Task formation commander`s operation order for fire support

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Abstract. The Czech Republic, as a member of international organizations (NATO, EU, UNO), with respect to current global security environment, employs the units of the army both at its own state territory and outside the Czech Republic in multinational forces operations. The article focuses on task formation commander´s operation order (OPORD) for fire support of future Automated Command, Control, and Information system (C2I) in conditions of the Army of the Czech Republic. The issue of automated command, control, and information systems is of high importance in the solving of asymmetrical operations tasks today and in the upcoming future. Define the basic resources for creation of OPORD of NATO standards in Network Enabled Capabilities (NEC) conditions. The authors define group of OPORD for designing a new and by the Army of the Czech Republic required sophisticated Automated Fire Support Control System of Artillery meeting NATO standards in Network Enabled Capabilities (NEC) conditions. The article represents section of a huge defensive research project of Ministry of Defence of the Czech Republic and the Army of the Czech Republic solved by leading scientists of the University of Defence in Brno.

Keywords: fire support, artillery support, shooting schedule, list of targets, artillery, command and control automated system, shooting control, intensification, coordination of combat support.

1 Introduction

Fire support executed only by artillery, i. e. artillery support is the only and the main part of combat support at lower levels of commanding which can actively decrease combat potential of enemy in accord with requirements of task formation commander. Task formation commander is fully responsible for combat and therefore also for artillery support. This responsibility is expressed in task formation commander`s OPORD, which has to contain clear tasks for all subordinate subjects and therefore for subjects of artillery.
In case of using command and control automated system of artillery support (ASRPP-DEL) it is necessary that OPORD, more precisely its part E - fire support, contained

data, which is indispensable for activity of ASRPP-DEL and which has not been told before. [5]

Issuing tasks is base for command and control. Tasks for artillery are usually issued in a form of order, command or signal. Commands make basis of communications for shooting control. Signals are coded commands with fixed content and defined subsequent activity used in every kind of activities. Regardless the form which task is issued in, its content has

to be complete, understandable and precise. Hierarchy of issuing tasks for units and subjects of artillery support is standard; i. e. tasks are issued only by superiors. Superior commanders of task formations issue their tasks in a system of command and control of artillery support by OPORDs and by some other orders and commands. Superior artillery commanders and leaders are usually at working post of a control shooting system and issue tasks by commands. In command and control automated system in necessary to formulate every activity in advance and to determinate authority for issuing orders and commands and for fulfilling them.

Content of this chapter is deduction, definition and explanation of data which the task formation (with units of artillery using ASRPP-DEL) by commander`s OPORD has to contain. In order to principle that all units of the system of artillery shooting control has to be ready at all times for change to secondary method of shooting control, data for manual shooting control are attached.

2   Main principles of writing OPORD

The main method of issuing tasks for subordinate units or subjects of artillery support is OPORD. This document has to be written in precise and exact way. The other types of orders then can be documents written as parts of OPORD which specify tasks of subordinate subjects in concrete situation. [12]

In present time OPORDs are based on experiences from the past and contain only data for sort of action which unit will do. Except that a lot of data is written only in graphic form. For ASRPP-DEL it is necessary to formulate OPORD containing precise orders for all tasks which artillery units and subjects can fulfill in every situation.

There should not be repeated present military publications in OPORD. For example every commander should know that artillery during fire cover of moving units destroys enemy artillery batteries, reconnaissance units, point of commanding and main objects of air defense and therefore it doesn`t have to be written in OPORD. It should be written there only in case, when commander decided to add any kind of target or to give any of targets higher priority.

3   GEOGRAPHICAL ZONE

In case that combat activity will take a place near to border of 6° geographical zone, task formation commander will have to determine if it will be needed to recalculate coordinates to neighbor geographical zone and if so, he have to decide if it

will be the left or the right one. Chosen geographical zone will be known as the main one. This decision will depend on space which the task formation will be in. It can be generally said, that with using ASRPP-DEL it doesn`t matter which zone we choose, because the system is able to recalculate any coordinates in real time after creating needed mathematical apparatus. System, based on evaluation of combat structure, will automatically pick the zone in which it will find during combat activity more subjects of artillery units of the task formation. In case of manual shooting control, for time reasons it will be necessary to recalculate coordinates of combat units to the neighbor zone. In case of detection of enemy in neighbor zone this will allow to start firing without long recalculating coordinates to target zone in which combat units of artillery are situated. The decision which zone will be the main one is more important in case those subjects of combat structure and expected targets will lie in two neighbor zones. In this case the main zone will be the one with more expected targets.

