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CENTRAL INTELLIGENCE AGENCY
WASHINGTON 25, D. C.

9 APR 1962

MEMORANDUM FOR: The Director of Central Intelligence

SUBJECT : STRATEGIC MISSILE BULLETIN: "Some Problems of
Camouflaging Primary Siting Areas of Missile
Troops"

1. Enclosed is a verbatim translation of an article which appeared in a Soviet Ministry of Defense publication called Information Bulletin of the Missile Troops (Informatsionny Byulleten Raketnykh Voysk). This publication is classified TOP SECRET by the Soviets and was first issued in 1961. It is intended for generals and officers of the Missile Troops.

2. In the interests of protecting our source, this material should be handled on a need-to-know basis within your office. Requests for extra copies of this report or for utilization of any part of this document in any other form should be addressed to the originating office.

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Richard Helms

Richard Helms
Deputy Director (Plans)

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Enclosure

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COUNTRY : USSR

SUBJECT : STRATEGIC MISSILE BULLETIN: "Some Problems of Camouflaging Primary Siting Areas of Missile Troops"

DATE OF INFO: September 1961

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SOURCE : Reliable source (B).

Following is a verbatim translation of an article titled "Some Problems of Camouflaging Primary Siting Areas of Missile Troops", which appeared in the 1961 Second Issue of a TOP SECRET Soviet publication titled Information Bulletin of the Missile Troops (Informatsionnyy Byulleten Raketnykh Voysk). The 1961 Second Issue was sent to press on 19 September 1961.

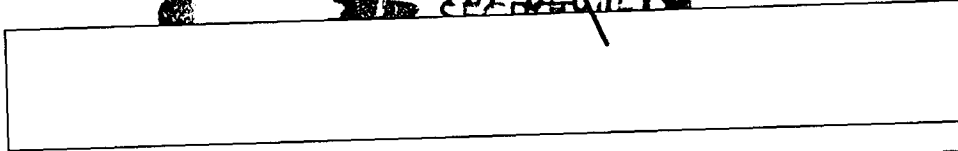
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Some Problems of Camouflaging

Primary Siting Areas of

Missile Troops

1. A Short Description of Modern Day Means of Reconnaissance.

The intelligence of the imperialist nations, and primarily of the USA, is trying to find out at any price the nature and deployment of missile troops, making use of all the known and latest methods and means of reconnaissance.

The command of the United States Army considers aerial reconnaissance as the most important method, and first of all aerial photography, and all other sources of intelligence data must merely supplement the information obtained by aerial photo-reconnaissance. A great deal of attention is therefore given to aerial photo-reconnaissance by the United States Army.

For reconnaissance of missile troop installations, the most typical would be the employment of strategic aerial photo-reconnaissance in conjunction with television equipment. For this purpose the US Air Force possesses the strategic reconnaissance aircraft B-58, B-47E, and Lockheed U-2, and special aerial photographic equipment, including long-focal-length equipment, making it possible to take large-scale photographs from altitudes of 1.5 to 30 km and more.

The development of aerial photographic equipment is proceeding on the following lines:

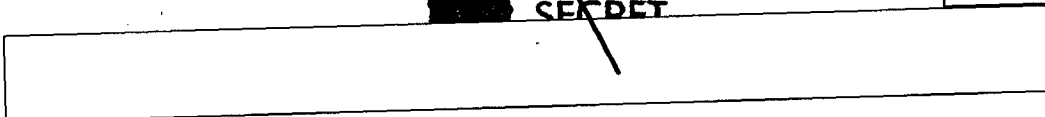
- increasing the altitude of aerial photography;
- possibilities of photography from artificial earth satellites;



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- low altitude photography (100 to 1000 m);
- taking photographs of large areas in a short time;
- expediting the receipt of photographic documents;
- development of equipment for night photography.

In the USA, a great deal of work is being done on the development of pilotless means of aerial reconnaissance, mainly of pilotless reconnaissance aircraft with supersonic speeds, drifting automatic balloons, and artificial earth satellites. The satellites are equipped by the Americans with aerial photo-reconnaissance equipment, including improved television equipment for direct transmission of pictures of the objective installations to ground stations. In August 1960, the USA began its practical launching of satellites into circular polar orbits at altitudes of 480 to 650 km with an orbit time of 90 minutes. Information is available that containers with photographic equipment from two of these satellites returned to earth. A modified version of the satellite "Samos" (I - 3) is specially intended for reconnoitering the location of intercontinental missile launch sites, various military bases, and large-scale construction.

Of the other methods of aerial reconnaissance, the most effective are thermal and radar reconnaissance. It is known that all missile troop installations are powerful sources of thermal radiation (exhaust pipes of mobile electric power units and electric power plants, boiler chimneys, diesel motor exhausts, etc.). With the preliminary data, thermal reconnaissance equipment makes it possible to fix the sources of infrared radiation from altitudes of 600 km and more, i.e., from the altitudes of the orbits of reconnaissance earth satellites.

