**TOPIC 3/10**

**OBSTACLE PLACING EQUIPMENT**

Tank minefields are established:

* by mechanical equipment
* mine layers,
* scatterable high-capacity minelaying systems
* lorries chutes,
* mine throwers.
* manually
* through mine rope
* entended order manner.

**The means of mining are intended for the establishment of minefields. Minefields have the following advantages over other types of barriers:**

* their establishment usually requires less time and effort,
* easy to disguise and difficult to identify,
* they are difficult to overcome and require considerable effort, time and special resources to overcome them,
* they are still effective in the territory which the enemy has seized, restrict their movement and require considerable force and resources to eliminate them,
* are highly resistant to the effects of nuclear weapons,
* they can be set up during the fight,
* after completing the task, a certain number of mines can be used again.

**Minefields must meet the following requirements:**

* high efficiency,
* the most difficult to detect mines and clear mines for the enemy,
* high resistance to pressure wave (in case of nuclear strike, artillery and mortar fire, aerial bombing, explosion of towed charges during demining and explosion of adjacent mines),
* the ability to quickly find and clear mines by their own troops.

Current mine laying equipment must be able to establish minefields that meet the above requirements.

**MINE Layers**

**Mine layers** are an effective means of establishing minefields. They spread in the 1960s and especially in the 1970s and significantly streamlined the establishment of minefields. The use of mine layers has eliminated a number of shortcomings and disadvantages of the manual method of mining, especially its laborious and time consuming. The layers made it possible to increase the speed and maneuverability of setting up minefields. They do not allow the establishment of minefields during combat in contact with the enemy and in its depth. When laying mines, the contact of the depositor with the terrain is necessary.

Mine Layers are mechanical mine-laying devices intended for the establishment of minefields (especially anti-tank ones), by laying mines by means of a slide on the surface of the terrain (surface) or under its surface (recessed).

**The layers are divided into:**

* special single-purpose storers firmly attached to the chassis of a wheeled or crawler vehicle,
* outboard layers that can be attached to the tractor with the required parameters, the chute and the hopper are part of the trailer,
* universal layers consisting of a chute and tanks that can be mounted (mounted) on tracked or wheeled vehicles.

Minefields set up by mine layers are characterized by the systematic arrangement of mines in rows with specified distances between mines and rows. When setting up minefields with mine layers, unmasking symptoms arise in the mining area after the movement of the layers, or after the mines have been sunk. Despite the intensive development of qualitatively new minefields, mine layers are still the most widespread mechanization tools for establishing minefields in all armies.

**Requirements for mine layers and development trends:**

* minimal capacity usually 600 - 700 PT mines,
* speed of mining on the terrain 4 - 10 km / h, recessed 3 - 7 km / h.
* mobility (tank terrain, snow, wading, sailing),
* distance of mines in the minefield,
* laying mines in the field,
* operability of use,
* crew protection.

**MINE throwers**

Mine throwers are mine-laying devices designed for the establishment of anti-tank and anti-personnel minefields, by throwing mines on the surface.

The throwers are divided into:

* portable,
* transportable and self-propelled,
* universal.

**Portable mine throwers** are designed as small-capacity for single use by all types of troops at a low organizational level. These are relatively simple in construction, small in size and inexpensive, transported on all possible types of means of transport.

Portable mine throwers make it possible to throw several tens of mines to a distance of tens of meters at a given moment and in the required space. These are relatively simple in construction and small in size, allowing you to set up explosive barriers with a surprise. Their use is assumed in front of the front edge of the team's defense to the company, on the banks of water obstacles, in passes, in passages of minefields, etc. These throwers are controlled remotely by radio, by conductors or their firing can be programmed in time. Portable mine-throwers can be an effective component of diversionary armaments, airborne units, special operations forces, or the currently much preferred rapid deployment units.

Portable and self-propelled throwers are designed as large-capacity for multiple uses at higher organizational levels than portable throwers. They are structurally more complex, larger in size and more expensive. They are designed for the establishment of minefields in advance, which reduces their operability and increases the cost of setting up minefields. They are placed on trailers, trucks, combat vehicles or special chassis.

Universal throwers are designed as large-capacity for multiple use similar to transportable or self-propelled special chassis. Their use and combat properties are similar to those of transportable or self-propelled throwers.

The available information on mine throwers shows that the development of mine means is aimed at the use of modern PT and PP mines of the 2nd generation, characterized by greater barring capabilities. There is an effort to use throwers, throwing these mines at a distance of several tens to hundreds of meters.

Laying mines with these means is significantly faster than laying with conventional methods - mine stackers or manually, and there is an effort to replace these standard methods of laying.

The basic features of minefields set up by mine throwers are identical to minefields set up by means of remote mining. This means that the location of the mines and the shape of the minefield have a random character.

Mine throwers are used in defense for fast and flexible establishment of minefields, replenishment of existing minefields in the directions of enemy penetration, for the establishment of barrier nodes, damming passages in minefields, for maneuvering barriers and so ...

In general, there is an effort, especially in the armies of developed countries, to move from the use of classical types of mines to the use of 2nd generation mines, thrown by large-capacity throwers for single use.

**Means of remote mining**

Remote mining is a method of establishing minefields by means of remote mining on troops, enemy objects and sections of terrain, located on the line of contact with the enemy and in its tactical (operational) depth.

Since the 1970s, new barricades have been introduced into the armaments of the armies, which have been given the name of means of remote mining.

The means for remote mining represent, compared to traditional means, conceptually different means of blocking means. Minefields are created over considerable distances depending on their construction.

The new concept of means for remote mining is based on the use of second-generation mines, which by their construction allow transport to areas intended for mining and automatic preparation for combat use (adjustment).

Minefields established by means of remote mining are considerably different from the minefields established classically in terms of the distribution of mines on the terrain surface. The difference lies mainly in the fact that they are not precisely delimited by control lines and rows of mines and in the fact that mines are not systematically and evenly placed in individual rows, but are irregularly scattered in the field.

**Minefields set up by remote mining are characterized by:**

* various shapes, usually oval with indistinct edges,
* optional dimensions and densities, depending on the mine equipment used,
* irregular distribution (mines) of mines in the mined area, the highest density is usually in its middle part,
* by surface mines,
* the possibility of automatic destruction of mines by self-destruction or neutralization after a predetermined time.

In addition to the engineer army, artillery and air force are making a significant contribution to barricade by introducing means of ranged mines.

**Requirements for means of remote mining:**

* establishment of minefields in the depth of enemy assemblies,
* operational establishment of minefields according to the current situation on the battlefield,
* safe mining of the terrain without endangering its own units, which carry out remote mining,
* rapid exit from the firing point and the ability to reuse quickly,
* precise geodetic connection of the device.