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WASHINGTON 25, D. C

IRONBARK

MEMORANDUM FOR: The Acting Director of Central Intelligence

SUBJECT : MILITARY THOUGHT (SECRET): "Rapid Setting Up of Siting Areas for Missile Units and Large Units in an Operation", by Engineer-Colonel B. Mikhaylov

1. Enclosed is a verbatim translation of an article from the SECRET Collection of Articles of the Journal "Military Thought" published by the Ministry of Defense, USSR, and distributed down to the level of division commander.

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Richard Helms

Richard Helms
Deputy Director (Plans)

Enclosure

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Department of State

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The Director for Intelligence,
The Joint Staff

The Assistant Chief of Staff for Intelligence,
Department of the Army

The Director of Naval Intelligence
Department of the Navy

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COUNTRY : USSR

SUBJECT : MILITARY THOUGHT (SECRET): "Rapid Setting Up of Siting Areas for Missile Units and Large Units in an Operation", by Engineer-Colonel B. Mikhaylov.

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Comments on a Previous Article

Rapid Setting Up of Siting Areas for

Missile Units and Large Units in an Operation

by

Engineer-Colonel B. Mikhaylov

The setting up of siting areas (pozitsionnyy rayon) for missile units and large units in the course of highly mobile operations, as is known, has to be carried out in very limited periods of time, amounting to only a few hours when troops are advancing more than 100 km per day. At the same time, the increase in power and probable density of the enemy's nuclear/missile strikes obliges us to provide a higher degree of antinuclear protection for personnel and for highly vulnerable missile equipment.

At the present time, missile units and large units are unable to set up reliable reinforced positions in short periods of time, and in the event of a strike by the enemy they will suffer extremely heavy losses.

Therefore, in amplification of previously published articles on, and reactions to, the subject under consideration*, we would like to indicate some practical engineering ways and means of solving this problem which is so important in present conditions.

In solving the problem of antinuclear protection of missile units in a highly mobile operation usually an attempt is made to choose any of the following as the principal method:

* Collection of Articles of the Journal "Military Thought", Nos. 4 (54), 1960; 1 (56), 1961; and 2 (57), 1961.

the setting up of fortifications, or the strengthening of active defense; frequent changes of location, or dispersal and camouflage; the setting up of decoy areas; or, finally, the hardening of arms and equipment. However, not one of these methods, taken alone, proves decisive as a defense against the comprehensive and concentrated effect of contemporary weapons. The fortification layout used at present for siting areas of missile units, including, as a rule, open pits (kotlovan) 1 to 2 meters deep with one or two approach ramps (apparel), for increasing the protection of equipment, and slit trenches, blindages and shelters for the protection of personnel., requires a large expenditure of manpower and a great deal of transport, machinery, and materials, cannot be completed in a short space of time and does not ensure proper combat effectiveness and viability of missile troops.

Only by the coordinated collaboration of all the above-mentioned methods and means of protecting missile units and large units can we leap forward toward an increase in the viability of these troops. Fortifications and the hardening of equipment must have an important place in this system.

Let us review an example of ensuring the viability of a siting area of a missile brigade, taking into account all factors of protection. The extent of losses can be expressed by Academician Kolmogorov's equation:

$$P = \frac{N F_N}{F_o p} \quad \text{or} \quad P = 1 - e^{-N \cdot \frac{F_N}{F_o}}$$

Where: N — is the number of warheads of the enemy — the probable density of fire (can be decreased by active defense);

F_N — is the area of destruction (may be decreased by the erection of fortified shelters and strengthening of equipment);

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P — is the number of misses (increases with dispersal and deployment of target);

F_o — is the area under fire (increases with camouflage and dispersal of target)

With reinforced shelters (zakrytiye), with a designed pressure of $P_{pov} = 3.5$ kg/cm^2 (the radius of destruction is about 1,000 m. for large nuclear weapons) the damage to the siting area of a missile brigade with an area of $F_o = 300$ km^2 with four bursts of nuclear weapons of 150-kiloton yield ($p = 1.5$), will be:

$$P = \frac{4 \times 0.8 \ (1 + 1)^2}{300 \times 1.5} = 0.03 = 3\%$$

i.e., viability is ensured within the limits of 97%.

