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FM 5-20B

WAR DEPARTMENT FIELD MANUAL

U.S. ARMY MILITARY HISTORY INSTITUTE
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CORPS OF ENGINEERS

CAMOUFLAGE OF VEHICLES

WAR DEPARTMENT • APRIL 1944

MANUALS IN THE FM 5-20 SERIES

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| FM 5-20 | Camouflage, Basic Principles |
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WASHINGTON 25, D. C., 2 April 1944.

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G. C. MARSHALL,
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OFFICIAL:

J. A. ULIO,
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The Adjutant General.

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(For explanation of symbols see FM 21-6.)

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CHECK LIST

1. QUARTERING PARTY

- a. Make reconnaissance of area to be occupied. If aerial photographs and large-scale maps are obtainable, study them before and during reconnaissance. Purpose is to—
 - (1) Provide adequate dispersion.
 - (2) Site unit parking within dark and heavily textured areas of the terrain pattern. Make use of overhead cover, clumps of bushes, scrub growth, and folds or other shadow-casting irregularities in the ground surface.
 - (3) Take advantage of overhead cover and the terrain pattern to conceal traffic circulation.
- b. Make a track plan, preferably on a map overlay. This is necessary to prevent violations of camouflage discipline and to take full advantage of natural terrain features. Copies should be distributed to all motor officers and key unit N.C.O.'s. Track plan should—
 - (1) Make full use of all existing roads and paths for entering and leaving, for circulation within the area, and for access to security outposts.
 - (2) Locate new routes close to and parallel to lines which are normal features of the terrain pattern.
 - (3) Provide one-way traffic circulation.
 - (4) Show portions of routes to be wired in.
 - (5) Show portions of routes to be patrolled by traffic guides to prevent short cuts and other violations of camouflage discipline.
 - (6) Show portions of routes and parking areas requiring overhead or oblique screening.
 - (7) Show portions of routes where tracks must be obliterated after traffic has passed.
 - (8) Show locations of traffic signs. Reflectors and lighted signs for night traffic should have natural or artificial overhead screening.
 - (9) Show locations of soft or soggy areas which may become noticeably rutted.
 - (10) Show locations of unloading areas.
 - (11) Show locations of unit parking areas.
 - (12) Show locations of areas where materials may be cut without making scars attracting attention of enemy aerial observers.

2. MOTOR OFFICERS

- a. Instruct drivers in details of track plan. Make sure they understand purpose of it.
- b. Check parking for—
 - (1) Dispersion.
 - (2) Concealment measures.
- c. Cover repair and refueling areas with overhead screens, if natural overhead cover does not exist.

3. DRIVERS

- a. Maintain dispersal distances on the march, at halts, and in bivouac.
- b. If vehicle breaks down, don't park in an open field. If possible, pull off main road on to a side road and park under trees, or in the shadow of bushes or a building. Drape vehicle if repairs will take more than a short time. Don't keep shiny tools or repair parts in sun, where reflections may attract enemy airmen.
- c. Follow traffic signs and instructions of traffic guides when approaching, within, and leaving a concealed position. Keep to designated routes, unloading areas, and parking areas.
- d. Don't make unnecessary noises during concealed movements. Disconnect horns during these operations.
- e. To conceal your vehicle in a parking area—
 - (1) Park under overhead cover, if available, or parallel to and close beside a building, hedge, or other natural terrain lines, or close beside a clump of bushes. Park to take advantage of shadows.
 - (2) To prevent shine, cover windshield, headlights, cab windows, and taillights with mud, rags, foliage, or prepared covers. To conceal betraying shadow, drop curtain over rear entrance to cargo space.
 - (3) Drape with net. Arrange props so net is at least a foot above top of vehicle, and so props make soft and irregular bumps in net. Pull edges of net out as far as they reach and stake them to the ground. In sparsely wooded areas, carry props and stakes with you.
 - (4) If vehicle is *not* draped, use cut foliage to break up form of vehicle and the shadow it casts. If vehicle *is* draped, use cut foliage to break up prop bumps and edges of net. Choose foliage which blends with the surroundings and keep it in its natural growing position.
 - (5) If in bivouac or a concealed position, cut foliage only in areas designated for that purpose.
 - (6) Don't wash body of vehicle unless ordered to by motor officer. In some terrains, mud and dust help to blend vehicle with surroundings.
 - (7) Maintain blackout discipline at night.

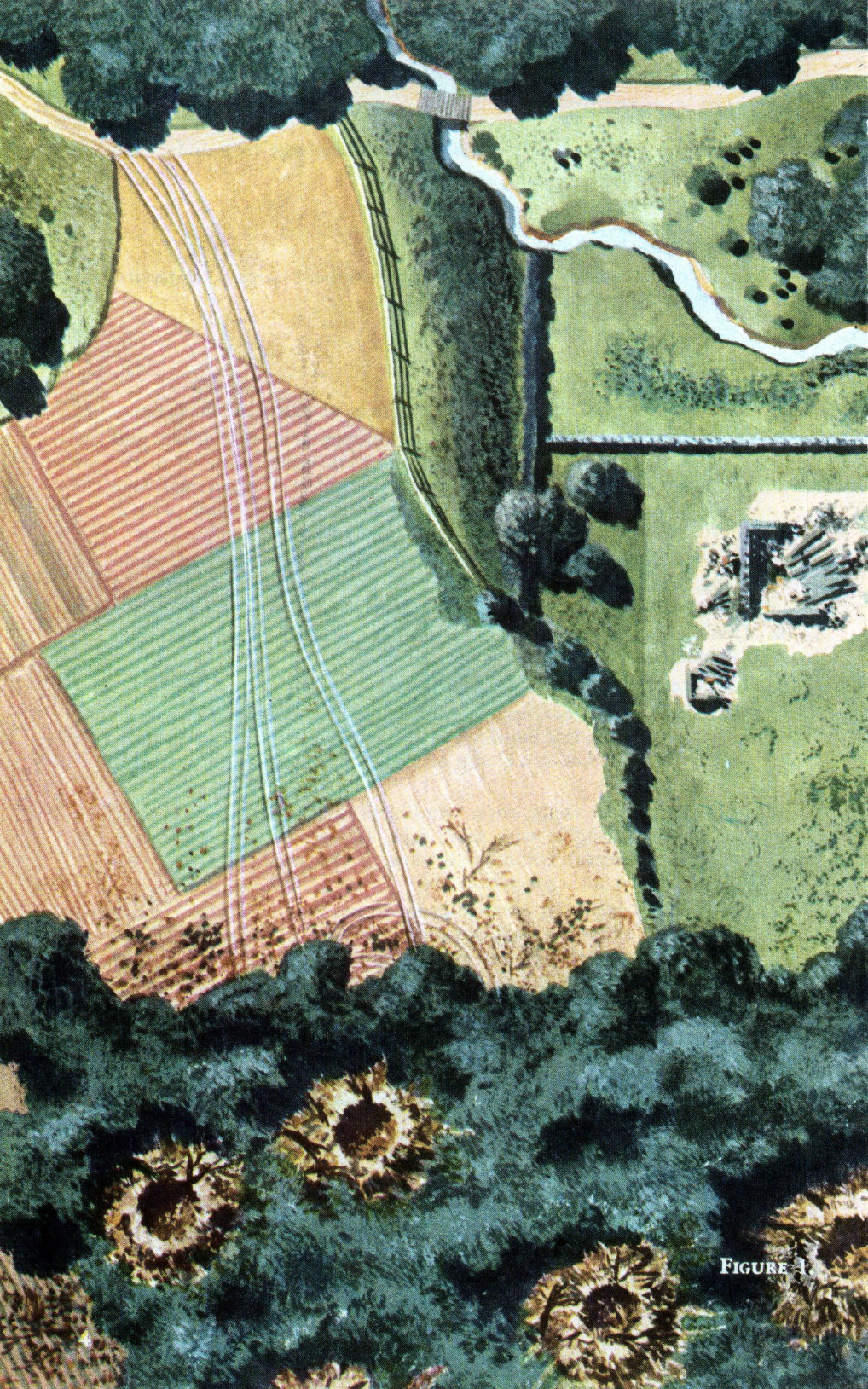


FIGURE 1

CAMOUFLAGE OF VEHICLES

INTRODUCTION

Knowledge of the principles of camouflage is as important to the vehicle driver as proper vehicle maintenance. A badly concealed vehicle can draw a bombing or strafing attack, which is even more crippling than a poor maintenance job. In either case, the result is a lost vehicle. In the case of poor camouflage, it may mean much more—enemy discovery of a unit, disclosure of an important tactical plan, or complete destruction of installations.

Camouflage of vehicles depends not only on concealing vehicles themselves but equally on preventing and concealing their tracks. Methods of solving these two problems are covered in this book.

Figure 1 illustrates the importance of track concealment. Three tracks cutting diagonally across the plowed fields lead enemy airmen to the position previously concealed in the lower part of the picture. This has been bombed out. Tracks like these are the result of either lack of training in adequate track planning or in proper camouflage discipline. This position would have remained undiscovered if vehicles had made only one new track to the position, following the fence line and the line of bushes.

It should be borne in mind that enemy ground and aerial observation is drawn quickest by anything which is moving, and that nothing can be done to conceal vehicles moving through undergrowth or along exposed routes.

ENEMY AERIAL OBSERVATION

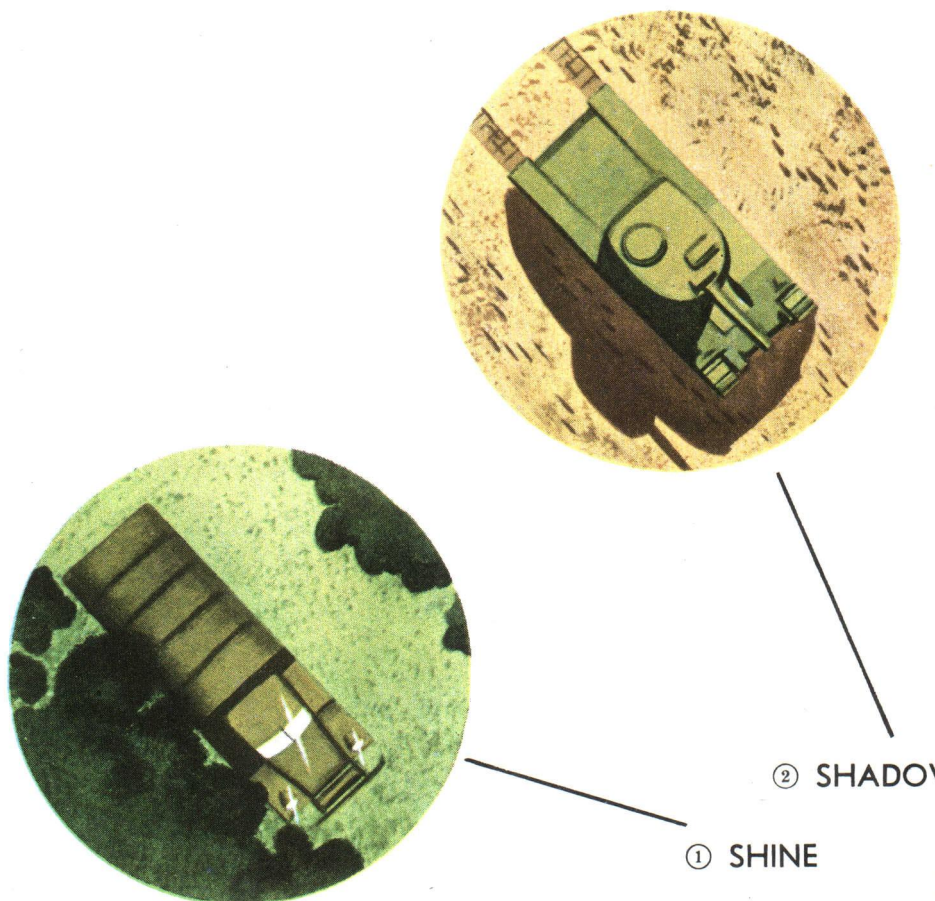
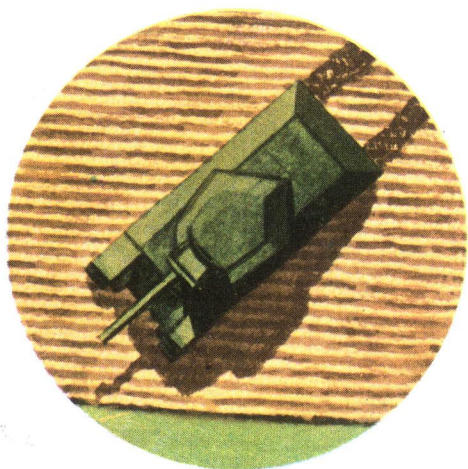
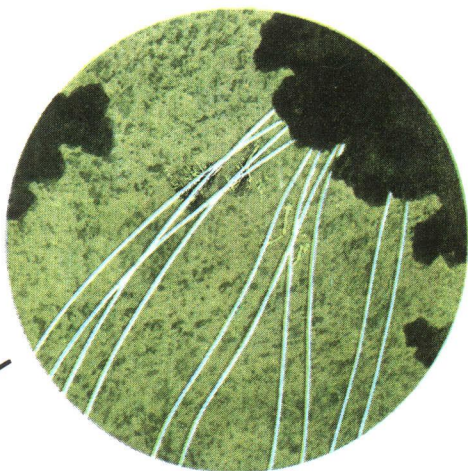


FIGURE 2.—The factors which reveal vehicles to enemy aerial observation and which must be concealed or camouflaged are illustrated above. Aerial observers and photo interpreters are able to locate vehicles and often to identify their types, number, and intentions by detecting the presence of one or more of these factors. Even where the color of the vehicle is similar to its surroundings, the "value," or difference in lightness and darkness between them, may indicate the presence of the object. In an ordinary photograph, "values" indicate the presence of objects that are differently colored. When it is impossible to make a vehicle the same color as its surroundings, much is accomplished if the lightness or darkness of the vehicle is made similar to the surroundings.