Based on decision of recalculating coordinates, members of topographic and reconnaissance units will recalculate gathered coordinates of subjects of combat structure to main geographical zone and in order with "sketch of topographical-geodetic connection" they will mark them E_1, N_1. Subsequently they will calculate correction of direction for neighbor zone - $\Delta\alpha$. Rules for fulfilling the "sketch of topographical-geodetic connection" are written in chapter.

If the task formation will operate near to the border of two geographical zones, it will be necessary to give coordinate in whole shape PPV CC EEEEENNNNN, where PP marks 6 ° zone, V marks layer of the zone, CC marks 100km square in MGRS system and EEEEENNNNN stands for horizontal and vertical coordinate of the point.

In case it will not be necessary to recalculate coordinates to another geographical zone, it will be possible to work with shortened coordinates. It means that coordinate of subjects of combat structure will be given in five digit groups (EEEEE NNNNN). But ASRP-DEL will register coordinates of all given point in full shape. Mark of the zone and 100km square will be added in order of actual position of combat structure. If the coordinate will be given in tens or hundreds of meters, system will put instead of missing numbers zeros (for example: operator will write coordinates of a point in shape: 426847, combat structure is situated in 33rd zone, layer U and in 100km square marked VR, ASRPP-DEL will save the coordinates in shape 33U VR 4260084700)..

4 Determination of area

The Standard Among most important data written in OPORD belong areas of firing posts for firing units, areas of special attention and targets of special attention, borders of reconnaissance zones for reconnaissance units and minimum distance of shooting. This data is used for planning and positioning of units, executing maneuvers with units and planning of firing. So far this data has been given in graphic form and in text it has been determined by terrain subjects and objects. The purpose was only rough determination of area and therefore during subsequent preparation for combat, reconnaissance units exactly determined borders of areas and measured firing posts. This method is unsatisfied for automatic process of commanding. It also does not fit for shooting from firing posts with dispersedly placed cannons. An area has to be

determined in a way so they can suit every tactical requirement and simultaneously chosen with such a precision which allows software to work with them.

Mentioned tactical requirements are for example sufficient area for required dispersing of combat units, sufficient areas for suitable artillery units and weapons, areas with natural camouflage for commander's post and waiting posts, good visibility to areas of predicted presence of enemy units, terrain allowing good connection within and out of the area, terrain allowing fast and hidden arrive and exit and so on. Therefore every area has to be set by right-angled coordinates of four or five points (2nd Areas of firing posts, 4th Front line of ally armies and borders of reconnaissance area, 5th Areas of special attention, 6th Areas of targets of special attention). It should be coordinates of terrain subjects which can be easily identified in terrain. In case of determination reconnaissance zone, coordinates has to be set at least in form of three front line points of our armies, which cannot be crossed by units of artillery reconnaissance. In scheme of OPORD are 4. Front line of our armies and border of reconnaissance zone 1st and 5th direction point determine left and right reconnaissance zone side and 2nd and 4th determine left and right side of observation post line.

This attitude will allow the possibility of automatic comparison of the weapon system, observation post or commanding post location with location of departure zone and in case of crossing this zone`s border, the system will automatically alert the operator. Except that, coordinates of left and right side of observations posts line will be used for determination of reconnaissance group`s cover angle.

Reconnaissance group should be kept because they have to prepare areas of firing posts for case of ASRPP-DEL malfunction. During activity areas preparation the reconnaissance groups will be able to use ASRPP-DEL in every way including automatic checking of departing firing posts in the area. [5]

The form, more precisely accuracy of points determining area`s coordinates will follow from ASRRP-DEL use. If the system will use the commander of task formation during order processing, it will be possible to write in complete coordinates in form PPV CC EEEEENNNNN. In case of ASRPP-DEL use there will be digital maps for disposition for determination of area`s edge points at contact screen by finding concrete point in a catalog of geodetic points coordinates or by some similar method. It will be possible to input vertical and horizontal coordinate with accuracy of one meter. If there will not be possible to work with needed map of ASRPP-DEL, it will be alright to quote only edge areas points with accuracy of one hundred meters without marking of zone and 100km square MGRS. The coordinates form will be EEENNN. This method is for areas determination sufficient.