Present day radar stations make it possible to detect from the air, installations on the ground and the characteristic features of the terrain, which can be used for the accurate

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guidance of aircraft and missiles onto a target and precision bombing of an installation with the aid of radar devices.

With the aid of radar equipment it is possible to detect:

- the accumulation of combat equipment and transport vehicles at the launch sites from a distance of 50 to 70 km;
- the movement of missile subunits along open roads from a distance of 30 to 50 km;
- radar landmarks--inhabited localities, lakes, sea inlets, islands, bends of large rivers, and separate forest areas - from a distance of 200 to 300 km.

Over a wooded terrain, radar reconnaissance of the components of launch sites is not sufficiently effective. At the present time, however, our probable enemies are developing special radar stations with high resolution (with angle coordinates to 0.1° and in range to 20 m) which can detect the components of launch sites in wooded and broken terrain at a distance of up to 60 km. Consequently, present-day means of reconnaissance permit the probable enemy to conduct reconnaissance and determine the location of open and poorly camouflaged installations of missile troops.

Making use of progress in the development of the means of aerial reconnaissance and first of all of the possibilities of conducting aerial photo-reconnaissance and radar and thermal reconnaissance from great altitudes and distances, American intelligence is even now organizing reconnaissance of the principal missile troop installations. With this purpose, the Americans are trying to send over our territory highflying aircraft and drifting balloons and are launching artificial spy-satellites. They are organizing periodic flights along our borders by reconnaissance aircraft which, from great altitudes, conduct reconnaissance of our frontier areas to a great depth.

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All this is being done despite repeated protests by our government and the condemnation of these operations by all progressive mankind, and it proves that our probable enemies are persistently trying to utilize everything possible, even in peacetime, in order to determine the locations of the primary siting areas of our missile units and large units.

Under these circumstances, the capabilities of American intelligence must be reckoned with, and therefore it is necessary to take the most serious measures to camouflage installations of missile troops in order to conceal them from aerial reconnaissance.

2. The Principal Aims and Tasks
in the Operational and Unit Camouflage
of Missile Troop Installations.

When modern weapons of mass destruction are employed with improved means of delivery on a target, it is impossible to build installations and sites which could not be neutralized or put out of action if their coordinates were known to the enemy.

As distinct from the other types of armed forces ² or 3 words missing⁷ of intercontinental missiles at present lack the capacity to move freely on the terrain, and they carry out their battle tasks from the primary siting areas. Only units equipped with intermediate range missiles can change their primary siting areas for alternate areas. However, even these units will also carry out their task for the initial phase of war mainly from the primary siting areas, which were constructed in peacetime. With this static disposition, the camouflaging of the installations of missile troops from all modern types and means of reconnaissance acquires the greatest national importance, and the state of the camouflage of installations determines the combat effectiveness of the missile troops.

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Depending on the scale and allocation of the tasks to be carried out, it is usual to divide camouflage measures into unit and operational types (voyskovoy i operativnyy).

Unit camouflage is one of the measures of combat security of troops, and its aim is to conceal the disposition and operations of missile units and large units from any form of enemy reconnaissance.

The main tasks of unit camouflage are:

- concealment of the principal structures at installations, both during construction and during their use;
- concealment of the special equipment of missile troops when located immediately at the installations and during moves;
- concealment of structures and equipment of missile troops in field siting areas;
- concealment of the work being done during construction;
- adoption of measures to ensure seasonal changes in the camouflage cover (the change from summer to winter and vice-versa).

The tasks of unit camouflage are performed by the missile troops themselves, as well as by construction subunits and units.

Operational camouflage among missile troops is a measure of operational security, and its aim is to conceal the operations and disposition of a grouping of missile troops from any type of reconnaissance and to mislead the enemy as to the location of the grouping and the operations of our troops.

The principal tasks of operational camouflage are:

- concealment of the disposition, complement, and activity of a missile troop grouping (of the primary and alternate

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siting areas, of control points of formations and large units, and of movements of special equipment of missile troops);

- creation of dummy (false) dispositions of the grouping and combat activity of missile troops;
- concealment of the real, and creation of false, optical, radar, and thermal reference points;
- concealment of loading and unloading, and also of the movements, of missile troops along paved roads, railways, and waterways during a maneuver, and redeployment of units and large units;
- concealment of supply bases and depots of atomic weapons, arsenals, large railheads, factories, and installations of missile troops;
- adoption of measures to mislead the enemy, by means of his clandestine agents;
- adoption of measures for radio, illumination, and sound camouflage;
- observance by the troops of the prescribed procedure for activities and for camouflage discipline;
- strict observance of the requirements for concealed control of troops.

The tasks of operational camouflage include the most complicated and labor-consuming engineer-camouflage measures, the performance of which requires special training for troops and the employment of special equipment. All measures of operational camouflage of missile troops must be done by sub-units and units specially detailed for this purpose in accordance with the operational camouflage plan worked out by the General Staff and by the Main Staff of Missile Troops.