However, with the existing means of fortification, and with the equipment and arms now in use in missile units, it is impossible to ensure a high degree of all-around protection, even by employing the entire complex of means and methods indicated.

Historical experience shows that even in the past, under conditions of mobile operations, troops have used improvised fortifications consisting of fabricated mobile shelters (gotovoye podvizhnoye zakrytiye) (shields, transported structures) which ensured the creation of effective and reliable, fortified positions in very limited periods of time. However, this "mobile fortification" was used only sporadically.

At the present time, however, when the high mobility of troops and great vulnerability of weapons have become constant factors in armed combat, the employment of mobile, fabricated shelters and the use of them to set up fortified positions, as well as the hardening of equipment, have become regular phenomena. This course provides an opportunity, basically, for the resolution of all the inconsistencies and disparities which have developed between

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new weapons and new forms of armed combat, on the one hand, and old means and methods of organic fortifications, originating during the last war, on the other.

The employment of the mobile shelters and their use in setting up fortifications has become possible, also, thanks to the development of the material-technical prerequisites to the mass manufacture of the shelters: weapons of enormous striking power have low transport weight; materials and casings of little weight have tremendous load-bearing capacity; there is a broadly developed industrial base for the production of automobiles, bodies, fuselages, frames, and transport vehicles; and lightweight, high-capacity earth-moving machinery have been produced.

Mobile shelters for missile units are divided into:

protective ones - designed for housing control points, mobile technical-repair bases (PRTB-podvizhnaya remontno-tekhnicheskaya baza), technical battery positions and depots; and

combat ones - for safeguarding and protecting missiles and aiming (navedeniye) and reconnaissance equipment at launch sites.

Depending on the size of the sheltered objects, through the use of these shelters, provision can be made for:

the comprehensive protection of missile equipment, armaments, its control apparatus, and serviced personnel; the partial protection of control points (personnel and control apparatus) in the case of types of unsheltered, remote-controlled, reinforced missile equipment and armaments, or, finally, using them merely as personnel shelters.

From the point of view of transportability, mobile shelters are divided into self-mobile (sobstvenno-podvizhnoye), comprising the main type, and portable ones.

Self-mobile shelters refer to automobile-shelters (avtomobil--ukrytiye), prime mover-shelters, trailer-shelters, and armored personnel carrier-shelters. They consist of chassis of standard military vehicles, which are permanently joined to supporting casings (nesushchaya obolochka) and have a specially secure entrance, as well as equipment for conversion from the mobile to stationary condition, and vice versa. The internal outfitting is such that men, armament, and equipment can be housed in them, even when on the move. The shelter , when covered with earth, is in its basic working position, and in this form is a typical reinforced structure. During the period of transferring from one siting area to another, mobile shelters serve as buses, prime movers with special bodies which can be lowered, and also fulfil protective functions.

Thus, mobile shelters of this kind occupy an intermediate position between fortified structures and transport vehicles, and must meet the requirements of both. Fully assembled under factory conditions, capable of being used many times, and intended for permanent disposition of personnel and equipment, mobile shelters have considerable advantages over static fortified structures made of local materials. At the same time, they are not purely transport vehicles, as they carry only that system (komplekts) of missile equipment, or means of control, which is located in a stationary position at a site along with the necessary personnel. A degree of mobility is needed sufficient only to move from one position to another in a ready state, which guarantees speed and frequency of employment, and makes assembly work unnecessary

Some military specialists do not consider mobile shelters as means of fortification, holding that this is merely hardening of equipment, and not fortification. Such a point of view, in our opinion, is untenable. These shelters have all the characteristics of fortification structures: protective layers of earth, integral construction, protected entrances, etc.

They reliably shelter personnel and control apparatus against all destructive factors. An increase in mechanical design strength and the use of mobile shelters are complementary measures, and are not mutually exclusive. For example, a hardened remote-controlled antenna cabin combines successfully with a control point, housed in a mobile shelter in which personnel and aiming apparatus are located.

With the employment of the above-mentioned mobile shelters, a solution was found to the problem of providing a high degree of all-around, complex protection, and of speed and frequency in setting up fortified positions in the course of highly mobile operations, without lowering the mobility of missile troops and without wasting materials at the location of the establishment of the siting areas.