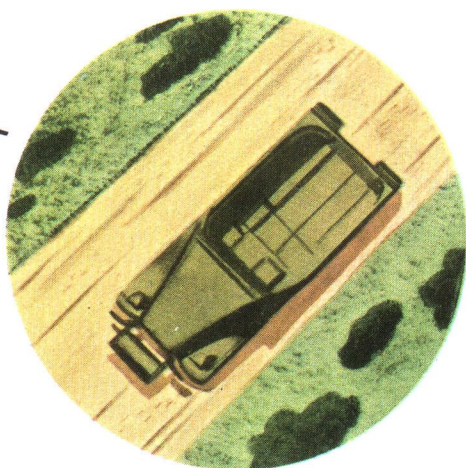


③ SHAPE



④ TRACKS

⑤ COLOR
AND VALUE



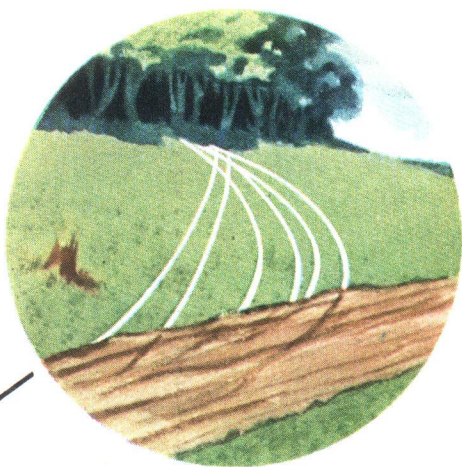
ENEMY GROUND OBSERVATION



② SHADOW

① SHINE

FIGURE 3.—Vehicles are revealed to both ground and aerial observation by the same factors. However, because there is a tremendous difference in the appearance of a vehicle when seen from the ground and from the air, different measures must be taken against each kind of observation.



③ SHAPE

④ TRACKS

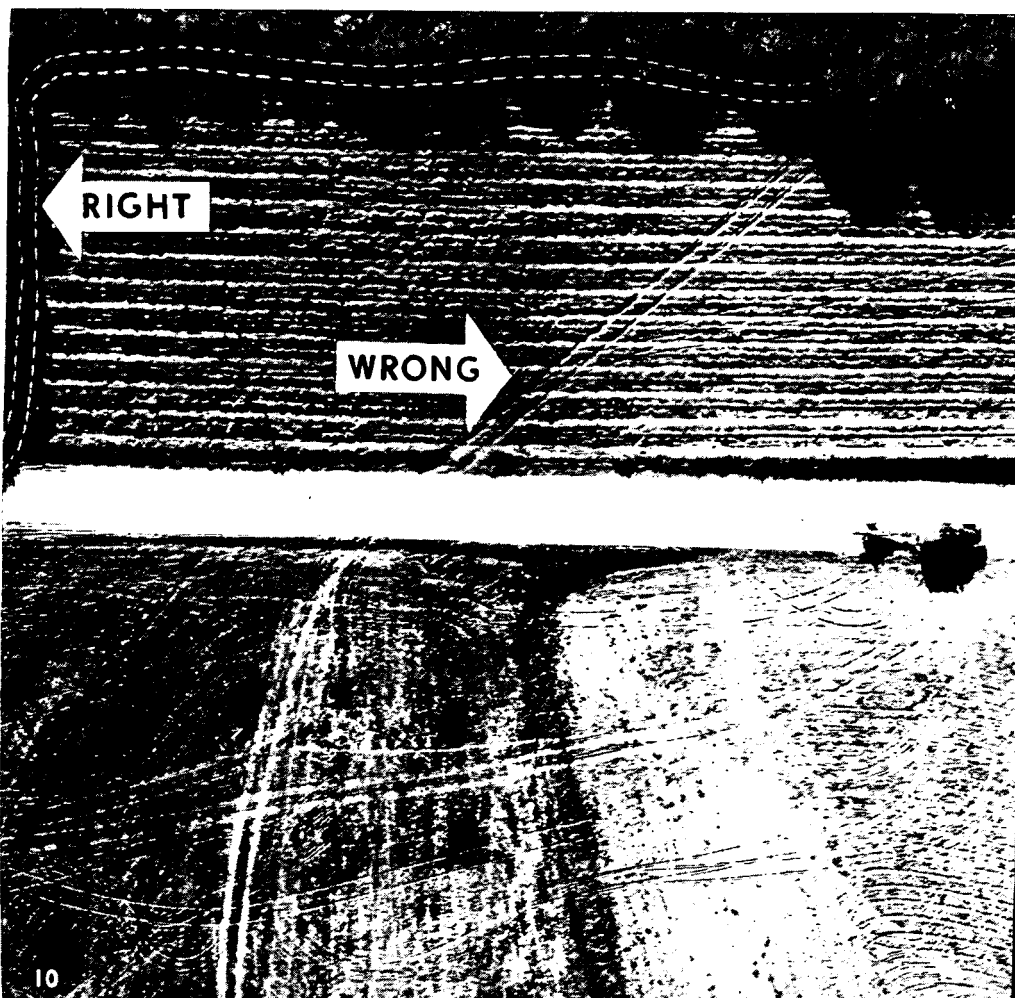
⑤ COLOR
AND VALUE



TRACKS

Tracks are especially revealing signs to the aerial observer and to the interpreter of aerial photographs. They may reveal the location, strength, and even the intention of a whole unit. The gradual turns of wheeled vehicles are distinguishable from the skidding turns of track-laying vehicles, and often a single track across an area of low vegetation is clearly visible.

FIGURE 4.—Tracks crossing natural terrain lines are noticeable, while tracks parallel to natural terrain lines are likely to be overlooked.



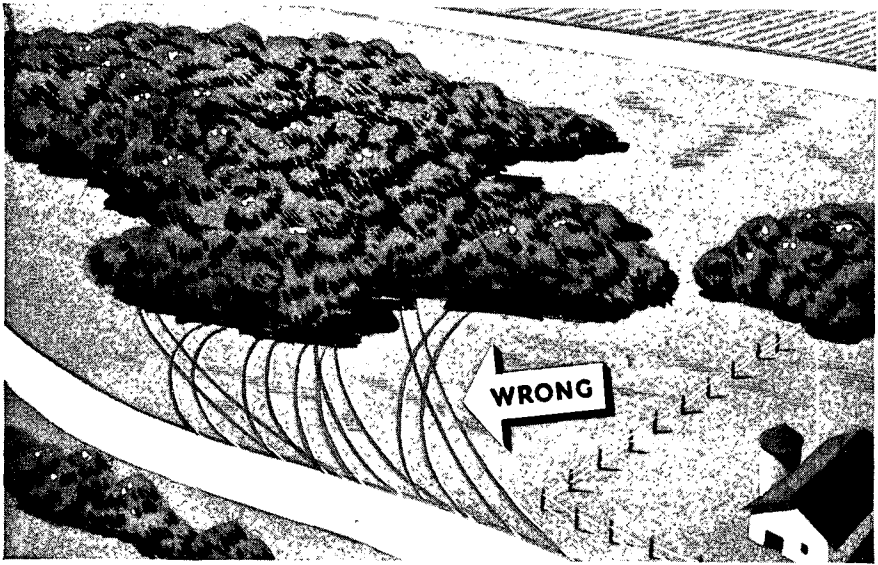
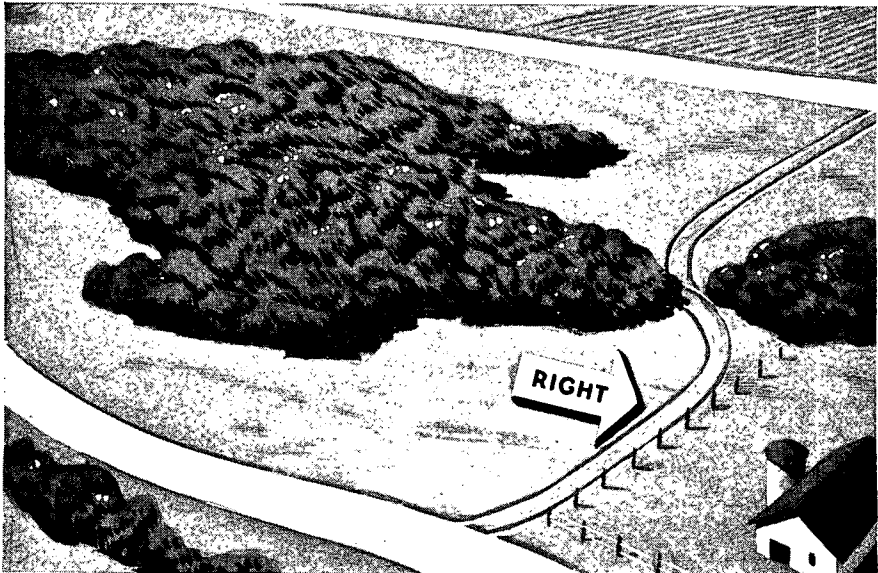


FIGURE 5 ①.—Here, tracks point clearly to a concealed installation or bivouac because of lack of planning and lack of camouflage discipline.

②.—Here is the correct way to gain access to a concealed position. Vehicles stay in one track which is continued past the position to a logical termination, such as a road. This track must show signs of equal wear throughout. Locate turnoff where it is least conspicuous.



TRACK DISCIPLINE AND SITING

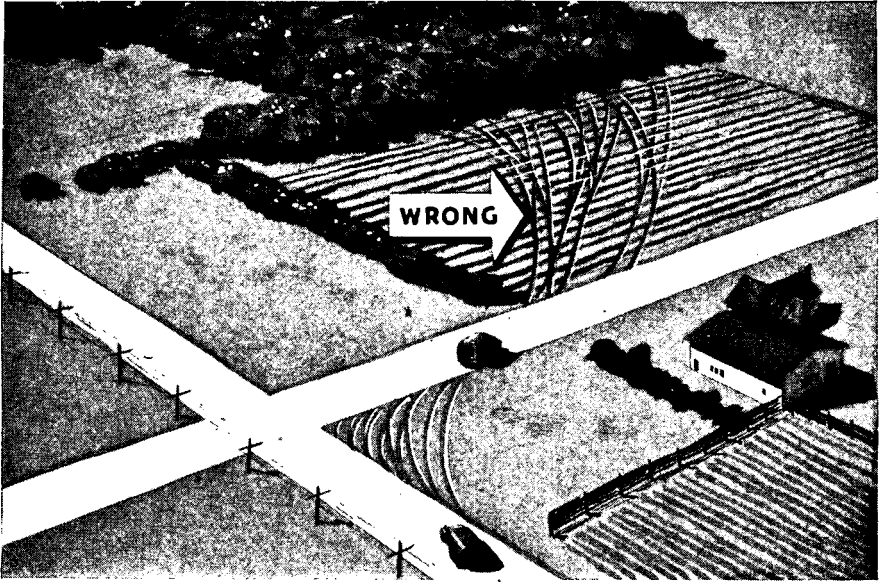


FIGURE 6 ①.—Cutting corners is a good indication to the enemy of traffic activity. It is a driver's responsibility to maintain the normal appearance of the terrain by not making this kind of scar.

②.—If there are no existing routes to a concealed position, any new ones should follow closely and be parallel to hedge lines, fences, cultivation lines, or other natural terrain lines. Tracks made this way are inconspicuous from the air.

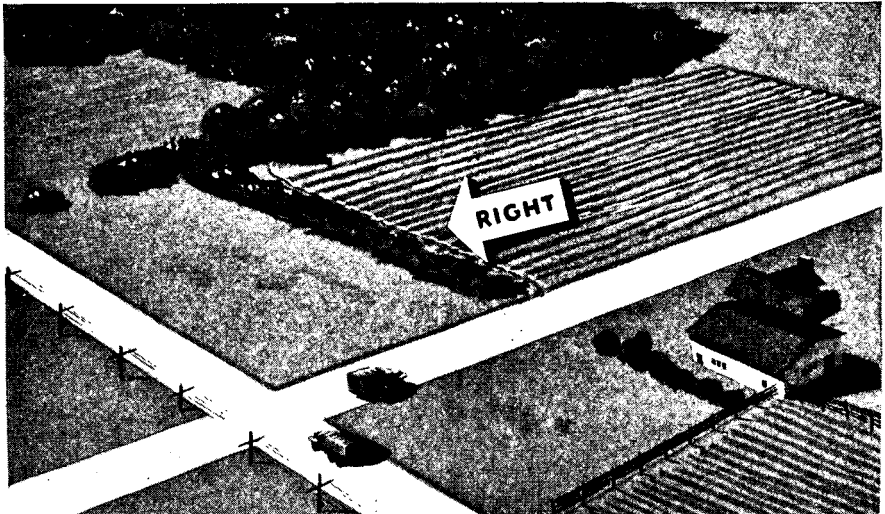


FIGURE 7.—WRONG. ① Corners cut short. ② Tracks and parked vehicles contrast with terrain pattern. Succession of track loops especially noticeable. ③ Good track plan spoiled by failure of three trucks to follow plan, and good siting plan spoiled by insufficient dispersion. ④ Bad siting around perimeter of large and unusually shaped terrain feature. Newly made tracks point to position. Insufficient dispersion.

RIGHT. ⑤ Existing tracks used for access. They have not been widened noticeably. ⑥ Good use of lines in the terrain pattern. Correct dispersion. ⑦ Good use of overhead cover. ⑧ Inconspicuous existing tracks to cultivated field.