Let us examine the measures that have to be done by missile units and large units, i.e., unit camouflage.

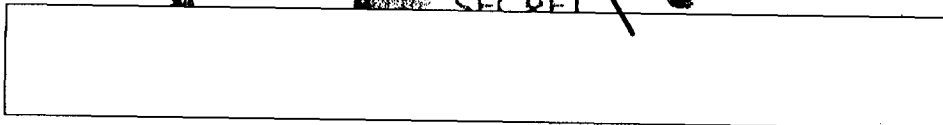
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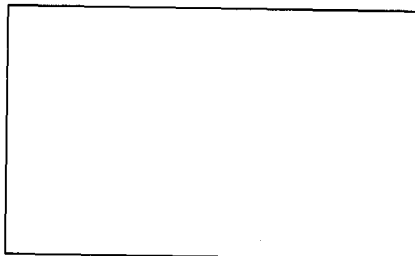
3. Principal Methods of Unit Camouflage
of Missile Troop Structures and Equipment

The enemy identifies installations and troops by means of revealing signs. The principal revealing signs of primary siting areas of missile troops as disclosed by aerial photography are:

- the presence of a definite number of launch pads of regular and standard shape;
- the presence of a road system with many branches and with large turning radii, constructed in great density and, as a rule, with dead ends;
- the presence of structures of large dimensions above ground or partly buried;
- the appearance of new cuttings through forests for the construction of fencing and high-voltage lines;
- the presence of barracks and small towns in the immediate vicinity of launch pads;
- the presence of production bases for builders (plants, construction areas, etc.);
- the presence at the sites of special bulky equipment in transport or combat position, etc.

The revealing signs of targets disclosed by radar reconnaissance are:

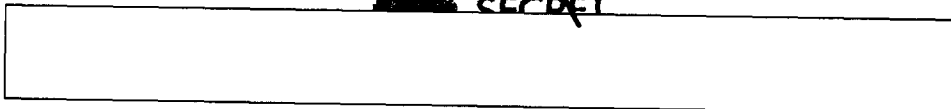
- the presence at the sites of a large number of engineer structures and storehouses with vertical metal gates;
- the presence of newly erected small towns and settlements with a large number of buildings;



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- the appearance of a road system with many branches, and the movement along it of special equipment;
- the appearance in small areas of large concrete pads.

The revealing signs of installations disclosed by thermal reconnaissance are:

- the presence of bonfires, especially during construction;
- the presence of heated metal pipes of diesel-electric power plants, boilers, etc;
- the appearance of industrial fires, both during construction and when the plant is operational.

Camouflage is attained by adopting a combination of measures including:

- the use of the camouflage features of terrain and of natural camouflage conditions as a whole;
- the accomplishment of technical methods with the aid of standard, improvised, and commercial means and materials;
- the observance of camouflage discipline by troop personnel and construction organizations.

As the basis for camouflage of the installations of missile troops, the principle must be laid down that maximum use is to be made of the camouflage features of terrain and of natural camouflage conditions. Camouflage with the aid of technical means and methods is employed to improve the natural cover and to increase the general camouflage capacity.

Technical camouflage methods are based on the employment of standard, expendable, and improvised camouflage means and materials.

Some technical methods of optical camouflage (i.e., camouflage intended as concealment from enemy optical means of

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reconnaissance) are:

- camouflage painting;
- camouflage made from artificial material;
- use of growing vegetation;
- construction of decoys and dummies;
- cultivation of land for camouflage purposes;
- illumination camouflage.

The principal technical methods are described in the camouflage plans for installations. In the present article we shall dwell in more detail on certain special features of their accomplishment, and also on methods which do not appear in the camouflage plans.

Camouflage painting is used to alter the color of structures, or of their overhead cover or background for the purpose of concealment. Camouflage coloring can be protective, imitative, or for changing the outline (*deformiruyushchiy*). For stationary installations, protective and imitative painting are the most effective. When selecting pigments, it is necessary to take into account that among the undetectable pigments are chrome oxide and cobalt green.

For protective painting on green backgrounds, 4BO paint (pigment paste, oil) is used, and on sandy background 7K paint. The size of the patches for imitative paintwork can be determined by the formula

$$A = \frac{5D}{3400} = \frac{D}{680}$$
 when D = observation distance and A = diameter of the patch.

When selecting the color for imitative painting, it is necessary to aim for maximum contrast between patches and

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minimum contrast between the patch and the background, which is the continuation of the patch.

At launch and maintenance sites, all the main structures must be camouflaged with paint.

When employing camouflage paint, it is necessary to remember that it cannot conceal the installation, but only assist in doing so.

Artificial cover - horizontal, vertical, and overhead camouflage cover-is the most effective means of concealing equipment and structures as well as sites and installations as a whole from aerial reconnaissance and visual observation. Using these camouflage covers in combination with dummy tree-tops and with vegetation camouflage, good concealment can be attained of launch pads, sectors of roads with hard surfaces, large structures, equipment, etc, which are most difficult to camouflage.