In the course of tests, we have succeeded in finding designs of strengthened reinforced duralumin casings which, in the required sizes (L = 6-8m and d = 3m), had the necessary load-bearing capacity (P_{pov} = 3.5 kg/cm^2) and a permissible transport weight for the normal chassis of existing troop vehicles.

For the purpose of protection against penetrating radiation, it is deemed advisable to cover the casing of the shelter lightly with earth. Placing an earthen shield over the pit where the shelter is located does not guarantee protection from the combined effect of the shockwave and the penetrating radiation, and such structures result in a lowered transport capability, and require large expenditure. With light covering with earth, these shortcomings disappear. It is true that some difficulty arises in removing the shelter from beneath the earth covering. However, if use is made of standard-issue plastic sheets between the casing and the earth, as well as of the simplest equipment (pneumatic-hydraulic jacks, caterpillar tracks), these shelters easily extricate themselves from beneath the earthen covering, without the use of prime movers or cranes, in 8 to 10 minutes. The installation and mechanical covering of the shelters with earth, with pits already prepared, requires no longer than 20 to 30 minutes. Excavation of the pits

themselves is usually carried out by advance detachments, with high-capacity equipment (of type MDK, ZMF and others). With the excavation of a pit by self-entrenching means, this period of time is increased to 40 to 60 minutes. On the march, during short halts, the protection of the shelters from the shockwave can be increased by using outriggers and lowering the body to the ground. With the aim of protection against radioactive dust and toxic agents (OV) the shelters are hermetically sealed and provided with special filtering devices.

In order to provide the running gear with an equal degree of comprehensive protection, it is organically connected with the shelter's lowerable supporting casing, which, incidentally, has made it possible for most of the mobile shelters to be amphibious. The placing of "tank shelters" (tsistern — ukrytiye) on prime movers of the saddle type is not advisable, as in this case the necessary protection of the running gear is not guaranteed, and an increase is required in the installation time and the volume of earthwork.

Limitations in size and weight have a considerable bearing on the use of mobile shelters in missile units. An analysis of the dimensions of organic missile equipment and armaments shows that the main types are housed in mobile shelters whose dimensions are determined by transport (cross-section - 4.5 x 3.5m) turning radius - 8 - 10m); i.e., they can have corresponding internal dimensions of 2.4 x 3.2m and a length of 10m. By joining the casing-shelters by means of flexible inserts of the type used for the bodies of buses and trolley cars, their length can be increased to 18 to 20m.* Consequently, even some strategic missiles — for example, the "Minuteman" type — as well as antiaircraft guided missiles with their fins (opereniye) removed, can be easily housed in mobile shelters. Certain difficulties arise in providing shelter during the process of checking out assemblies and erecting missiles; however, the employment of assembly

* See Figure 1.

dollies of the torpedo complex type assures accommodation within the above dimensions.

The weight of technological equipment and personnel carried in the special motor vehicles of missile units is usually not more than 2 to 2.5 tons. If the weight of the new supporting casing is taken, on an average, to be 2 to 3 tons, then the cargo capacity of the existing series of vehicles turns out to be fully adequate.

On the basis of analyses of the size and weight of missile equipment, as well as of numerous designing decisions, it can be asserted that it is possible to fit successfully into the mobile shelters of the automobile-shelter prime mover-shelter, and trailer-shelter types the equipment of all types of special vehicles, workshops, control points, and communications centers, of missile units and large units located in stationary conditions at positions, with the exception of the radar cabin of the antiaircraft complex, and extra large missiles. The latter require special reinforcement measures.

Trailer-shelters can also successfully protect a missile checkout point, and even a missile erecting (montazh) point. Considering that checkout takes $2\frac{1}{2}$ to 3 hours, and erection about $\frac{1}{2}$ to 1 hour, it can be asserted that they considerably increase viability.

The use of containers which can be lowered as a means of hardening the armaments on combat vehicles, the creation of TZM* on the wheelbase of the armored personnel carrier, the increase in protection of transport vehicles, dollies (telezhka) and other equipment by technological hardening measures (devices for fastening equipment to the ground, use of outriggers, the hardening of the running gear and cab within the limits of permissible transport weights), will raise the viability of missile equipment 3 to 4 times.