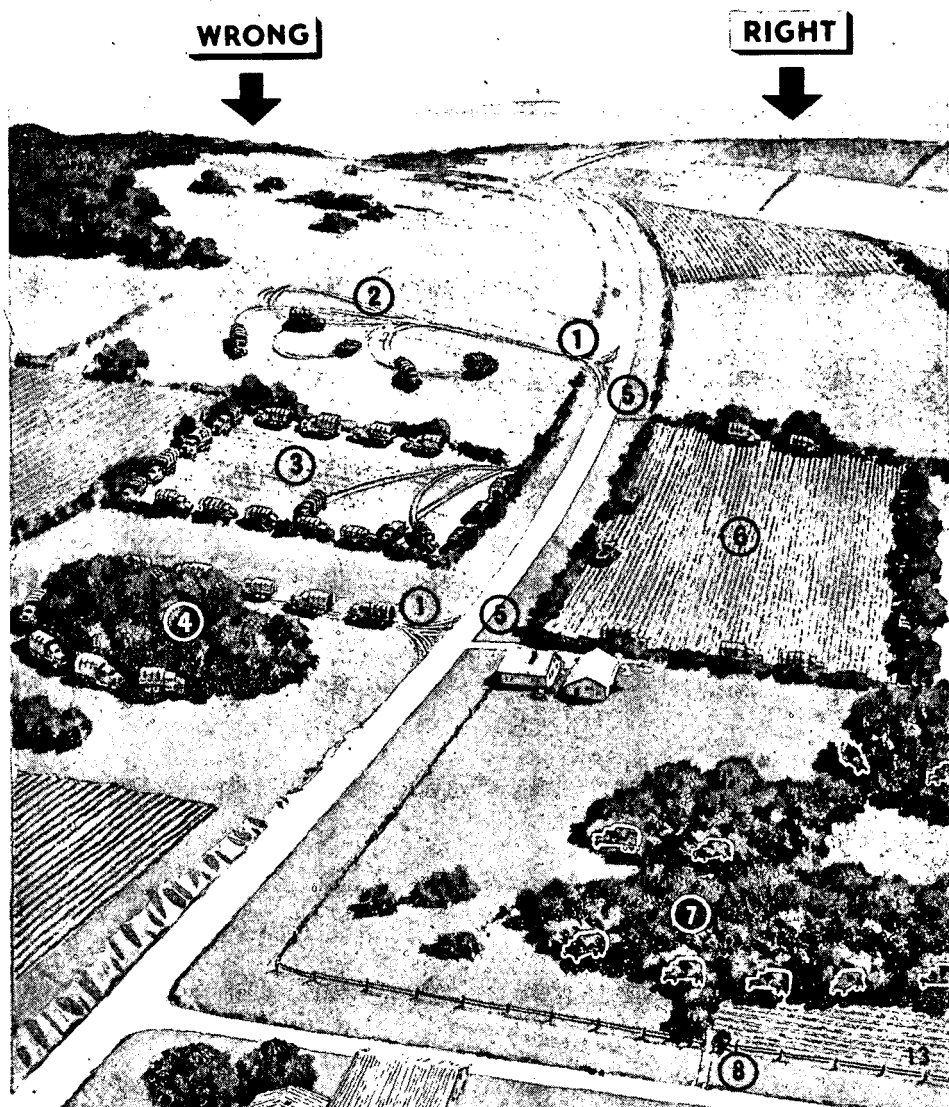




FIGURE 8.—Concealed entrance to a position. Route is wired in, and guides are posted to prevent changes in the appearance of the terrain.

CONCEALED ROADS

Completely concealed routes are rarely found. Even the comparatively small amount of timber which must be cut to clear a roadway through a wooded area leaves gaps in the overhead cover through which the road is visible to airmen. However, partially concealed roads are better than exposed roads, and reconnaissance parties should be sent out to find them. Gaps in overhead cover in important sections of a road can be concealed by erecting overhead screens of either natural or artificial materials (fig. 9). In other short stretches, exposed tracks may be erased by brushing leaves over them; or by raking sand, soil, or debris over them; or by placing brush upright on them after the heaviest traffic has passed (fig. 10). All concealed routes should be wired in in advance of use and guards posted to insure a minimum of disturbance in the area.

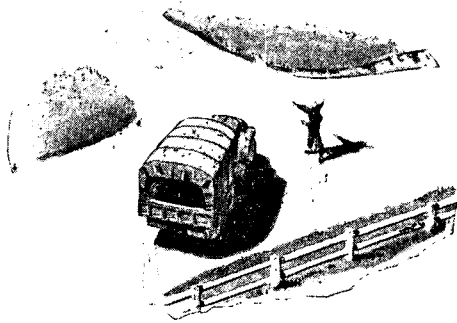


FIGURE 9.—Where short stretches of concealed roads have sparse overhead cover, they may be concealed completely by overhead screens tied between trees and garnished to match the surrounding foliage.



FIGURE 10.—Short exposed stretches of infrequently used access routes may be obliterated by placing brush over a scarred area or by brushing leaves, dirt, or other debris over it.

FIGURE 11.



TRACK PLANNING

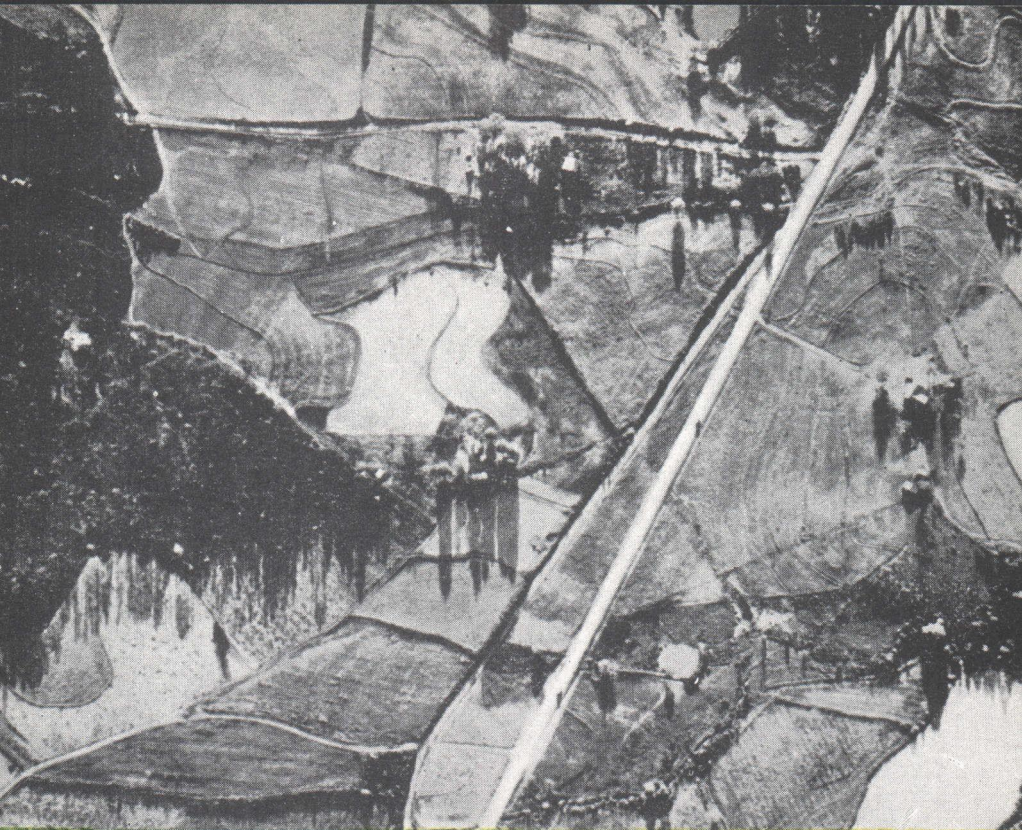
Before a unit occupies a new position, a quartering party must first make a reconnaissance and lay out a concealed track plan. No vehicle should enter the new area until this plan has been made and marked so that drivers can stay on the allotted routes. The quartering party should be capable of visualizing the appearance of terrain when seen from the air. A standard track plan is impossible—an individual solution is required for each installation. Track plan must be laid out to fit into the terrain pattern as inconspicuously as possible by taking advantage of existing roads, overhead cover, and shadow-casting lines which are a normal part of the terrain pattern.

Many factors which affect the character of the track plan must be considered by the quartering party. Some of these are: the duration of occupation; time allowed for entering and leaving; size, character, and mission of occupying unit; known distance from enemy; effect of climate on visibility; availability of all-weather road surfaces; and strength of mobile AAA. In addition to laying out a track plan on the ground itself, track plan should be sketched on either a map overlay or a sketch of the area. Parking areas are indicated as well as portions of routes to be patrolled by traffic guides, who are posted not only to insure that correct routes are taken but that camouflage discipline is maintained.

The photograph and overlay in figure 12 ① and ② illustrate a typical problem in track planning. Details shown on overlay are—

- ① Approach highway.
- ② Main bivouac entrance road.
- ③ Bivouac loop.
- ④ Bivouac exit road.
- ⑤ Two-way road linking bivouac and headquarters.
- ⑥ One-way road through vehicle park and headquarters.

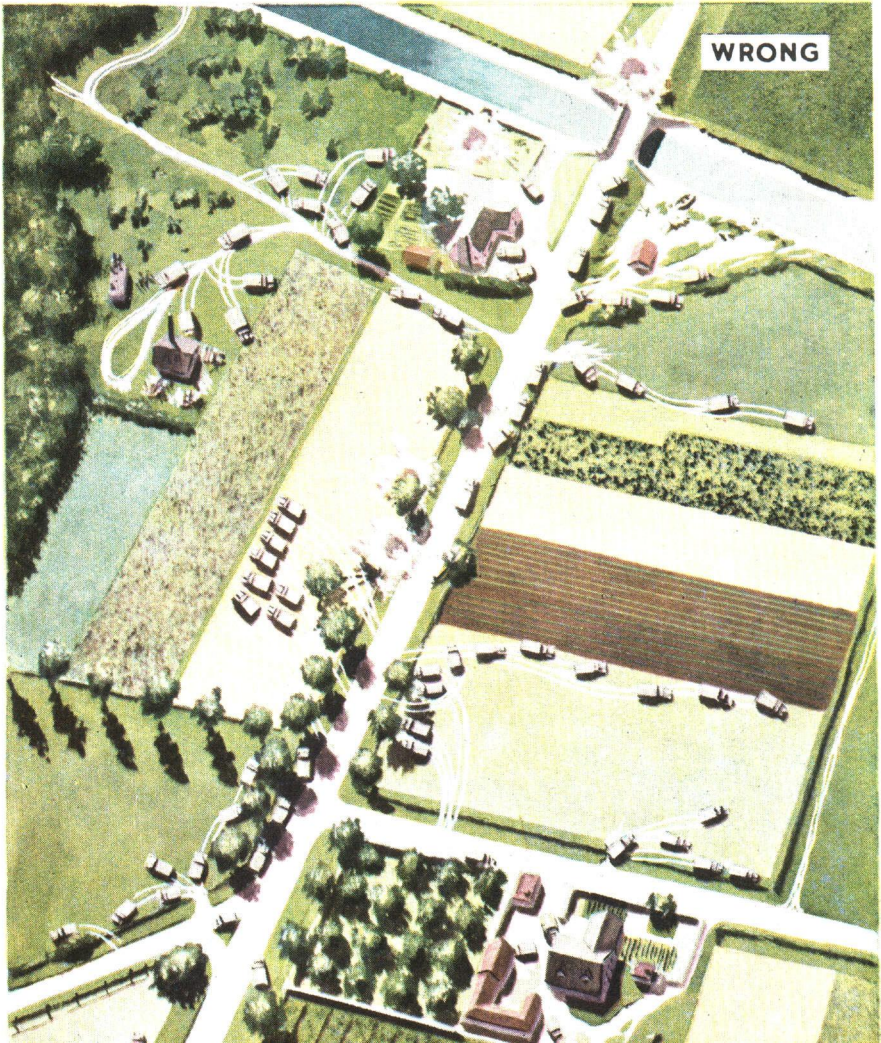
FIGURE 12 ① and ②.



SITING

Siting is choosing an advantageous position in the terrain pattern. The aim of good siting is to occupy the terrain without altering its appearance. To do this, park vehicles under natural cover whenever it is available. When cover is inadequate, park so the shape of the vehicle will appear to be a natural part of the terrain pattern.