The framework for artificial cover is made at the site, using 5 to 6 mm gauge wire, tree trunks, and uprights from materials at hand.

The camouflage screen which is placed on the camouflage framework must, as a rule, be made from durable materials. At the present time, these conditions are best satisfied by the use of soft polyvinyl chloride sheets (MMP) and rigid polyvinyl chloride sheets (MMV) painted green.

Garlands are made from a rigid polyvinyl chloride sheet and these, in turn, can be made into various forms of camouflage. An example of cover made in this way is shown in Fig. 1. Garlands can be made from a soft polyvinyl chloride sheet, but, owing to sagging of the soft material, the camouflage effect is inadequate.

When constructing overhead cover, it is more advisable to use the soft sheeting with a wire net, using the net as a frame for the overhead cover. Experimental work on the preparation

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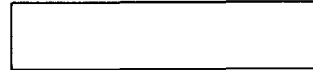
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of such camouflage carried out by the Central Scientific Research Institute No. 26 has shown positive results.

In this case, the camouflage screen is prepared in the following sequence. On an open level area a wire net with a mesh of 5 by 5 cm or 10 by 10 cm is stretched out. A polyvinyl chloride sheet is cut into 15 by 20 cm squares, which are then fastened individually with wire to the metal net (Fig. 2). To attach them more firmly, a hard object 1.5 by 1.5 cm (a piece of wood, small stone, etc.) is placed in the center of each square. The camouflage screen prepared in this way is placed on the wire frame of the overhead and fastened to it with wire. Horizontal and vertical camouflage can be prepared in this way as well as camouflage for overhead cover.

Instead of the camouflage screen, dummy treetops can be fixed to the camouflage frame.

The transparency of camouflage screens prepared on site must not be more than 30 to 35 percent. Dummy treetops can also be prepared by the above-mentioned method.

For this purpose a wire frame for the treetop is also prepared (or a cover with a wire net base) and camouflage garlands are fastened to it (Fig. 3). To obtain the best camouflage effect it is necessary to place the dummy treetops at a height of not less than 3 to 4 m above the surface to be camouflaged. With the aid of camouflage screen made from a soft sheet and of dummy treetops, individual structures, concrete pads, including launch pads, as well as roads, can be camouflaged.

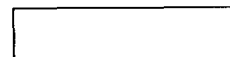
To camouflage a pad of 100 square m using dummy treetops, each having an area of 7 square m, 8 to 10 dummies will be required, and when their area is 3.2 square m, about 20 will be necessary. (Fig. 3).

In all cases when using polyvinyl chloride sheets for the preparation of camouflage, the average expenditure of the



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sheets is considered to be 1 to 2 square m of sheet for each square m of camouflage. Calculations show that to camouflage the primary siting area of a missile battalion 3 to 4 tons of camouflage sheet will be required.

When camouflage sheet for camouflaging structures is not available, as an exception, standard camouflage sets can be used as well as other commercial materials and those at hand.

The most complicated problem is the camouflaging of a launch pad with a missile (izdeliye) on the launching platform. One method proposed is the construction of a horizontal sliding camouflage cover at a height of 6 to 8 m. This cover will conceal both the pad and all the special equipment on it. When raising the missile to the firing position, the cover slides apart 5 to 6 m from the center. The part of the missile protruding above the cover is camouflaged to resemble a group of trees with the aid of camouflage garlands made from polyvinyl chloride sheet. In this instance, the hoisting-transporting trailer (pod'yemno-transportnaya teleshka) and the erector boom (strela ustanovshchika) are used for attaching the camouflage devices.

Lightning rods, boiler chimneys, high... /two words missing/ are camouflaged as tall trees by attaching camouflage garlands to them. (Fig. 4).

Camouflage with growing vegetation should be widely used for camouflaging constructions in primary siting areas because it possesses good camouflage properties and lasts for a considerable time. Horizontal and vertical camouflage screens can be made with the use of fresh vegetation. By turfing over, sowing grass, and planting vegetation, the appearance of the terrain can be altered.

In the case of structures where planting is impossible (launch pads, roads, approaches to structures) portable trees planted in tubs can be used. Methods of camouflage with vegetation are given in detail in the Provisional Instructions on Vegetation Camouflage of the Siting Areas of Missile Troops.

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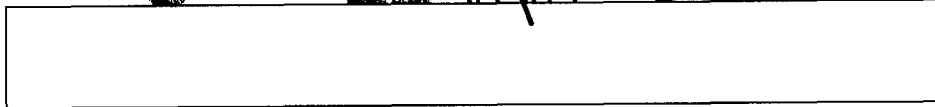
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Dummy and decoy structures can be employed to camouflage individual components of primary siting areas.