* See Figure 2.

In addition, mobile shelters in missile units ensure good conditions for accommodating personnel, which is extremely important to successful work and handling of the equipment.

Let us examine the second type of mobile shelters—portable ones (vozimoye). These are fabric-framework, folding, pneumatically inflatable or container (konteyneroye) shelters, in which the supporting casing is not fixed to the transporting chassis, and personnel and equipment can be accommodated in them when they have been prepared for use. They are industrial products, intended to be used many times, but they require considerable expenditure of time and labor to be set up, and especially to be dismantled, as well as a large quantity of transport resources. Such shelters reduce the mobility of missile troops substantially, and do not fully ensure their due protection and combat readiness.

Thus, a comparative analysis of mobile and portable shelters from the standpoint of their combat effectiveness, viability, erection time, transportability, magnitude of expenditure of transport, machinery and cost, indicates that the former more fully meet the requirements of highly mobile operations with the mass employment of nuclear/missile weapons. However, the use of the portable shelters will be necessary for equipment of very large dimensions.

The expenditure of funds on the creation of mobile shelters is fully justified, in view of the fact that they can be used many times, and will considerably reduce losses in personnel and equipment. Most advantageous will be the creation of shelters on the wheelbase of the chassis of organic, serial-production models of automobiles, prime movers and trailers in conjunction with the production of special vehicle-shelters (mashina-ukrytiye). Numerous experimental projects have shown that the supporting duralumin casings — the bodies of the shelters — can be manufactured at factories separately. The fitting of these casings to the chassis will involve only minor assembly

work. The making of the casings themselves, can be implemented by wide use of stamping and welding. The cost of a duralumin casing is 1,500 to 1,800 rubles. Taking into account the prospects for the development of the aluminum and plastics industries, it can be asserted that the cost of casings can be greatly reduced within the next few years.

With the object of ensuring viability during the actual launching of a missile, in our view, with the use of mobile shelters the following combat groups can be created:

1. Mobile, durable launching assemblies (P_{pov} - 0.5 kg/cm^2) and a group of mobile shelters (P_{pov} - 3.5 kg/cm^2) for monitoring the launching (by the commander's vehicle, the communications vehicle, the radar station and the meteorological station, etc) at a distance from the combat vehicle (of the type used for tactical and operational-tactical missiles).

2. A fixed assembly and launch pit (shakhta) which ensures greater durability in the launch of a Thor-type missile (P_{pov} - 1 kg/cm^2) and a group of mobile shelters for monitoring the launching (P_{pov} - 3.5 kg/cm^2). The time required to set up the shelters is up to 2 hours; time to take them down, about 1 hour.

3. A shelter for a Jupiter-type missile in a horizontal protective container (coffin) with a hardened erector-launcher (P_{pov} - 1 — 3.5 kg/cm^2), as well as a set of mobile shelters for monitoring the launching (P_{pov} - 3.5 kg/cm^2). The time needed to set up and take down the shelters is the same as for variant 2. above.

4. The shelter of a missile in a protective silo (kolodets) of the Minuteman-type (P_{pov} - 3.5 kg/cm^2 and higher), and the monitoring complex in mobile shelters (P_{pov} - 3.5 kg/cm^2). Making the silo takes up to 6 to 10 hours; setting up and taking down the shelters takes 1 to 2 hours.

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Variant 1. above has been the one used most widely so far for protection when siting areas are changed frequently; in missile units changing their positions once in 24 hours or less, all the other variants can be used.

For subunits of tactical missiles and for antitank guided missiles, in view of the fact that they are in the zone of effective fire and frequently change their positions, trenches alone are not sufficient. It is essential to make extensive use of tracked armored personnel carrier-shelters and of armored prime mover-shelters (mobile shelters) to effect the hardening of equipment, as well as the frequent change of disposition areas. When setting up siting areas for these missile units, often under enemy fire, use should be made of tanks equipped with bulldozer attachments (BTU) and detachable gear for self-entrenching.*

In siting areas of missile units and large units, sufficiently removed from the main line of resistance, it is possible to make use of wheeled shelters on the wheel-base of automobile-shelters and of trailer-shelters with duralumin supporting casings. In these instances, it is best to carry out entrenching with MDK unarmored earth-moving vehicles and with detachable gear on organic prime movers.