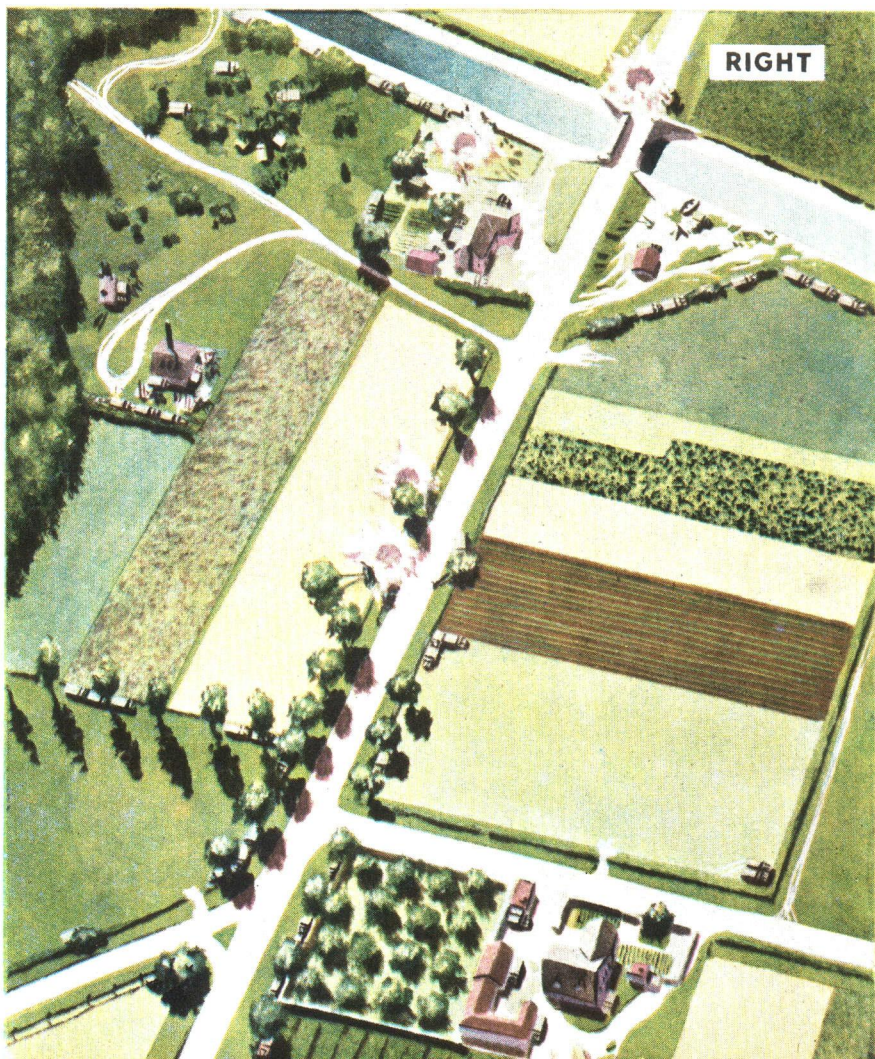
FIGURE 13 ①.—Bad siting. No enemy airman would miss the story of this scene. An undisciplined congestion of vehicles, parked without regard for the terrain pattern, must expect machine gunning and bombing.



Before a driver can site his vehicle to take advantage of the concealment possibilities of the terrain, he must learn how different types of terrain appear from the air. In combat zones, knowing this is as important as knowing how to drive his vehicle.

There are four main types of terrain pattern: wooded, agricultural, urban, and barren. Different percentages of these four patterns are contained in the illustration below. How vehicles should be parked in them is shown in the following pages.

FIGURE 13 ②.—Good siting. The vehicles are still there, but the appearance of the terrain is undisturbed. Some are in shadows, others under natural cover; their shapes blend with elements in the terrain.



SITING IN WOODED TERRAIN

Wooded terrain gives excellent concealment for a vehicle and its tracks. The pattern of wooded terrain is irregular. To preserve its natural appearance vehicles must disperse and park irregularly, at varying angles and unequal distances apart.

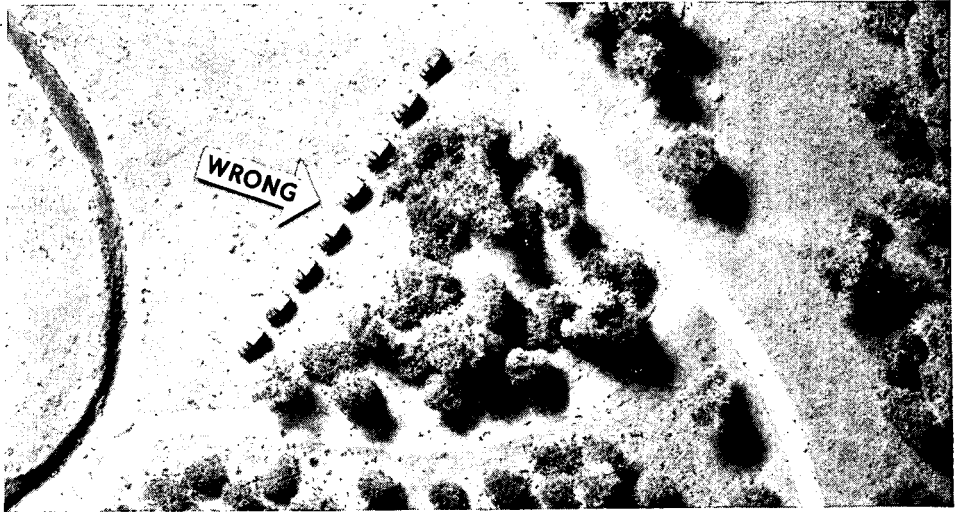
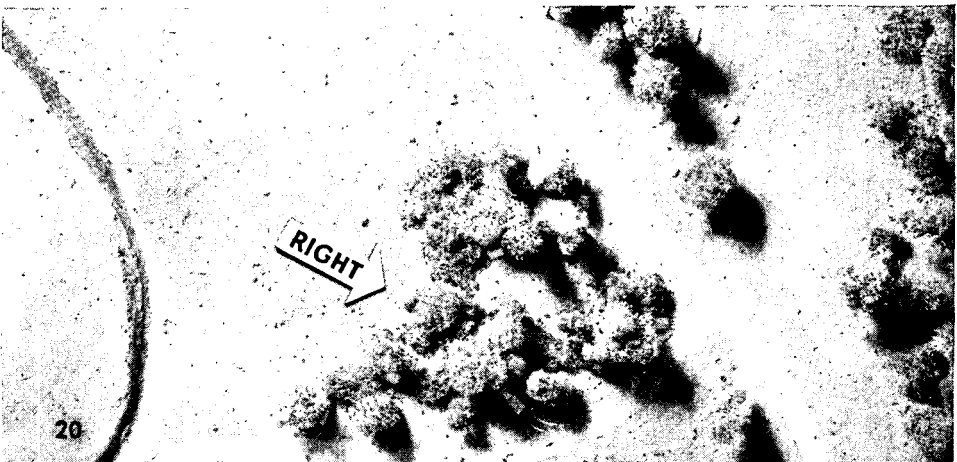


FIGURE 14 ①.—Straight line of convoy contrasts with normal pattern. Even if convoy disperses in woods, tracks would remain and give it away.

②.—Move off road on existing routes, or make shortest possible new ones where they are least likely to be seen. Disperse, park close to trees.



SITING IN AGRICULTURAL TERRAIN

The dominant characteristic of an agricultural terrain pattern is lines—fence lines, hedge lines, cultivation lines. A high degree of concealment is obtained if vehicles are dispersed parallel to terrain lines so that the lines remain more prominent than the vehicles.

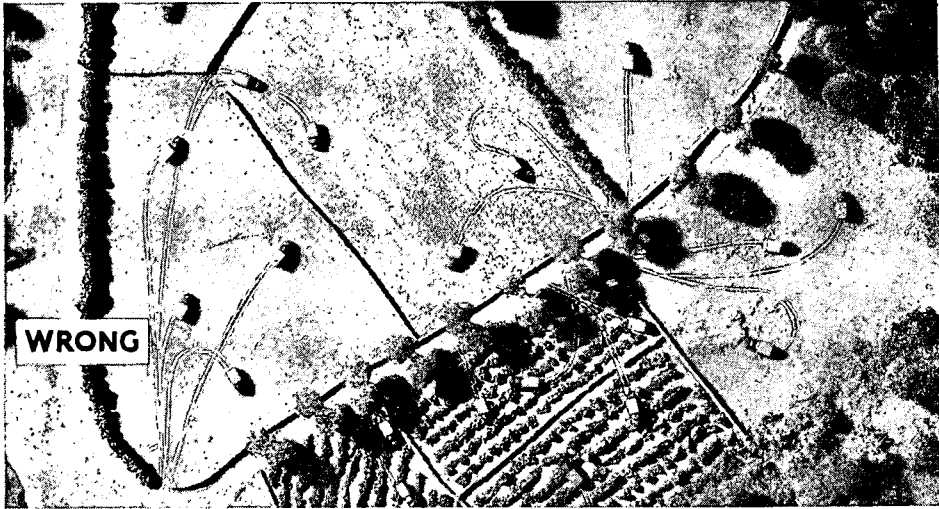


FIGURE 15 ①.—Don't alter the existing terrain pattern by parking in open fields, or by moving across them, or by cutting corners short.

②.—Park parallel to and as close as possible to fence lines, hedge lines, and cultivation lines. Tracks must follow these same lines.



SITING IN URBAN TERRAIN

The pattern of cities, towns, and villages affords many opportunities for concealment. There are large shadow areas, usually some overhead cover, and the wall lines of buildings can be used in the same way as hedge lines were used in the agricultural pattern.

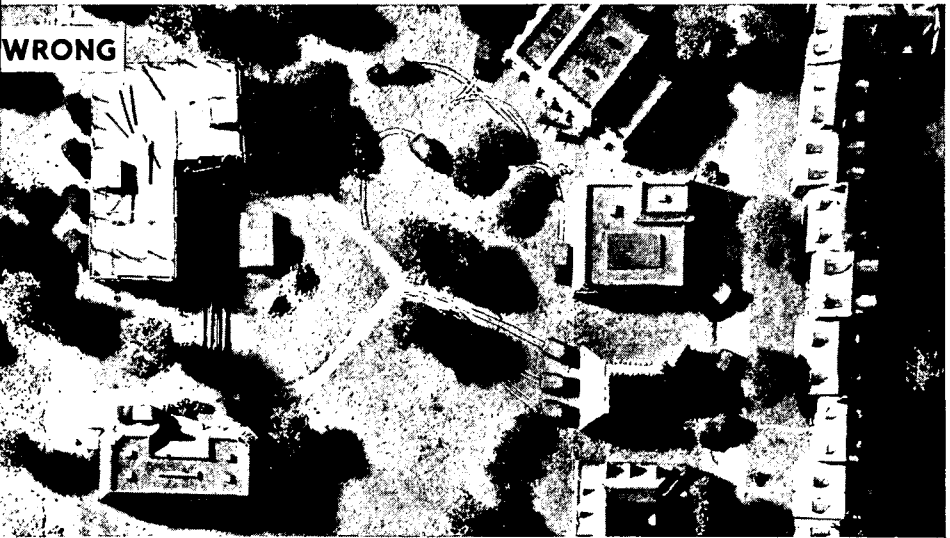


FIGURE 16 ①.—Follow existing routes. Don't park in open areas or at an angle to a building or wall. Don't ignore the cover of a few trees.

②.—Park under cover or so the vehicle is parallel to walls and buildings. Stay on their shadow side and as close to them as possible.



SITING IN BARREN TERRAIN

Even in barren terrain, such as a desert, at least partial concealment can be obtained by careful siting. Here the terrain pattern is composed of dry washes and other irregular folds in the ground, scattered rock accumulations, scrub growth, and the shadows from these.

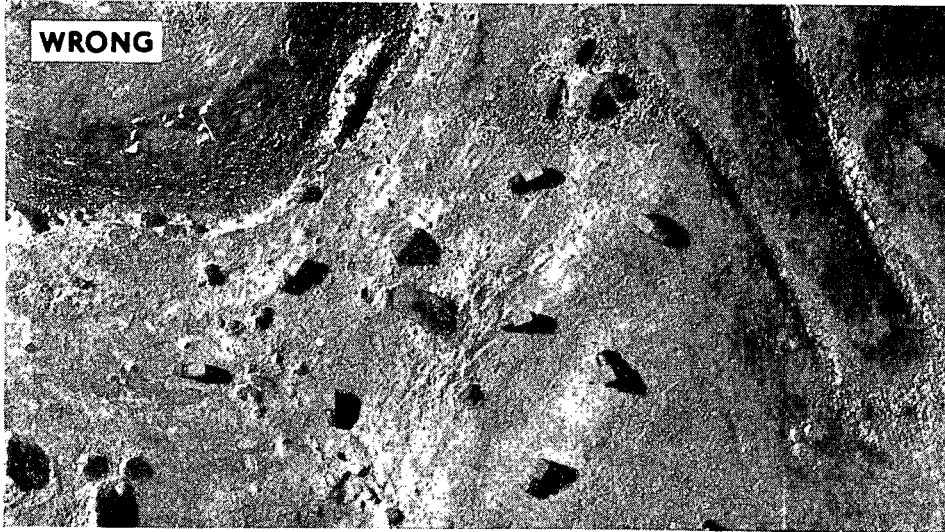
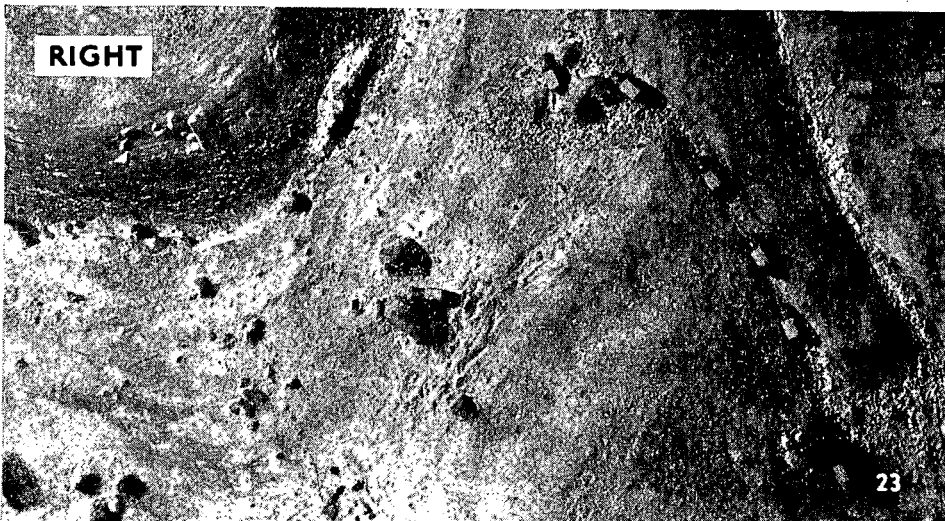


FIGURE 17 ①.—These vehicles and their shadows are conspicuous because they are in contrast to the smooth light areas where they parked.

②.—Disperse, and park so vehicle shadows are broken up by, or lost in, the shadows of folds in the ground, rocks, or scrub growth.