Dummy and decoy structures are built of sawn timber, plywood, tarpaulins, and materials at hand, and can be stationary or movable. Depending on the general camouflage plan, portable dummy haystacks, woodpiles, and separate buildings can be erected on launch pads, roads leading from the pads to the structures, etc. Covering dummies can also be constructed to provide total concealment of equipment or structures.

To create the necessary camouflage effect, along with the erection of dummies, the activities typical of the installation represented by the dummy must also be carried out.

Alteration of terrain for camouflage purposes is done to enhance the camouflage qualities of the terrain or to change its appearance.

This is attained by artificially making patches (raspyatnieniyè) on the terrain, by moving or camouflaging landmarks and by erecting decoy structures and camouflage screens. As a method of camouflage, artificial patching is employed on terrain with a large number of natural patches.

Illumination camouflage of objects is attained by blackout and by camouflage lighting.

For blacking out windows, skylights, and entrances, it is best to use "Pioneer" cloth, which does not let through either the visible rays of the spectrum or infrared radiation. If this cloth is not available, blackout paper can be used as well as poncho-tent cloth from artel 564. To obtain the necessary blackout effect, this material must be treated with the following coloring: 14 parts by weight of iron ochre, 3 parts by weight of carbon black, 7 parts by weight of debutilatalat, and 12 parts by weight of a 10 percent solution of polyvinyl chloride.



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Without this treatment blackout curtains made from poncho-tent cloth must be made in double thickness. For more lasting use of blackout paper it is advisable to glue it to plywood and use it in the form of panels and shutters.

Antiradar camouflage is achieved by skilful use of the camouflage properties of terrain together with the employment of engineer and radio-technical means of camouflage.

For the purpose of antiradar camouflage, it is advisable to locate primary siting areas well away from radar landmarks (50 to 60 kms), and to locate launch pads in clearings and edges of woods with trees 12 to 20 m high. Metal doors and walls of structures must be covered with V2-F2 absorbent covering or with mats made from materials at hand (dry twigs, straw, fresh fir branches, etc.). Water landmarks are concealed by placing T4-60 and K4-100 angle reflectors in groups of 10 to 12.

Large ground radar landmarks (cities, railroad stations, bridges) are camouflaged by altering the radar map of the terrain by creating decoy objects with the aid of K1-100, K4-100, K1-200, and K4-200 angle reflectors. For the concealment of separate structures, afforestation can also be employed.

The principal measure of thermal camouflage is the introduction of strict thermal discipline both during construction of an installation and when it is operational.

During construction, thermal camouflage consists of concealing all industrial fires (bitumen plants, electro-welding, etc.) and prohibiting bonfires.

The concealment of industrial fires is achieved by erecting screens and overhead covering made from materials that absorb or reflect infrared radiation. Some of these materials are: sheet iron, sawn timber, double thickness of poncho-tent cloth, "Pioneer" cloth, etc.

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During the operation of an installation, it is necessary to take measures to decrease the radiation of heated components of equipment and buildings. For this purpose diesel, boiler, and mobile electric power unit pipes can be shielded.

For thermal camouflage it is advisable to use brick or reinforced concrete stacks instead of metal ones. Along with methods of concealing or decreasing radiation, the construction of decoy thermal objects is an effective method of thermal camouflage.

4. Some Problems in Organizing the Work.

The main requirement for the organization of camouflage work in a siting area is to carry out prompt and continuous measures of camouflage for each structure installed, electric power lines, communications, etc, in order to conceal the installation from aerial reconnaissance and visual ground observation during construction and operation.

It is natural that [about six words missing] in the case when camouflage measures are provided by the plan from the arrival of construction units at the siting area and put into practice in strict sequence which ensures the concealment of the work of constructing the installation.

The most labor-consuming task is organizing camouflage of structures and work during construction when the natural features of the terrain are being disturbed and much construction machinery and depots of materials and equipment are located at the siting area, as well as auxiliary structures, installations, etc.

Effective concealment of construction work and auxiliary structures during this period is possible only by camouflaging the installation with artificial means, mainly of the horizontal type, together with intelligent use of natural camouflage, and by doing part of the building work at night.

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The use of artificial camouflage makes it possible right at the beginning of the construction of any installation to establish permanent cover that provides reliable camouflage of the installation both during construction and when it is operational. The erection of this camouflage must be started before the beginning of the construction work, after the area has been selected and cleared of trees and brush; but if the conditions of the assembly work do not permit this, then immediately after its completion.

Upon completion of the construction and layout work on each structure, in places where the operational use of the structure permits the growth of vegetation, it is essential to carry out this vegetation camouflage because it ensures the most effective concealment of the installation from optical, radar, and thermal means of reconnaissance.

It is advisable to locate all the auxiliary installations and structures, depots of materials and equipment, living quarters for the construction workers, and transport depots, which would reveal the area under construction, not less than 2 to 3 km from battalion primary siting areas, making full use of natural camouflage as cover from aerial reconnaissance.