In this way, tactical missile subunits will include, organically, mobile armored shelters for the protection of their principal personnel, armaments and equipment, and also support detachments of armored vehicles with detachable earth-moving equipment. Operational-tactical missile units and large units will include in their composition: mobile subunits of antiaircraft and antilanding defense, support detachments of mobile, high-capacity earth-moving and road-building vehicles, as well as detachments for setting up dummy launching sites.

* See Figure 2.

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The use of mobile shelters will make it possible for the combat formations of missile units to be arranged more densely in the form of strongpoints, which will ensure coordination of fire with the object of self-defense against enemy landings and sabotage groups.

The support detachments, sent out in advance to the new siting area, will be able to prepare the pits while the missile unit is on the move, and only a few minutes will be needed for the covering and camouflaging of the shelters. Calculations show that the setting up of a siting area takes less than 2 to 3 hours, and the dismantling less than 1 to 1½ hours, which corresponds with the tempo of a modern operation, and enables shelter of the missiles before the enemy detects them and delivers nuclear strikes against them. The expenditure of manpower and machines under the new method will be 10 to 15 times less than under the old.

Missile units, thanks to the use of mobile shelters and detachments of high-capacity earth-moving equipment, will be enabled successfully to combine mobility with rapid and frequent setting up of highly viable siting areas, which guarantees greater combat effectiveness.

Let us examine some aspects of the setting up of siting areas for missile units and large units.

A tactical missile battalion (battery), in view of its short range of fire and the high speed at which troops advance, is compelled to change its siting area up to 5 times a day. Under these conditions, 1 to 2 hours will be required to set it up. If trenches alone are dug in this period of time, then the battalion's losses (figuring density of fire at 5 weapons of low yield or 2 weapons of medium yield) will be greater than 50 percent. A set of corrugated steel (KVS-U) shelters is unsuitable for use, because of time and expenditure of transport and manpower.

The most practical way of ensuring the viability of a battalion located in a siting area, and of creating reliable reinforced positions in the course of an operation, lies in

the use of tracked armored personnel carrier-shelters and armored prime mover-shelters for personnel and equipment, as well as the inclusion in the composition of a battalion of a platoon of tanks with BTU or of combat engineer earth-moving tanks (of the American T-118 type). All the battalion's special vehicles (control points, radar stations, meteorological stations, and others) can, so far as their size and weight are concerned, be built in the form of the described shelters. By this means the battalion will receive a high degree of comprehensive all-around antinuclear protection. Possible losses when using armored shelters with a light covering of earth will not exceed 5 percent, whereas in trenches the losses would be 30 percent, and on the move (when outriggers are available) - 38 percent.

An operational-tactical missile brigade is relocated once or twice a day, and has not more than 12 hours for the engineer preparation of the siting area. According to present views, it is necessary to build in this area 200 open, shallow trenches and /figure missing/ underground shelters, (ubezhishche) and blindages. In this process, for the execution of first-priority work, up to 2 days will be required, and for second priority, 1 to 2 days. The expenditures of materiel, manpower and transport needed for such work is exceptionally great. The viability of the siting area against nuclear strikes, radiation and chemical attack is very low when structures of this type are used.

In our view, the way out of the present situation lies in the use of mobile shelters, the hardening of existing models of equipment (launchers, tanks ((tsistern)) containers, transport carriers and motor vehicles) (Figure 1), the inclusion in the composition of a brigade of special detachments of high-capacity earth-moving equipment of type MDK, as well as of mobile detachments for erecting dummy positions and of subunits for local defense against landings and low-flying aircraft. The presence in each shelter of means for firing and observation, and of a portable system of controlled /one word missing/ will make it possible to set up in a few hours a brigade siting area consisting of several groups interconnected by reliable means of anti-infantry and antitank self defense. The use of mobile

shelters will make siting areas highly viable, and easy to set up quickly.

An antiaircraft missile regiment, which has a limited range of fire (25 to 35 km.), has to change its siting area not less than 3 to 4 times a day, while the time for engineering work at each area will be not less than 2 to 3 hours. Especially vulnerable are its radar stations with large, sail-like antennas, as well as special, covered vehicles. Owing to the fact that the combat equipment has to be in the open when firing, and requires constant communications with service equipment, the personnel of the regiment will, for the most part, be unable to take shelter.