DISPERSION

Dispersion serves two purposes. The preceding pages have shown how dispersion aids concealment when vehicles are sited to take advantage of the terrain pattern. Dispersion also is the only effective way of reducing damage caused by a bombing or strafing attack made against a group of vehicles on the march, at a halt, or in bivouac.

The distance between vehicles when dispersed depends on the situation and is a command decision. Dispersion should be standing

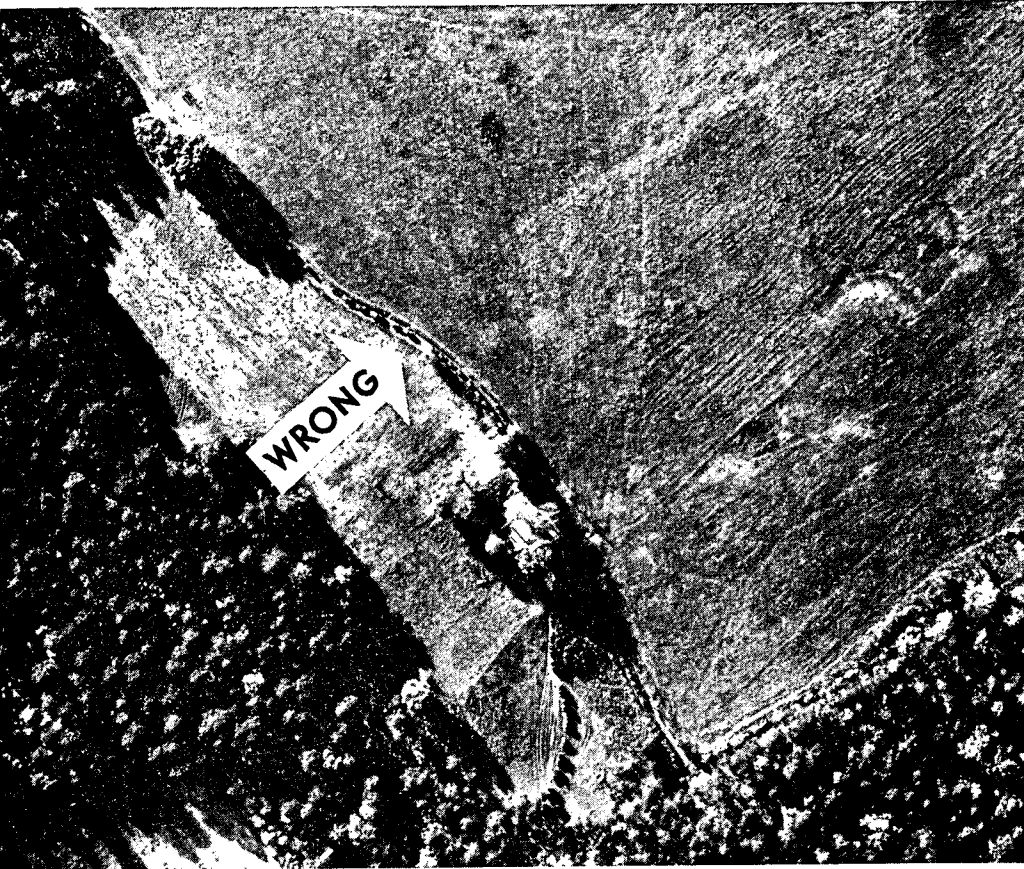


FIGURE 18 ①.—In a combat zone, columns like that in this photograph are attractive targets. The convoy is also conspicuous against the light-toned road surface.

operating procedure unless the unit commander specifically orders otherwise to meet a particular situation. Vehicles are always important targets for enemy bombing and artillery attack. On the march, if the enemy is overhead, they are sure to be seen, but they can make unprofitable targets of themselves. An unprofitable target is one in which a well-aimed bomb cannot possibly knock out more than one or two vehicles.

When vehicles are in terrain which does not restrict them to a column—as in a desert—maintain dispersion distances in width as well as in depth. This will further reduce the number of targets for an enemy bombing or strafing run.

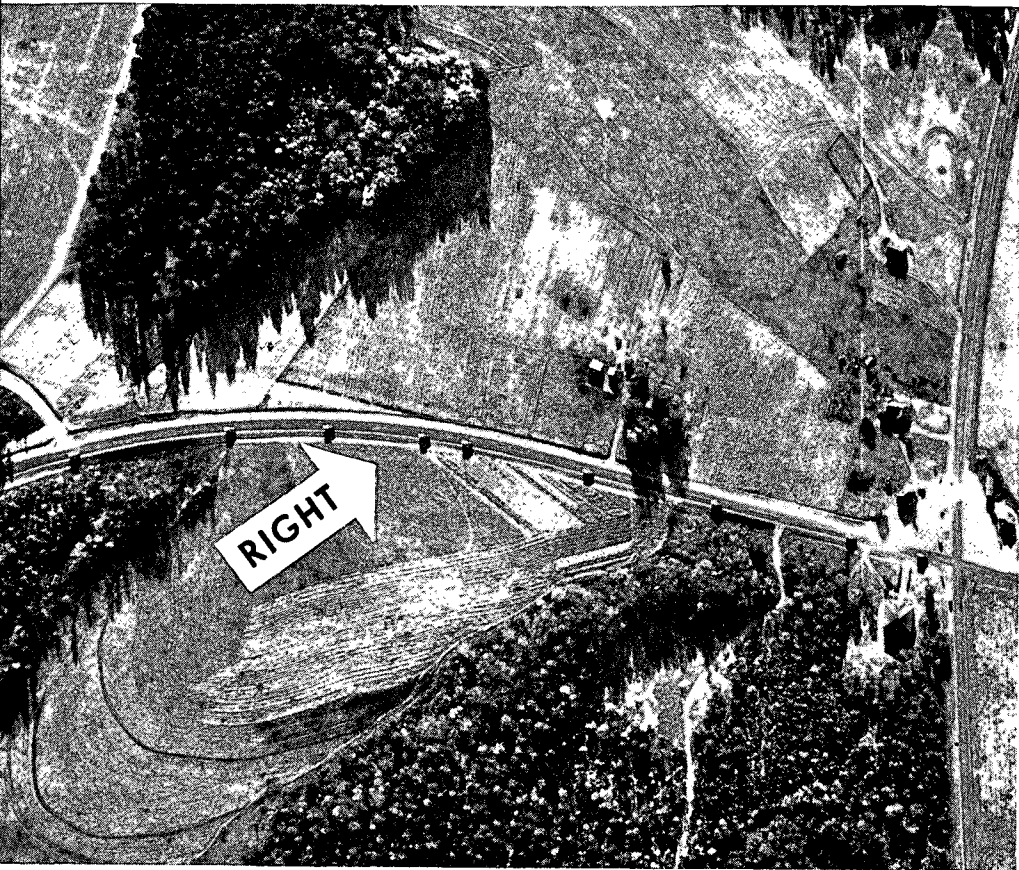


FIGURE 18 ②.—This dispersed convoy is harder to see than that in ① and unprofitable to bomb. A single hit on the road is unlikely to get more than one vehicle.

SHINE

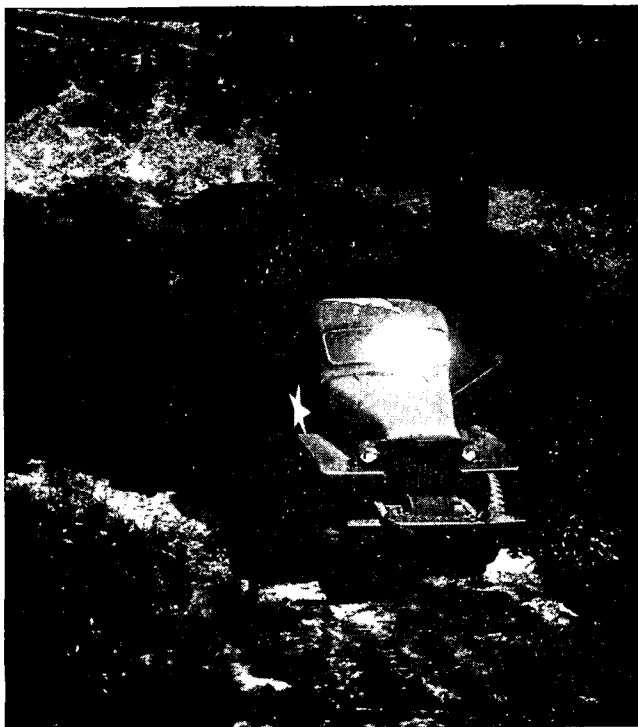


FIGURE 19.—Shine will betray a vehicle to the enemy observer a long distance away.

Siting and track discipline can do much to conceal a vehicle, but shine alone can nullify even the best siting and the best track discipline.

The existence of shine is not an accident; it is always present when there is light in the sky—sunlight, moonlight, or the light of flares. It is caused by windshields, headlights, cab windows, by wet vehicle bodies, even by light paint on the star insignia. These must be concealed by any means at your disposal.

FIGURE 20. — Blankets, shelter halves, or pieces of dark-colored burlap or osnaburg are expedients for covering the reflecting surface of a windshield quickly. Foliage may be used to cover headlights.



FIGURE 21. — The wise driver makes his own slip-on covers for headlights, windshields, and other reflecting surfaces. He keeps them covered at all times, if possible. They may be made of burlap, osnaburg, or salvage.



FIGURE 22. — Mud and leaves applied liberally to the windshield reduce shine. When moving, the area traversed by the windshield wiper should remain clear.





FIGURE 23.—Never underestimate the betraying nature of shine. The vehicles at the right are parked incorrectly—in line, bumper to bumper. They have tracked up the area unnecessarily. At lower left, the vehicles are moved back into the pattern of the woods and are parked close to scattered trees. Such areas should provide excellent concealment, but here they do not because of shine on upper surfaces of vehicles.



FIGURE 24.—A clear illustration of the effect of shine. Even under heavy overhead cover, this large ponton trailer and truck is not concealed. Shiny objects may be revealed through the numerous gaps which exist in the overhead canopy of almost every wooded area. Even here, camouflage discipline must not be relaxed. Such smooth surfaces must be covered with natural or artificial materials.

SHADOWS

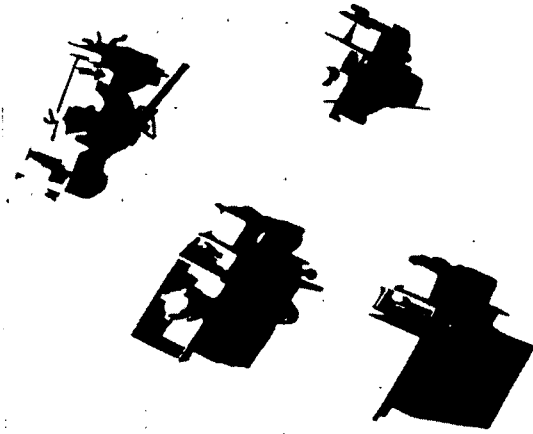


FIGURE 25.—A vehicle can be identified merely by the shadow it casts.

There are two kinds of shadows to look out for in camouflage.

One is the concealing shadows cast by objects or formations on the ground. From the air these shadows appear so dark that a vehicle parked within them has a good chance of being unnoticed. Other camouflage measures should often be taken, but making use of these shadows is an important primary step in concealment. In the northern hemisphere, the north side of an object higher than the vehicle is the best side to park on, and the east and west sides are each dangerous for half a day.

The other kind of shadow to look out for is that cast by the vehicle. This reveals and identifies a vehicle and must be hidden. Hiding is accomplished either by parking in the shadow of an object—if the shadow is large enough to encompass the vehicle—or by parking on the sunny side of the object, if the shadow is too small. Watch out not only for the over-all shadow of the vehicle but also for the smaller shadow areas contained within the vehicle itself, such as the shadow line of the truck body, in and around the cab, underneath the fenders, within the wheels, and in the open back of the cargo space. A vehicle is easily recognized by these small shadows even when its main outlines are obscure. They must be broken up or hidden by natural or artificial materials.

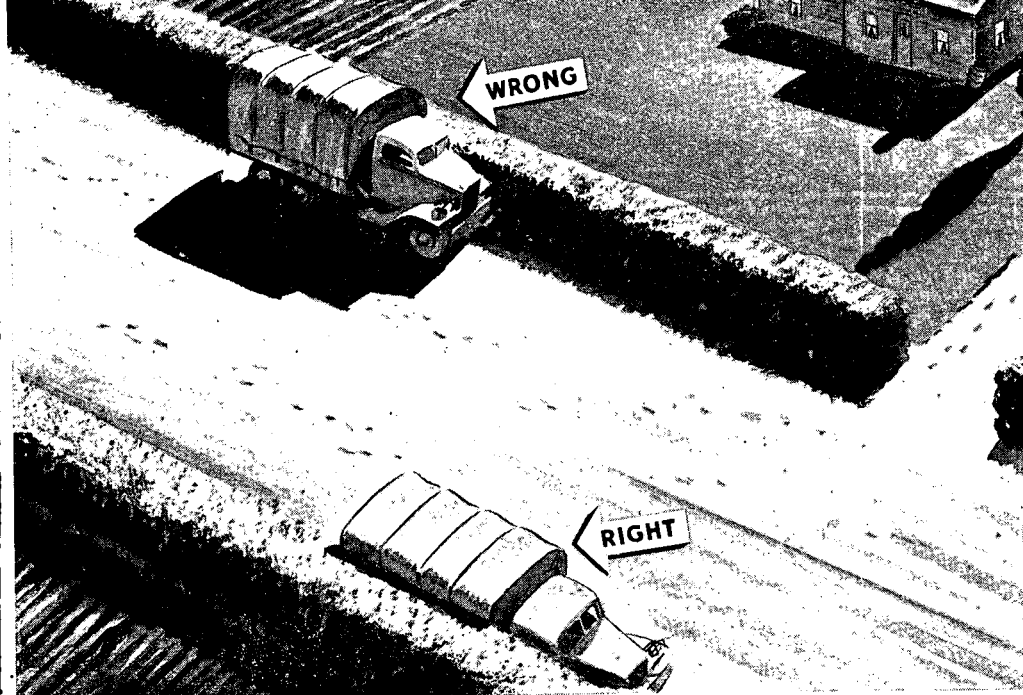


FIGURE 26.—If you must park on a road, watch that shadow. Park, as the foremost truck has done, so that the shadow is thrown into an irregular ditch or upon a bush. Do not park, as the rear truck is parked, so that the shadow of the vehicle falls on a smooth surface.