To maintain the camouflage of an installation under construction, it is advisable to deliver the building materials and equipment after construction of the roads in the siting area has been completed. At the same time, it is most important that dead-end roads, especially those leading to launch and maintenance sites, should be camouflaged as they are being built.

It is advisable to deliver at night, or under camouflage, building sections and equipment that are typical of missile troop sites (bulky half-arches for storage places, sections of personnel shelters, tanks for oxidizers and fuel, etc.).

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Naturally, the adoption of the measures proposed for camouflaging installations at the beginning of construction will entail some increase in the cost of the installation, as well as in the expenditure of labor, resources, and time. However, this will make it possible to conceal effectively the installations of missile troops from all types of enemy air reconnaissance.

Experience in constructing installations shows that the responsibility for prompt and continuous camouflage of the installations during construction and when in operation should be vested in the commander of the missile unit for which the installation is being constructed. He must require of the construction organizations that the building of any structure be done with adequate concealment from aerial reconnaissance.

To carry out complicated camouflage work, it is necessary to bring in special engineer-technical subunits.

The engineer of a missile regiment must be the chief organizer of camouflage work.

Only the most thorough organization of camouflage work can achieve full concealment of the installations of missile troops from enemy reconnaissance in peacetime and in war.

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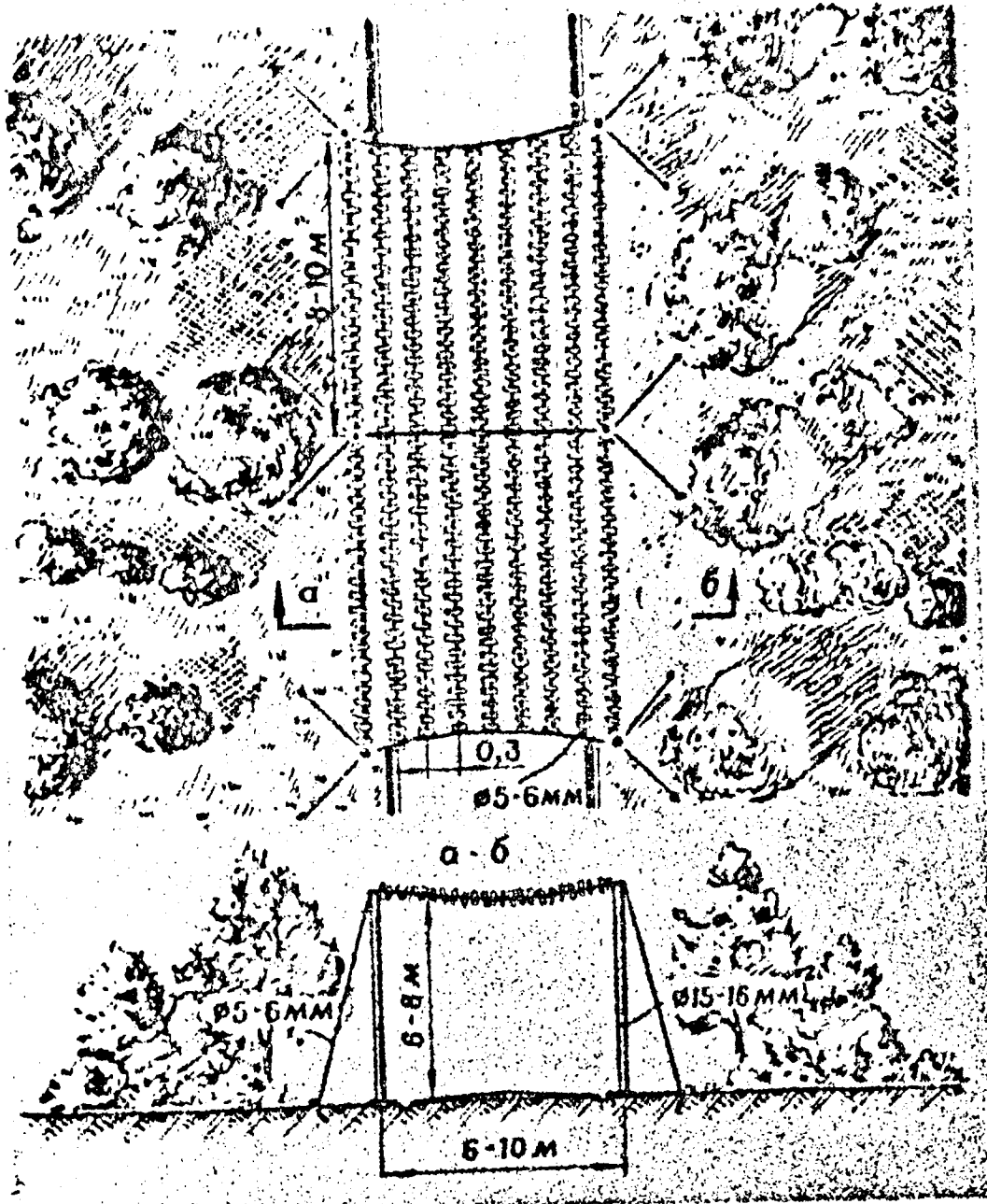