Point coordinates giving (subject of combat structure, targets, edge points, areas or lines and so on) in complete form is appropriate for their unique identification especially in case when the combat activity will be made with use of ASRPP-DEL and in the bordering area of two 6° zones. This relatively long point location determination is chaotic and means time lost when using radio communication for transmitting data or during writing all data which cannot be always necessary. Therefore it is suitable to write coordinates in shortened form in accordance to allied publications.

Combat structure subject coordinates and targets is possible in accordance with AArtyP-1 and possibilities of used methods of determining coordinate to give in

meters or tens of meters (form: EEEEENNNNN or EEEENNNN). The terrain subjects or objects location which are used for orientation in map is in accordance to STANAG 2014 given with marking 100km square and horizontal and vertical coordinate in kilometers or in case of need in hundreds of meters (form PVEENN or PVEEENNN).

5 Bearing of main direction of fire

Another major data which has to be part of task formation commander's order is bearing of main direction of fire for every firing post area. This data shouldn't be needed in future for standard cannon aiming into target course, but it will be necessary for cannon aiming by secondary method and therefore also for firing posts determination by reconnaissance units. Also it will make easier to orientate in area during machine departure and so on. It will be given in the same form as it has been so far, i.e. as direction course of main supported task formation rounded to hundreds of segments, miles marked α_{HS}.

6 Additional subjects determination

Regular part of task formation commander's OPORD is also an additional subject's determination. In opposite to present practice we need to take into account adding not only firing, reconnaissance subjects, but also others like firing command, topographical-geodetic, logistic and meteorological support and so on. Possibilities of strengthening task formation by artillery support subjects are described in publications - Possibilities of strengthening task formation by artillery support subjects with use of artillery firing commanding support automatic system.

7 Basis for firing

The Data which is most important for artillery support realization and allows basic artillery role fulfilling are basis for firing. In task formation commander's OPORD are usually written basis for scheduled firing. It has to include all information which are necessary for effective artillery fire which contributes to meet task formation commander's requirements. Most of basis for artillery fire will be part of documents called "Fire schedule" and "Target list".

7.1 Fire schedule

Fire schedule will determine basis for tactical command of firing, especially choose of the unit which will lead the firing, time of fire, in case of need signals for start or end of fire and the document can also include other data - for example fire task,

planned consumption etc. The first data of "Fire schedule" is unit kind determination for concrete task which will be possible to choose from formation task subjects.

From the artillery point of view there will be given if the task will be fulfilled by mortar or cannon weapon systems. Based on executor's determination and other needed input data, the system will process automatic choose of the unit. Choose of the unit will be processed with using ASRPP-DEL in accord to procedures created for automatic system.

Without using ASRPP-DEL the unit will be chosen by present rules. Decision about fire executor is basis for next planning of chosen fire unit. [6]

Planned ammunition consumption calculation for planned fire is made by present procedure. The standard of ammo consumption for the weapon system, shot, lighter, target (target area hectare), and fire length and fire task is needed. In present there is no standard for artillery ammo consumption in the Army of Czech Republic.

Determination of starting and ending times, more precisely length of firing is given by planning fire support results and it is written in order for firing. This number is used by ASRPP-DEL for weapon system fire mode determination. The form and content of "Fire schedule" is given by allied publication AArtyP-1(A) Artillery Procedures. It is wanted to keep the document content without changes in order to allow other army's commanders and our artillery commanders working on the field of international task formations to work with it without troubles. Although there is one exception.

For definite determination of starting and ending time of firing it is good to add a column named "Start/End". Therefore in the matter of time, every fire will be mentioned in the document twice. Once in a graphic form and once by letters expressing the start/end time of firing in astronomic time. Data start/end will be used by ASRPP-DEL to weapon systems number determination which will do the firing and the firing speed determination.

For the reasons of inserted data effective use by automatic system it is purposeful to input the firing time only by this method. If there will be in "Fire schedule" also a fire on request, there will be in a column "Fire on request" written a signal, on which the fire will be started and ended. Into the column "Notes" it is possible to write deflections from the standard suggested by system for determination of fire task and shoot and lighter kind for effective fire.

7.2 Target list

Fire schedule Document Target list obtains information about target which is needed for fire element calculation and at the same time it is one of the most important resources of data for whole ASRPP-DEL. There are numbers of lines in the first column and it is possible to orientate by them in the table.

The second column gives numbers of targets. These are determined by rules described in "Numbering targets". There are coordinates of targets in 3rd - 7th column. Artillery observer will discover and input coordinates into the target list or if the fire is ordered by superior level, coordinates will be taken from it. Artillery observer inputs right-angled or polar target coordinates. If he inputs polar coordinates, he has

to input right-angled coordinates of his own post. Superior estimates the target position by right-angled coordinates.