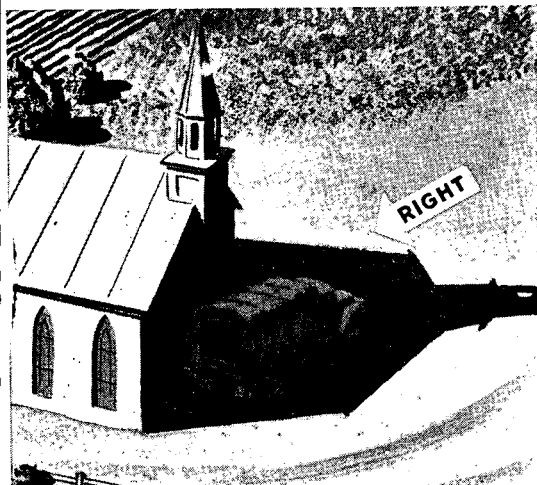


FIGURE 27 ① and ②.—Morning or late afternoon shadows are long and protective. Park your vehicle in them. But remember that shadows move. Be sure you move with them.

NATURAL MATERIALS



FIGURE 28.—Vehicle contrasted with natural background.

Camouflage measures for vehicles must often be hasty. Good siting in shadows and on the dark rough parts of the terrain pattern, as well as irregular dispersion, are essential, but they usually give only partial concealment. A much higher degree of concealment can be obtained by supplementing these measures with natural materials used to break up the shape and shadows of the vehicle. They are almost always available near a parking site and can be erected and removed quickly. They have the advantage of matching the local background. When cut foliage is used, it should be replaced as soon as it withers.



FIGURE 29.—Park a vehicle close to a clump of trees and use cut foliage to break up its shape and shadows. Cut foliage should always be placed upright in its normal growing position so that it looks the same as the surrounding foliage. Cover all surfaces which may shine. Tracks must not end here, but must be extended to another logical termination.

FIGURE 30 ① and ②.—The characteristic black shadow in the open end of a cargo truck can be seen for a considerable distance. One way to conceal this shadow is to drop the rear tarpaulin. Another way is to use natural materials, as shown here.

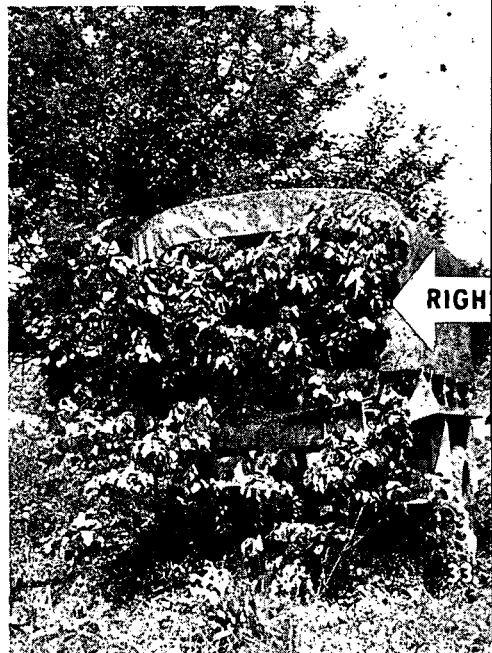




FIGURE 31.—Even at close range this vehicle blends with the background. It is concealed with natural materials.

FIGURE 32.—Overhead cover is sparse here. This tank destroyer is sited so its over-all shadow is broken up. The long shadow line below the skirt is concealed from ground observation by natural materials.





FIGURE 33.—Trees break up the shape and over-all shadow of this half track. Dead vegetation is common in the surroundings, and it has been used to hide the shadows underneath the fenders and within the wheels.

FIGURE 34.—A combination of natural materials and blankets prevents shine from headlights and windshield on this truck.



FIGURE 35. — Green vegetation being boiled in 5-gallon cans to make adhesive.



A further use of natural materials is to aid concealment by altering the color of vehicles or by adding texture to them. These expedient measures make it easier to blend vehicles with their surroundings. Color may be altered by applying local mud to the body and tarpaulin. Apply the mud to form a pattern, following the pattern principles described on page 38. Texture may be added all over or in pattern shapes by attaching leaves, heavy grass, or coarse sand to the surface of a vehicle by means of an adhesive.

Old grease can be used as an adhesive, or a highly satisfactory dark-colored adhesive can be made from almost any green vegetation, such as leaves, shrubs, vines, weeds, crop plants, and most desert plants. To make an expedient adhesive out of natural materials, fill a 5- or 10-gallon metal bucket two-thirds full of freshly cut plant materials, packed tightly. Add water until plant materials are covered by about 2 inches. Boil for $\frac{1}{2}$ hour, then transfer resulting liquid to a G. I. can or a 55-gallon drum and boil down until it is a paste with a consistency heavy enough to prevent it from running after it is applied. To avoid boiling over, never fill this container more than half way. Sixteen 5-gallon buckets of vegetation yield about 1 gallon of paste.

Apply adhesive paste in small patches. Press texturing materials on each patch before next one is applied. Texture applied this way resists rains, but may be scrubbed off with water.



FIGURE 36.—Vehicle camouflaged with leaves applied with green-vegetation adhesive.

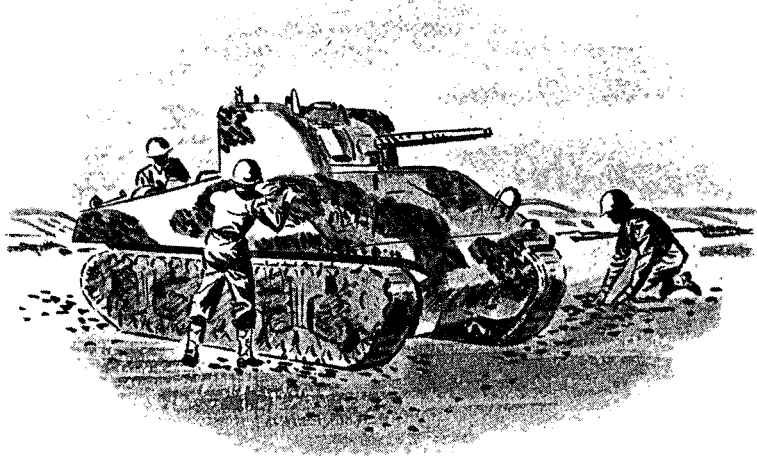


FIGURE 37.—Thick mud being applied in a disruptive pattern to a tank.

VEHICLE PAINTING

The enemy will usually see vehicles at an angle. At least two adjoining surfaces will be visible to him at once. For example, from close-range ground observation he might see a side and the front; from the air, or on an aerial photograph, he might see the top, a side, and the front. For this reason, vehicle patterns are designed to disrupt the cube shape of vehicles from all angles, to disrupt shadows cast by tarpaulin bows, to tie in with the shadow at the rear of a vehicle when it is faced into the sun, to tie in with the large dark shadow areas of windows, mudguards, wheels, and undercarriage, and to be *bold* enough to be effective at a distance.

Patterns are composed of a light color and a dark color. Black or olive drab have proved satisfactory dark colors in several theaters of operations. The light color is selected to match a light color typical of and predominant in the terrain in which the vehicle operates. White or light gray paint is applied to the undersurfaces of vehicles to cause them to reflect light, thus lightening the dark shadows of the undercarriage. This is called countershading.

Camouflage painting is not a cure-all. Alone, it cannot be relied on to do more than render a vehicle obscure, making it hard for an enemy gunner to locate the vehicle and confusing him as to the location of vulnerable areas. Nor can it conceal a moving vehicle, because other sight factors, such as dust, reflections, and motion itself, will betray its presence. However, camouflage painting is a valuable supplement to other camouflage measures. Added to good siting, dispersion, camouflage discipline, and the use of nets and drapes, it increases the benefits to be derived from these measures. Together, and intelligently used, they will provide a high degree of concealment for any vehicle.

In the following illustrations the national symbol has been left off the vehicles in order to show the pattern-painting method more clearly. This is not to be construed as authority for leaving off this symbol on all occasions. Paragraph 10a(3), AR 850-5, as changed, provides that the decision to obliterate the national symbol completely rests with the theater commander; the decision to obscure the national symbol, for reasons of tactical expediency, rests with the lower commanders concerned.

PATTERN FOR TEMPERATE ZONES AND JUNGLE

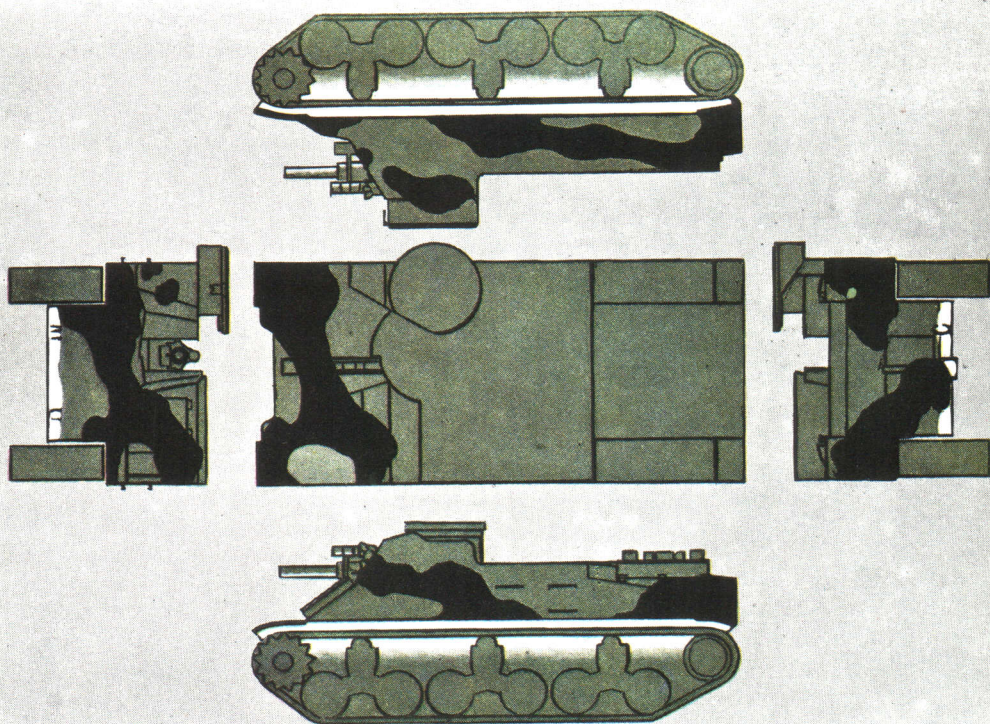
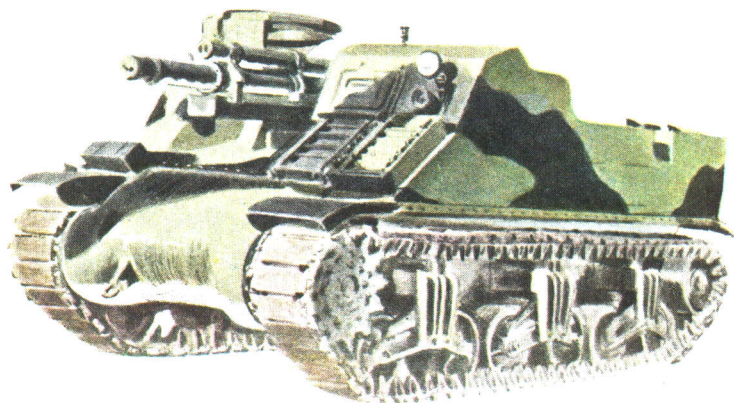


FIGURE 38 ① and ②.—Ground view and pattern plan of tank destroyer painted olive drab and black, the undersurfaces countershaded white. Keep patterns bold and simple.