Figure 1. Overhead cover made from camouflage garlands
(Camouflaging of roads in forests)

NOTE: The garlands are made from rigid polyvinyl chloride sheet MMV

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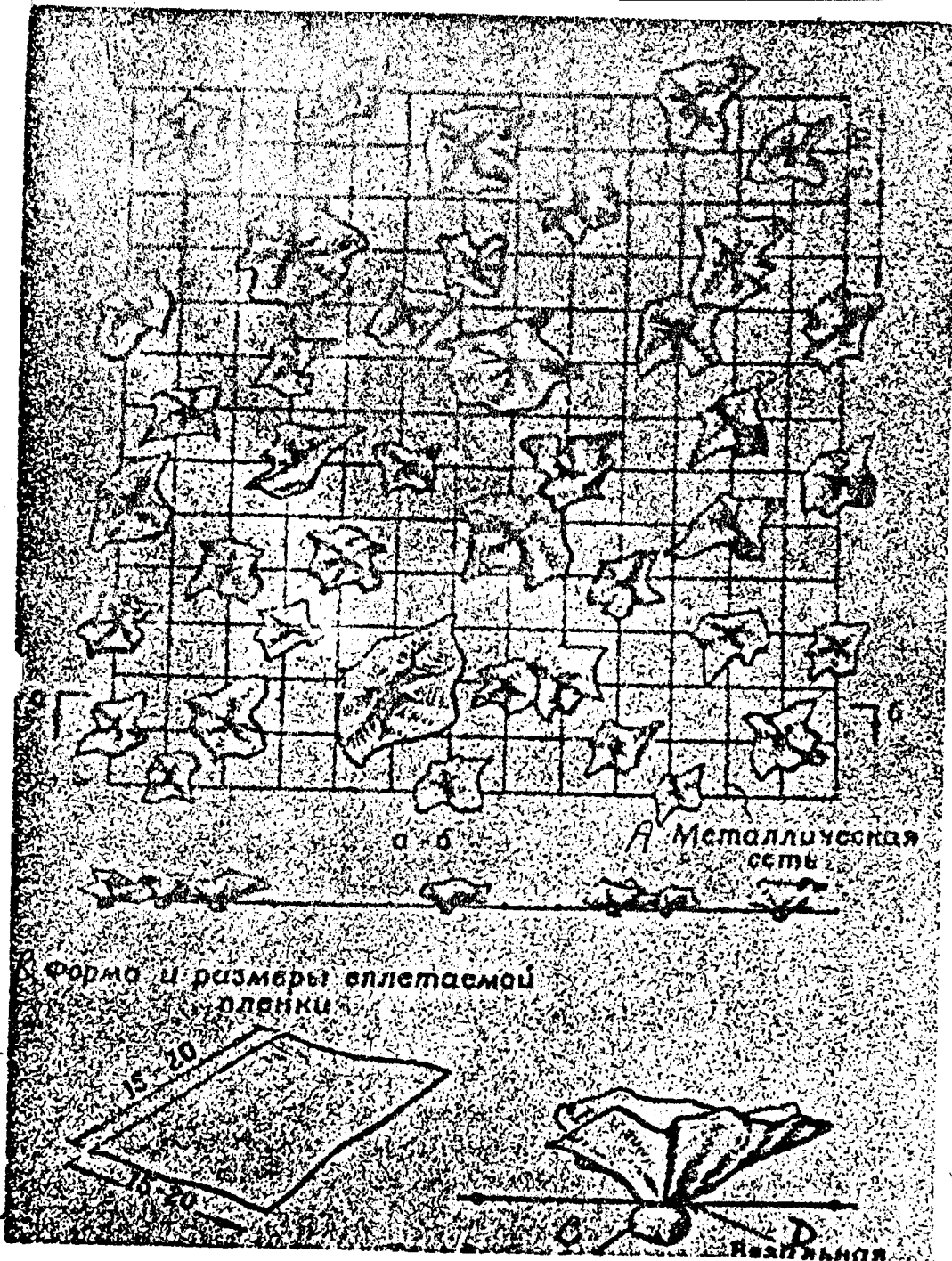


Figure 2. A camouflage covering with PVC sheet interwoven on a wire net foundation

- Wire net.
- Form and size of the interwoven mesh.
- C - A hard object (stone, wood 1.5 x 1.5 cms)
- D - Binding wire.

