

Fire Control

T 8 - Preparation of artillery fire control units

References and further reading :

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MO ČR. *Dělostřelecký průzkum, topograficko-geodetická a meteorologická příprava dělostřelectva všeobecné palebné podpory*. Dě1-6-4. Praha: 1996. 144 s.

MO ČR. *Palebná služba pozemního dělostřelectva*. Dě1-3-1. Praha: 1995. 185 s.

MO ČR. *Doktrína Armády České republiky*. Praha: 2004. 148 s.

References and further reading :

MO ČR. *Bezpečnostní strategie České republiky*. Praha: 2003. 22 s.

AAP-6 (STANAG 3680), *NATO glossary of terms and definitions, Přehled termínů a definic používaných v NATO*. Brusel: NSA, april 2007.

SOBARŇA, M., POTUŽÁK, L., VONDRÁK, J., aj. *Základní pojmový aparát pozemního dělostřelectva AČR*. Brno: Univerzita obrany, 2011. 186 s.

Pravidla střelby a řízení palby pozemního dělostřelectva (dělo, četa, baterie, oddíl). Pub-74-14-01. Vyškov: Správa doktrín Ředitelství výcviku a doktrín, 2007. 256 s.

Course Objectives:

Explain the principles and procedures during each of section of preparation of artillery fire control.

Content:

- 1) Determining elements for firing full, shortened and simplified preparation
- 2) Complete preparation
- 3) Shortened preparation
- 4) Preparing of Fire in the Automated Artillery Fire Support Control System
- 5) Reports
- 6) Time and space validity of meteorological report

1) Determining elements for firing full, shortened and simplified preparation

Corrections for changes in distance ballistic firing conditions are calculated for:

- the total initial rate of change of control works batteries (platoon) – $\Delta v_{0\Sigma}$;
- temperature change cartridges – ΔT_n ;
- change in other characteristics of ballistic missiles, which were not included in the determination Δv_0 (eg. type cartridge etc.).

1) Determining elements for firing full, shortened and simplified preparation

Correction for changes in the direction of ballistic conditions, the only fix for the derivative ΔZ .

Corrections for changes in distance shooting meteorological conditions are calculated for:

- a change in ground pressure – ΔH_v ;
- ballistic air temperature change – ΔT_v ;
- longitudinal component of ballistic wind – w_x .

Correction for changes in the direction of fire weather conditions only fix for the transverse component of ballistic wind – w_z .

1) Determining elements for firing full, shortened and simplified preparation

Ballistic wind is decomposed into longitudinal and transverse component as follows:

- calculate the angle of ballistic wind A_w according to the relation:

$$A_w = \alpha_s - \alpha_w$$

where:

- α_s bearing the shooting;
- α_w bearing wind.

If the bearing is less than the firing bearing wind ($\alpha_s < \alpha_w$), increases by 60–00. The result is rounded to 1–00. The angle and ballistic wind speed using a special table in the Tables shooting searches or calculated analytically transverse w_x and longitudinal w_z component of the wind through relation:

$$1 \quad w_x = w \cdot \cos A_w \quad \text{a} \quad w_z = w \cdot \sin A_w$$

1) Determining elements for firing full, shortened and simplified preparation

Exceeding target shall be determined as the difference between target height and height of firing position. The position angle of the target ε_C is determined by the formula:

$$\varepsilon_C = \frac{h_C - h_B}{0,001D_t^C}$$

and the absolute value of the result is reduced by 5 %.

Repair for height target $\Delta\varphi$ is calculated as the sum of the positional angle of target ε_C and additional repairs deliberate angle $\Delta\alpha_\varepsilon$.

2) Complete preparation

Preparation of elements for the shooting is deemed complete if the following conditions are met:

- firing position coordinates are determined geodetically using GPS, topographically by maps of geodetic data and using devices, and topographic tagger;
- bearing the orientations directions for aiming cannon are determined gyro, astronomically or geodetically and transfer current aim bearing on the celestial body or directional show and, together with a magnetic compass for repairs within a distance of 5 km from the firing position and, together with a KPzP grivace to the destination;
- coordinates of targets are determined according to Table T-2.1 with a degree of precision 1 and 2;
- meteorological conditions of fire are determined from the weather report METCMQ for sections with the fire control system ASPRO, METEO–MEDIUM, METEO– MEDIUM –APPROXIMATE, and their temporal and spatial validity is in terms of table T-2.8;
- are intended ballistic shooting conditions, in particular the total change of the initial speed;
- geophysical conditions are shooting (if necessary);

at rocketlauncher batteries are included corrections for ballistic winds on the active section of the trajectory the rocket charge.