PATTERN FOR DESERT TERRAIN

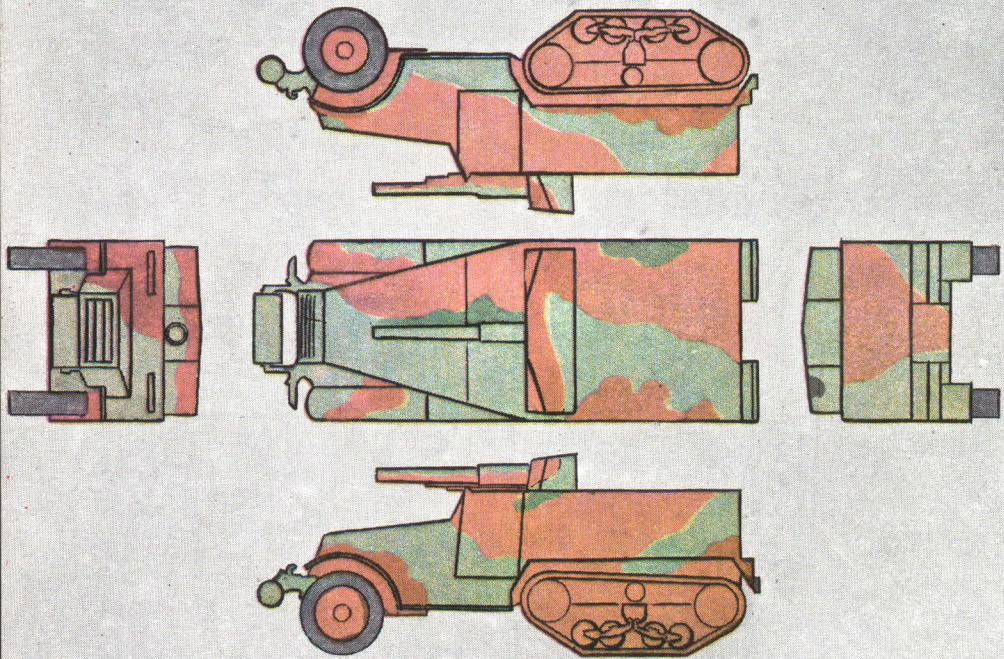
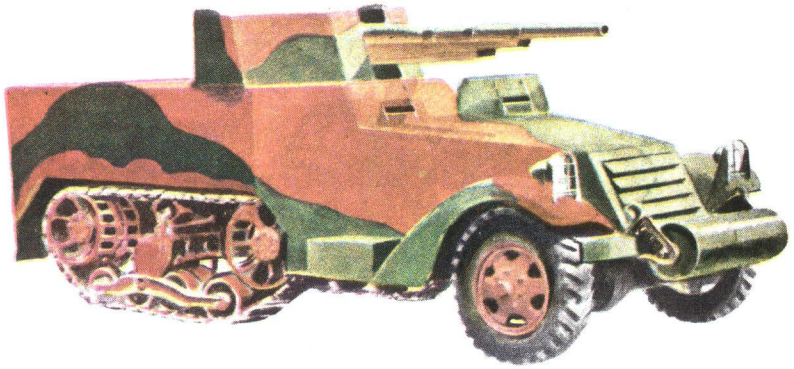


FIGURE 39 ① and ②.—Olive drab and earth red blend with reddish desert backgrounds. Other light colors useful in a desert are sand and earth yellow. Patterns break up angular lines of the vehicle.

PATTERN FOR SNOW TERRAIN

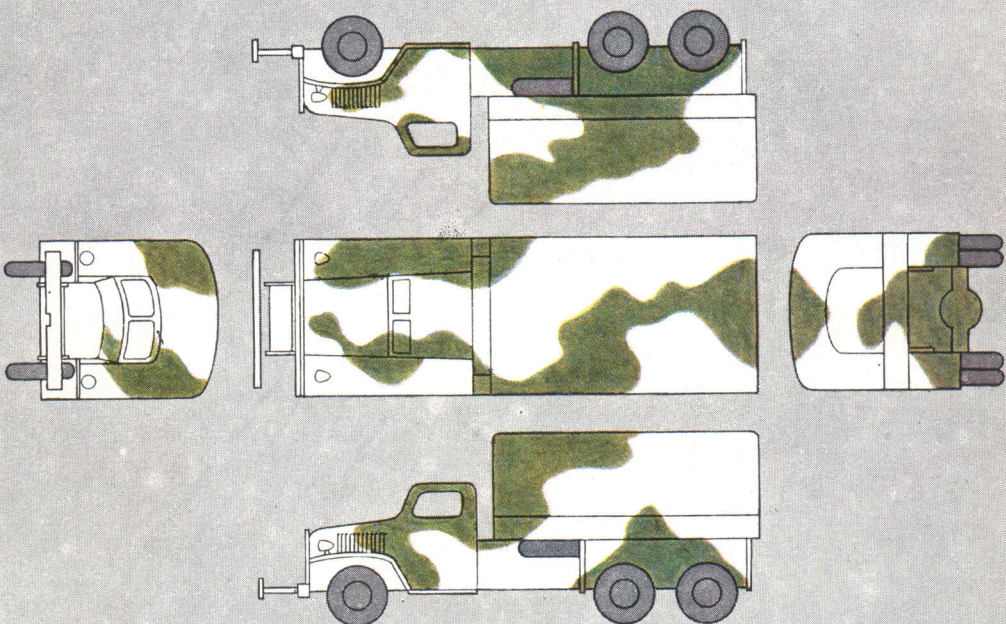
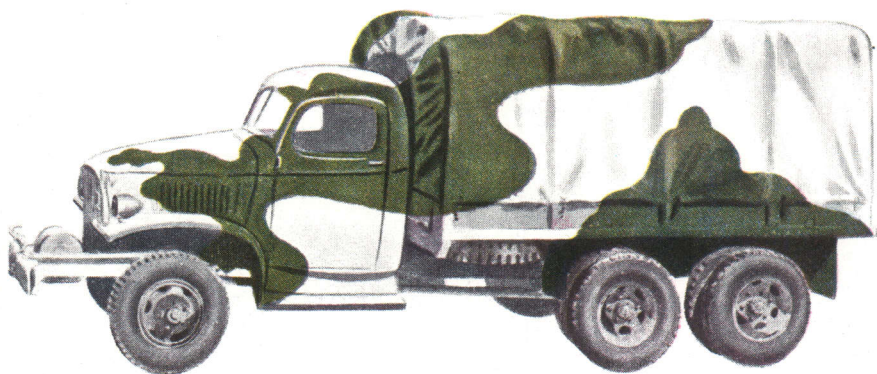


FIGURE 40 ① and ②.—White and olive drab for backgrounds of snow and trees. An equally effective scheme is black and white. In snow, countershading is not necessary.

ARTIFICIAL MATERIALS

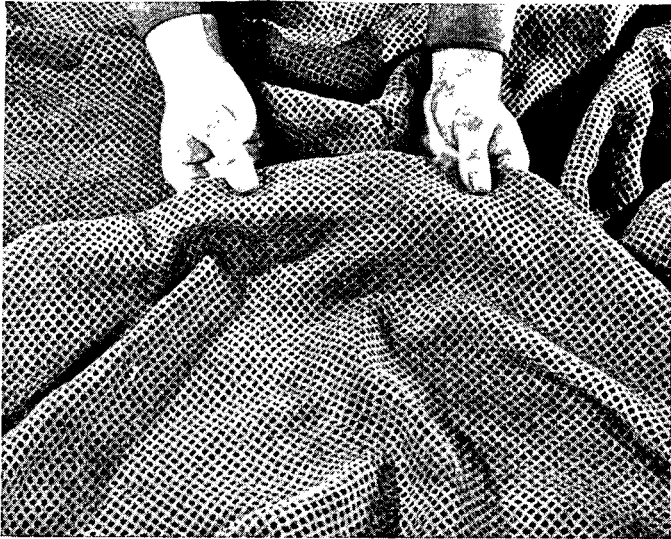


FIGURE 41.—Shrimp net which is used as a vehicle drape. This net furnishes only partial protection, as it is liable to shine. Where used as a drape, local natural materials should be added.

Camouflage nets, used as drapes, are the principal artificial materials used to conceal vehicles. Drapes are either small-mesh shrimp net, ungarnished (fig. 41), or large-mesh twine net, garnished (figs. 42 through 45). Both are easy to use, quickly erected, and quickly removed. They are easily adapted to various kinds of terrain, but they have limitations and they must be used correctly. Every vehicle driver must know what he can expect of a net in the way of concealment and how to erect it over his vehicle to best advantage.

Drapes can give complete concealment against direct observation but, as with most artificial camouflage, against photographic observation, they often fail to blend properly with the background and consequently may be detected. In every case, however, drapes properly suspended or propped up do conceal the identity of the object under the drape, even though the drape itself may be detected. In no case will the drape be allowed to rest directly on the vehicle, thus revealing its outline.

Drapes must be tied in with bushes or other natural terrain features by proper siting of vehicles.

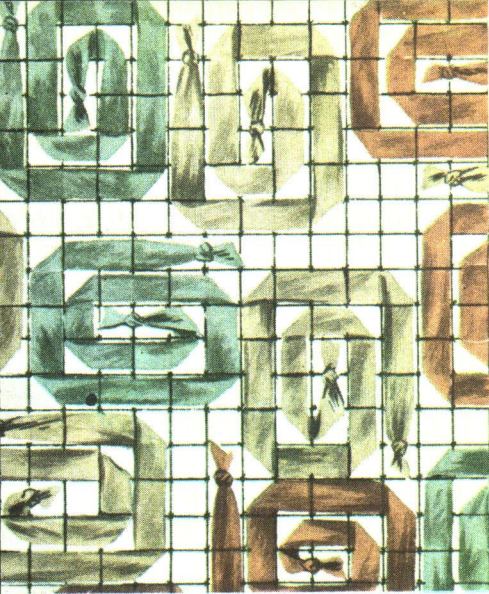


FIGURE 42.—Section of twine net garnished in typical Greek-key pattern with burlap or osnaburg strips. Mainly effective against long-range observation, this pattern adapts itself to various terrains.

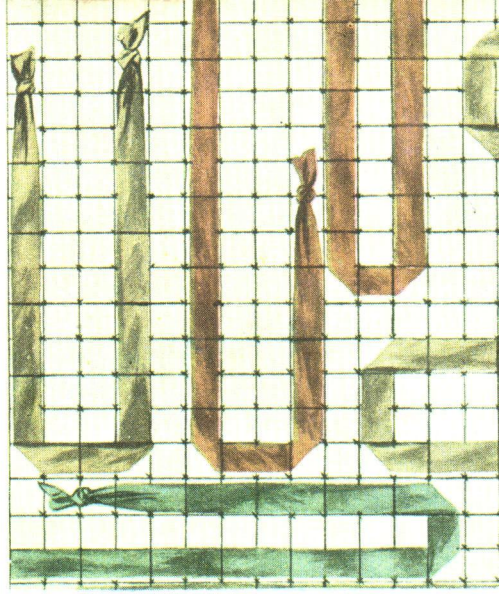


FIGURE 43.—Section of twine net garnished with U-shaped pattern. At the margins of the over-all pattern, the ends of the U should extend outward toward the edges of the net.

FIGURE 44.—Small section of twine net garnished with bow-tie garnishing, extremely effective both from the air and from close ground observation, almost exactly reproducing the coarse, leafy texture of bushes and high grass.

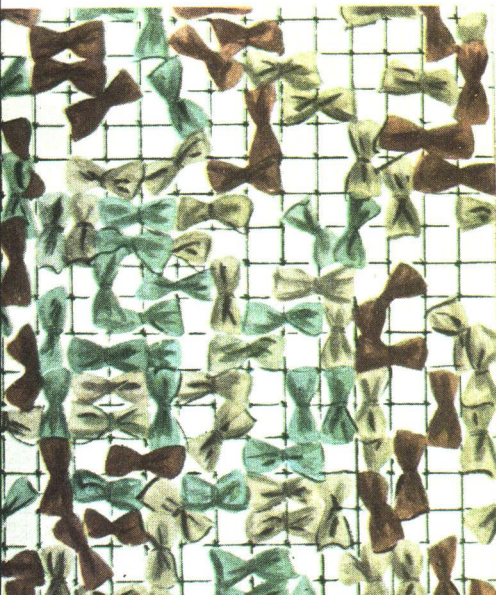
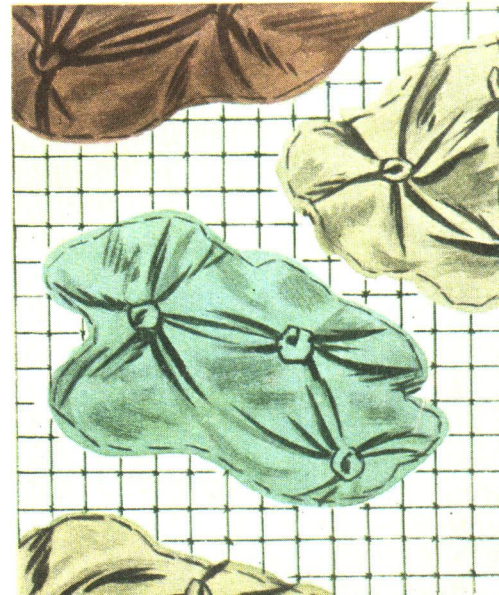


FIGURE 45.—Small section of twine net garnished with patch garnishing, useful at long ranges in barren mottled terrain, is made of large pieces of cloth fastened to net. Bunching each piece gives it a rough surface.



USE OF NETS

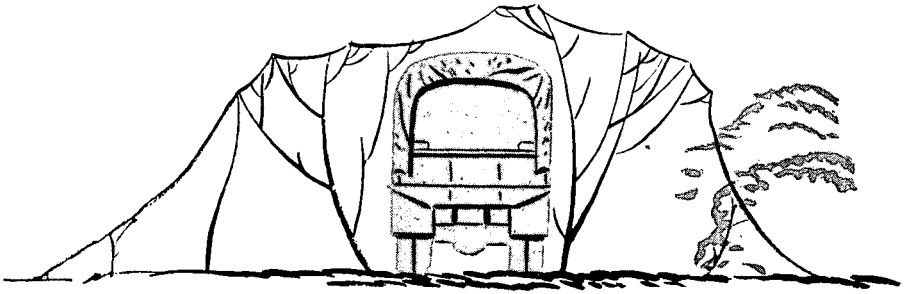


FIGURE 46 ①.—Nets must be propped above and away from a vehicle so that a distorted outline is formed. Branches or poles are used for this purpose. To eliminate shadow, extend net at a gradual slope from center of object covered.