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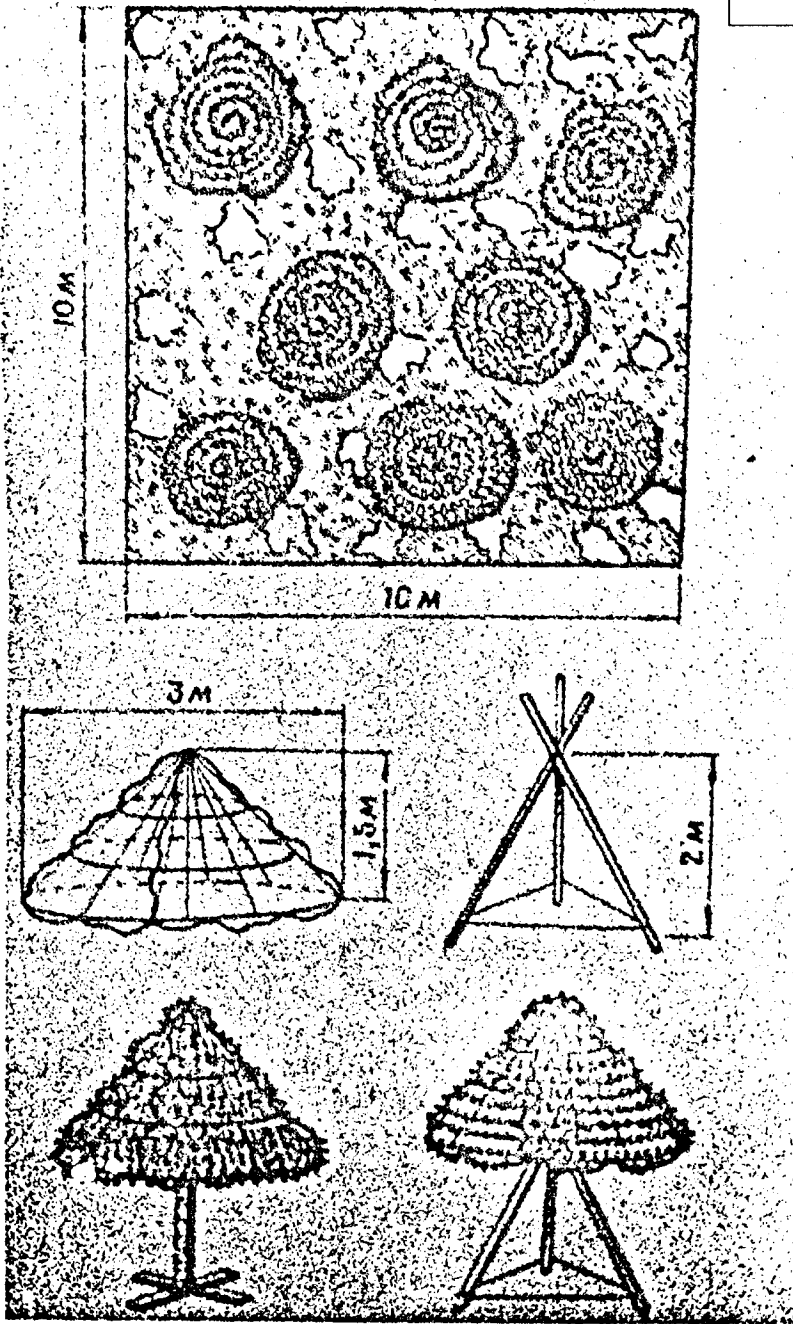


Figure 3. Camouflage for concrete pads dummy tree tops.

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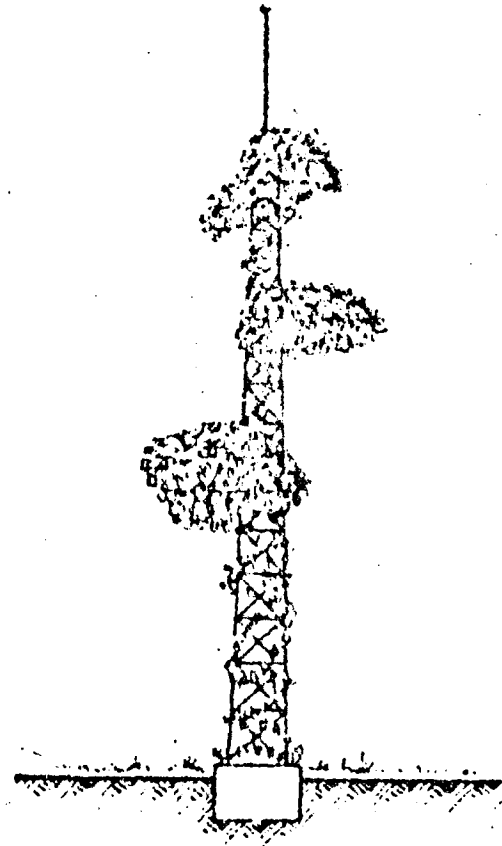
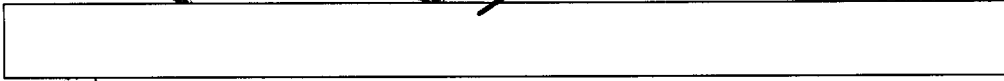


Figure 4. Camouflaging a lightning rod with garlands and dummies of tree tops.

NOTE: The garlands are made from polyvinyl chloride sheet.

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