3) Shortened preparation

It cannot exceed the following limits:

- firing position coordinates are determined by topography topographic maps of scale 1: 50 000 and using instruments;
- bearing the orientations are magnetically with the inclusion of repairs identified within 10 km from the firing position;
- Coordinates of targets are determined according to Table T-2.1 with the degree of precision 1, 2, 3;
- meteorological conditions of fire are determined from the weather report "METEO– MEDIUM –APPROXIMATE ", that is not older than 1 hour when used up to 1600 m;
- includes only change the initial velocity of the pellet, mainly caused by worn barrel, and repairs are included for changing the characteristics of ballistic missiles, which are listed in tables shooting.

4) Preparing of Fire in the Automated Artillery Fire Support Control System

Permanently embedded (unchangeable) information

The basic embedded information for calculating the fire elements are in tables shooting. For the alternative (manual) mode of fire control it's the documentation in printed tables of shooting, but for automated fire control system is more convenient to specify the individual permanently information using mathematical functions.

4) Preparing of Fire in the Automated Artillery Fire Support Control System

Information about the weapon set

Information about the weapon set in terms of fire control system is necessary in the following range:

1. Changing the initial velocity caused barrel wear (Δv_0), which is needed to calculate the elements of effective preparation and shooting using sighting cannons. In the first case will be used to calculate the distance repairs for a total change of the initial velocity. In the second case will be used for elimination of irregularity of the cannon due to the control cannon.
2. Rate of fire in wounds per minute (vstř), which is necessary to determine the type and number of firing sets to use in specific task of firing. (Figure 2 - Selection the type and number of firing sets)

4) Preparing of Fire in the Automated Artillery Fire Support Control System

Information about the ammunition

To calculate the fire elements are needed the following information about the ammunition:

1. The value of the maximum radius of the fragments of projection. This information is essential to calculate the coordinates of a new point of target in the event that fire on target will lies so close to own troops, it is for their safety.

4) Preparing of Fire in the Automated Artillery Fire Support Control System

Information about the ammunition

To calculate the fire elements are needed the following information about the ammunition:

2. The standard consumption of ammunition to specified types of targets. This information is essential for determining the number of weapon sets to accomplish the firing task. Commanders and staffs use this information when planning and artillery support. This is one of the major limiting factors during the implementation process of targeting. When planning the artillery support is it necessary to bear in mind the quantity of ammunition, which is for the operation and its duration available. With standard consumption of ammunition we can establish the types, quantity and degree of elimination targets.

4) Preparing of Fire in the Automated Artillery Fire Support Control System

Information about the ammunition

To calculate the fire elements are needed the following information about the ammunition:

3. The maximum range in kilometers is a basis in the selection process for choosing weapon set for specific firing task. Maximum firing range of weapon set is dependent on the type of missiles and Cartridge.

4. Maximum width of the fire section on the covered, uncovered, armored and non-armored target is a information which is used in calculating the number of firing points in relation to the character (armored, non-armored), location (covered, uncovered) and the width of the target.

5) Reports

To the fire control system continuously enter the information from:

- ☐ reporting about passion observation,
- ☐ reporting about ready to fire,
- ☐ reporting about ammunition at weapon set,
- ☐ reporting during combat operations,
- ☐ call for fire report,
- ☐ reporting about end of firing,
- ☐ combat orders,
- ☐ sketches topographic-geodetic connection,
- ☐ and meteorological reports.

6) Time and space validity of meteorological report

Kind of meteorological report	Space circuit of validity [km]	Time validity [hours]	Note
METCM	50	4 ¹⁾	¹⁾ Is valid only with settled weather.
METEO-MIDDLE	10	3 ¹⁾	
	35	2 ¹⁾	
METEOMIDDLE-APPROXIMATE	Is valid only for battalion (troops), whose meteorological team compiled a report.	1	For entry heights to 800 m of meteorological report for full preparation, to 1600 m for shortened preparation of firing data for effective fire without registration fire (if is valid a. 172 and 174 in Rules of fire).
Report of meteorological guard of rocket launcher company	Is valid only for rocket launcher company, whose meteorological guard carried out airy probing.	Only for one fire task.	Airy probing has to be ended not later than 15 minutes before fire.

List of tasks for students:

- ☐ To master each of section of preparation of artillery fire control.
- ☐ To acquire the determining of the values and ratios in each of section of preparation of artillery fire control.
- ☐ To master the rules and procedures during each of section of preparation of artillery fire control.