution

The future recon vehicles for artillery have to clear away the shortages of the present artillery systems in terms of high mobility, smart ammunition, simple maintenance, higher range, low fuel consumption, high ballistic protection, modern fire command and control system and communication and information network. Thus the optical and electronic assets mounted on the armored vehicles have to exceed 40-60km/h and to be capable to send data and photographic images to CP, to send operationally through communication, command and control systems of the force group.

5. New Structures Proposed for the Target Acquisition

- Teams of the forward observers;
- Structures of type I – scouts to be equipped with multiple sensors – drones, communication and sound recon facilities;

- Structures of type II – the scouts should be concentrated in specialized cells, to be equipped with optical and electronic systems, drones, robots, radars;

- The recon teams in the enemy disposition having the mission to:

- accurately obtain data on targets;

- evaluate the fires and the collateral damages.

- Target acquisition detachments in enemy's depth at joint unit which can make call for fire over targets accurately determined.

Every echelon needs own target acquisition/recon elements in order to

facilitate its firing unit's actions. Combined maneuver of artillery target acquisition elements, reconnaissance specialized units and the units in contact with the enemy have to be integrated and coordinated with Special Forces actions.

Coordination measures for both ensuring of an efficient ISR process and enhancing safety for sensors are intended to minimize the difficulties of communication in urban areas and their excessive crowding.

6. Conclusions

In conclusion, operations in depth are conducted against enemy forces and supplies which are not regularly engaged in actions; they are conducted at all echelons by command, fires and maneuver and expend the battlespace limits up to friendly forces maximum possibilities.

Artillery missions in depth, are normally focused on informational operations, reconnaissance, surveillance and tracking of targets, providing of suppressing and destruction fire on enemy dispositions and

also harassing and interdiction of enemy actions. This type of actions are performed by artillery units that are equipped with modern systems, like MLRS and artillery radars or other ISR assets.

Maneuver of artillery sensors implies high consumptions of human and material resources. Information collection using images is essential in that areas where ground sensors cannot be deployed and the collection is assured by small and handy UAVs. Interception, technical analysis and detection of electromagnetic emissions are ISTAR capabilities as well, constrained by saturation of radiation in a narrow space combat environment.

Indirect fire support brings a powerful contribution for mobility in military operations and integration, synchronization and coordination of their effects on enemy targets. Artillery target acquisition units have a great responsibility as well, for providing accurate on time data about target, detect and determine the target, adjust and control fires and finally, carry out the battle damage assessment.

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