Of special importance for increasing the viability of siting areas of antiaircraft missile units, over and above the measures indicated for tactical and operational missiles, will be the hardening and fortifying of the radar station cabin, the employment of containers for the protection of missiles ready for firing, and the hardening of the launcher. A sample variant of the employment of mobile shelters for an antiaircraft regiment is given in Figure 2. The degree of viability of the siting area when using this variant is increased 8 to 10 times, while the period to set up the area will be reduced to 1 to 2 hours.

In order to support the operations of a front, the latter may well be provided with both mobile units and large units of strategic missiles. The above-mentioned ways and methods of setting up and raising the viability of siting areas, command posts and assembling and erecting bases of mobile units of strategic missiles will, in our opinion, also come into extensive use. The greatest difficulties here will arise only in providing protection for the missile at launch.

With a view to achieving the practical development of this new way of ensuring the effectiveness and viability of siting areas of missile units under conditions of highly mobile operations and mass employment of nuclear/missile

weapons, it is essential that there should be collaboration between missile specialists and fortification experts.

Preliminary theoretical trial design and experimental work has demonstrated the complete practicability in modern conditions of this new way of providing troop fortifications, especially for supporting missile units in conjunction with measures for the hardening of equipment, camouflage, dispersal, changing of areas, and the use of permanent open field works.

The practical realization of this aim is not a matter for the distant future. Numerous developmental projects of the Military-Engineering Academy have proved that even now, on the wheelbases of the existing chassis of automobiles MAZ, YaZ, ZIL, of artillery prime-movers ATT, ATS, ATL, of armored personnel carriers BTR-60 P, BTR-50 P, and of trailers of the Serdobsk plant, it is possible to make mobile-shelters for control points of missile units, for technical batteries, PRTB (mobile technical-repair bases), etc. More prolonged work will be needed to develop ways of hardening radar cabins and launching equipment, and this will evidently fall into the second stage of solving the problem of increasing the viability of launching positions. At present, it is possible only to make stronger containers for the protection of the components of missiles at depots.

Thus, even in the near future, the degree of viability of a number of the most important subunits of missile units and large units, under the new conditions of highly mobile operations, will increase considerably. The solution of this problem will have the greatest significance in the initial period of a war, when the density of destruction and the maneuverability of missile positions may be particularly great.

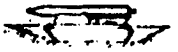
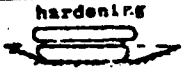
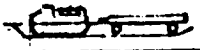
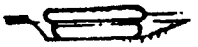
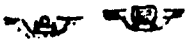
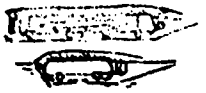
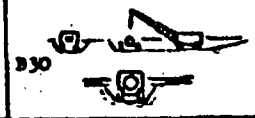
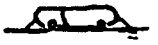
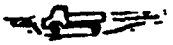
DESIGNATION	EXISTING	PROPOSED
Launchers		 hardening
Special vehicles - heating, degassing, survey (topoprivyaznik), control		 cars, trailers - shelters
Carrier		 hardening
KP(D) - Battalion Command Post US - Communication Center MS - Meteorological Station RLS - Radar Station MP - First Aid Post REM - Repair/maintenance shop		
Checkout (kontrol) shelters		
Erecting point (punkt montazha) Special tanks		 hardening
Transport vehicles		 hardening

Figure 1: Mobile shelters and hardening of equipment of operational - tactical missiles.

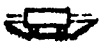
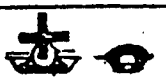
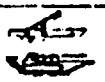
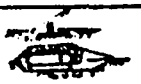
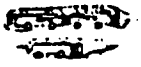
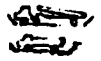
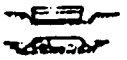
DESIGNATION	EXISTING	USING MOBILE SHELTERS
Control Point		
Antenna cabin (hardening)		
Launcher (hardening)		
TEM (hardening)		Containers 
Earth-moving vehicles		Tank with STU 
Subassemblies depot		
Checkout (Poverka)		
Transloading, fueling (hardening)		
Care for housing communications control points		

Figure 2: Mobile shelters and hardening of equipment of antiaircraft missiles.