Every target has to be estimated by right-angled or polar coordinates. Right-angled coordinates will be input according to principles for determining the geographical zone and it will be done with toleration of ten or hundred meters (form: EEEEENNNNN or EEEENNNN). Target position can be set by polar coordinates only in case when we know the coordinates of post (coordinates of post are in the system) which the values where measured from. System will automatically recalculate polar coordinates into right-angled ones and if the coordinates of observation post which detected the target are known, it will calculate polar coordinates for this post.

Data will be used for calculation of distance and direction of fire, fired reparation and in case of fire to targets in dangerous distance from our units for calculating new aiming point. Steps for calculating a new aiming point is written in Fire requiring in ASRPP-DEL. There are data about target description - its sort, character, position and activity in the 9th - 12th column. This data is necessary for choose of the firing unit, estimating of firing task and the method of fire activity, determining of shot fly trajectory, shot kind and initiator and its adjustment according to scheme Effective fire.

There is target turn in the 13th column. Target turn is front target direction written in hundreds of panels and it is needed for determining of aiming points of NATO armies artillery units. Data will be given by subjects of artillery reconnaissance ACR in case of cooperation with other armies firing units.

The 14th and 15th columns include values of target width and depth, if need be there could be a value of round target radius in the 14th column. The value is used for determining needed number of weapon systems for fire, fan calculation and consumption of ammo for fire to given target. There is written accuracy of target coordinates determination on the last - 15th column. The accuracy is given by term "accurate" labeled "P" or "inaccurate" labeled "N".

Accurate coordinates are determined in accord with rules of fire with probable round error within 50 meters and are in accord with conditions of complete preparation. Inaccurate coordinates are determined with greater probable round error. This value is used for decision about method of determination subjects for effective fire. The value has to be input by subject which gives target coordinates.

8 Sources for marking the targets

Marking the targets is activity performed always after detection of the target. Process of marking the targets is set in ahead. In an OPORD it is necessary to set two first symbols of marking the target, i.e. letter which will be in front of number marking of every target which will be detected by reconnaissance group of task formation. This letters will be determined by task formation commander or on basis of superior's order. Entry is basis for creating numbers, which the targets (detected by task formation reconnaissance units) will be marked by. Except that he can also determine departure from standard procedure.

9   Marking of fire control system elements

The For marking of fire control system elements in sense of scheme - System of fire command and control and target marking according to Numbering targets it is important to establish names of task formations. It should contain number marks of regiments (brigades) which are parts of the task formation. Nevertheless it is possible, that task formation is made by bigger amount of units and none of them is the biggest one. If lack of clarity is likely to appear in task formation marking, it is vital that superior task formation's commander will establish marking of subordinate task formations in his order. [7]

10   Target priority

For planning and choice of targets automation it is necessary to establish priorities of targets for single periods, tasks or fazes of combat activity. Strengthened task formation commander will establish by this method which enemy objects are most important for the success of mission. Based on this decision, official responsible for combat support can decide about elimination of targets detected in real time without necessity of approving by task formation commander. Also ASRPP-DEL suggests target elimination order in accord to priority established by OPORD.

11   Ammunition replenishment

Commander has to set a value of ammo stock which will lead to requirement for ammunition replenishment from logistic units OPORD. The amount depends on logistic capabilities to react immediately to required amount of ammunition. The faster logistic reaction will be the smaller amount of ammo can be set by the commander.

12   Conclusion

It is necessary to write a great number of facts in task formation commander's OPORD, which has never been there so far or which has been written in a different form. It is obvious that these facts will not be usually written in main parts of OPORD, but in its annexes, i.e. annex E - Fire support, in firing schedule and in target list.

All basics for fire command and control have to have the form which will allow printing and using the documents without ASRPP-DEL support. [5]

The system also has to allow an access to documents and information to all subjects of command, coordination and fire support control which would obtain them regularly by normal way or they need it for their activity. The system of creating OPORDs allows changing of OPORD parts according to actual needs.

Therefore there are conditions for automatic fire command and control even in case of cooperation with superior task formation commander.

For effective work of artillery units near to the meeting line of two geographical zones it is needed for ASRPP-DEL to create mathematic apparatus allowing automatic recalculation of coordinates from one geographical zone to another.

For calculation of ammo consumption for fire to expected sort of targets it is necessary to set norms of ammo consumption for weapon systems which are in ACR.

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