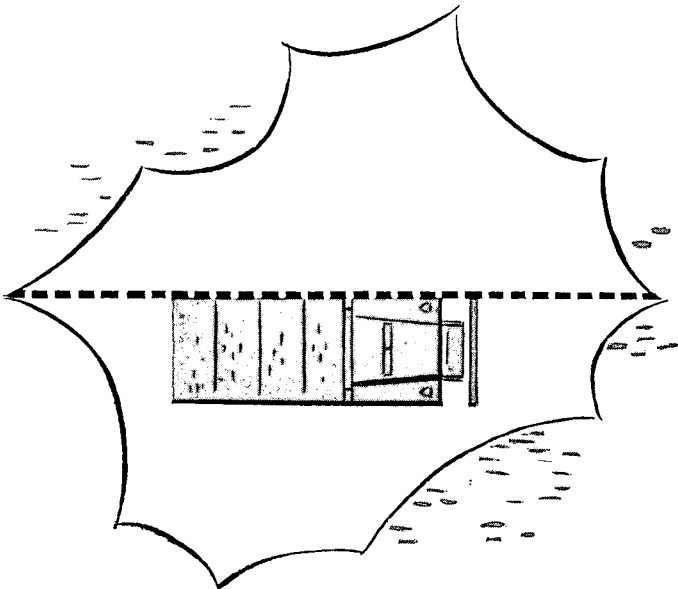


FIGURE 46 ②.—For best results, erect the net over the vehicle so that it is diagonal to the long axis of the vehicle, and slightly off center, and so the larger part of the net is on the side away from the sun.



FIGURE 47.—An overhead screen provides good concealment. It is particularly valuable over more permanent parking places because it allows considerable freedom of movement underneath it and because vehicles can come and go while the camouflage remains in place. With this type of cover, a tight flat screen is unnecessary.

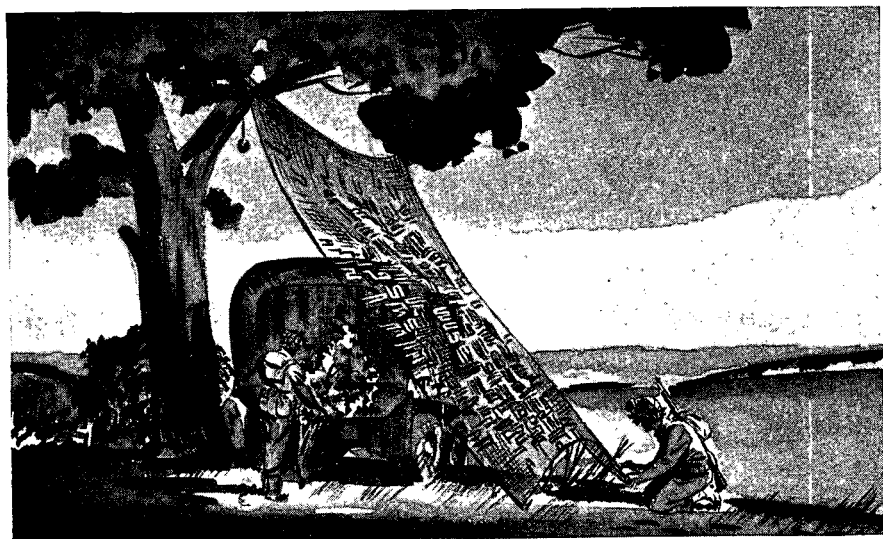


FIGURE 48.—A sloped side screen hung from a tree conceals a vehicle from oblique observation. Repairs, unloading, and other activities can be carried on behind it. Camouflage nets used as drapes can often combine the principles shown in figures 47 and 48, and thus provide concealment from both ground and air observation.



FIGURE 49 (a) and (b).—Steps in the erection of a drape. In upper picture, truck is parked close to bush. Reflecting surfaces which may shine are covered before the net is put on. Rear curtain is dropped to cover shadow in cargo space. In lower picture, net is unfolded so its long axis is diagonally over the truck and slightly off center.





FIGURE 49 (c) and (d).—In upper picture, drape is unrolled over vehicle; ends are spread out and partially staked down. More of net is on the shady side, stretching out farther with a gradual slope. Draping must not stop at this stage. Below, poles prop net off top of vehicle, creating an irregular shape. Addition of small branches completes the job.





FIGURE 50.—Tank parked in shadow of tree. Garnished twine net, offset toward the clearing, ties the vehicle into the tree.

FIGURE 51.—A light-colored, heavily garnished drape ties a vehicle into scrub growth in a desert.





FIGURE 52.—A well-draped vehicle. Scrub has been used around the edges of the drape to break up the shadow made by the drape.

FIGURE 53.—Parked between two clumps of trees, this vehicle is draped with a well-propped net which joins the tree patterns.



HOW TO FOLD NETS

To be transported easily and erected quickly, a net must be folded correctly. Practice in folding should be carried to the point where a crew can unload, erect, refold into a small bundle, and reload a net in a short time in the dark. Below is the correct folding procedure.

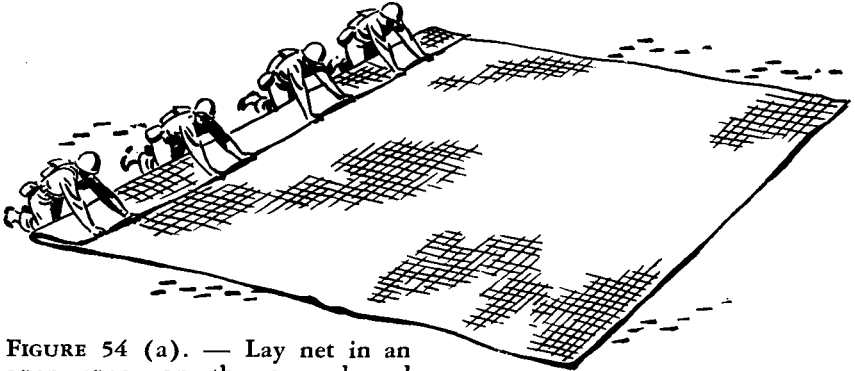
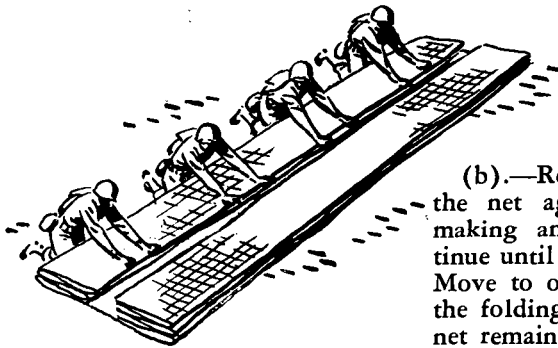
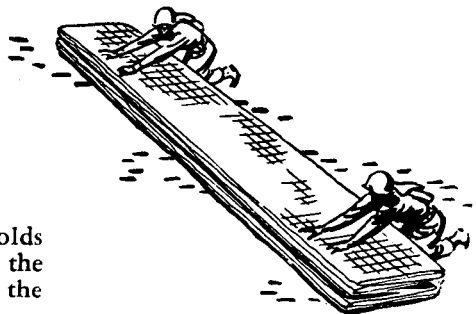


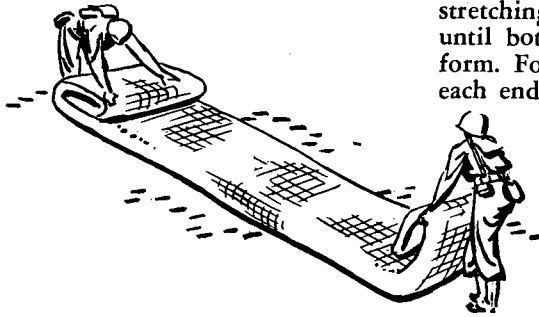
FIGURE 54 (a). — Lay net in an open space on the ground and stretch it square. Line up on the long side and insert thumbs into edge of mesh.



(b).—Reach forward and grasp the net again with the thumbs, making an accordion fold. Continue until center of net is reached. Move to opposite side and repeat the folding process until 2 feet of net remain unfolded in the center.

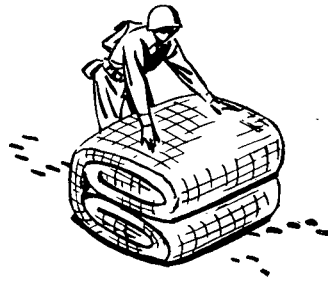


(c).—Lift second series of folds up and lay it down on top of the first series so the outer edge of the second series is away from you.



(d).—Two men move to ends, stretching them against each other until both series of folds are uniform. Fold in 3-foot lengths from each end toward the center.

(e).—Place one folded end on top of the other and tie the resulting bundle securely.



CARE OF NETS

Folded nets generate heat; to prevent them catching fire, they should be stored in a well-ventilated place. Nets of recent issue have been mildewproofed, but other nets may be weakened by mildew or dry rot and should be opened and exposed out of doors at periods determined by the conditions of storage:

Nets of recent issue are not fireproof, although they have been treated to become fire-retardent, and since most garnishing smolders when exposed to flame, care should be taken to keep nets clear of fires, exhausts, or other fire-conducting agencies.

All twine nets shrink considerably when wet, expanding again when dry. Therefore, nets held under tension, such as drapes or flat-tops, must be loosened when wet by rain, snow, or dew.

Nets should be inspected frequently for torn or wrinkled garnishing and for tears in the net itself. Garnishing should be replaced and tears mended as soon as discovered to prevent spreading. Use No. 18, medium-laid seine twine, or its equivalent, for mending. Process of mending tears is explained in figures 55 and 56.

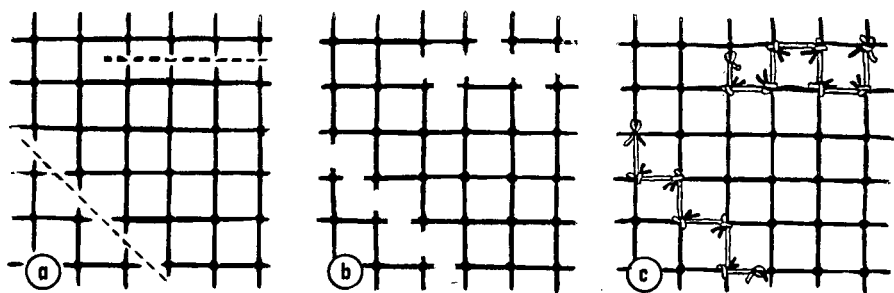


FIGURE 55.—(a) Different typical tears before trimming. (b) Same tears after trimming. (c) Sequence in which tears are mended. Mending must start and end at a knot joining three strands or from a tag end leading from such a knot. Knots around edges of tear must have two unbroken strands of original net. As a guide to finding proper sequence of mending, spread net out tight and flat and thread twine through meshes—without tying at knots. Keep this guide in place until mended.

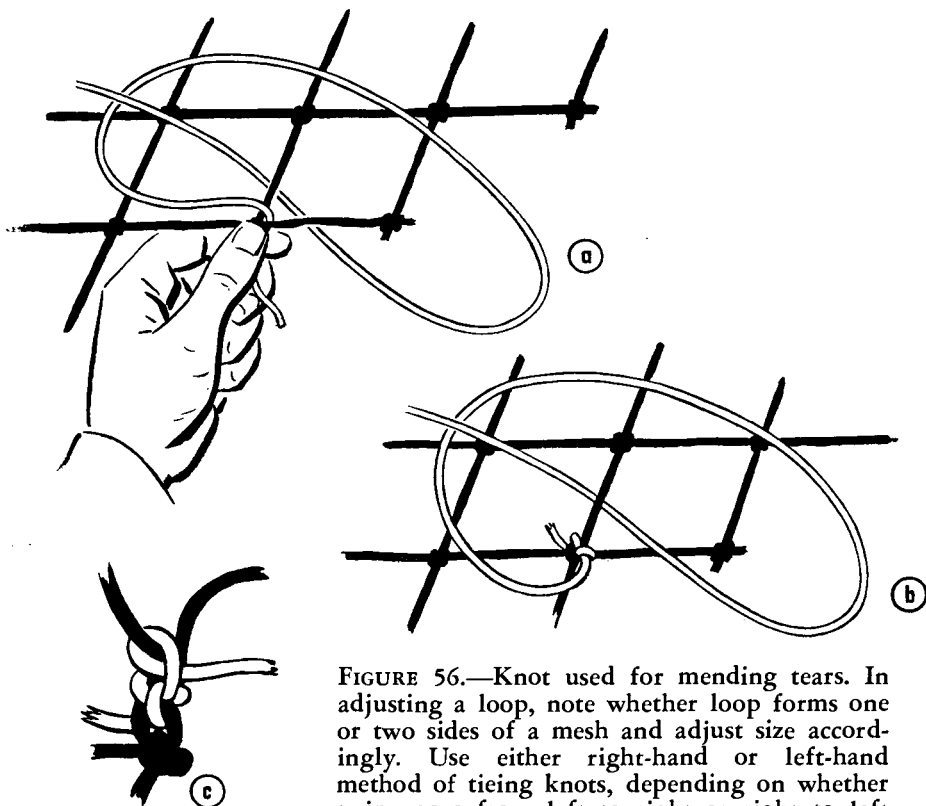


FIGURE 56.—Knot used for mending tears. In adjusting a loop, note whether loop forms one or two sides of a mesh and adjust size accordingly. Use either right-hand or left-hand method of tying knots, depending on whether twine goes from left to right or right to left when repair meshes are nearest weaver.

ISSUE NETS

Issue twine nets are issued pregarnished so that approximately 80 percent of the voids in the central area of a net are covered; and from this area to the edge, the garnishing is thinned out to cover only approximately 10 percent of the voids. So garnished, these nets are correct for use on a flat-top (horizontal overhead screen on supporting wire frame) but unsatisfactory to use as a vehicle drape.

Front-line troops will not have time or materials to change the garnishing on the nets. Therefore, these nets should be altered, preferably by camouflage units in rear areas or during training. This also applies to changing the color of the garnishing as the seasons change.

As a guide for altering the garnishing in rear areas or in training, the standard color combinations for summer, winter, and desert, and the labor and materials required for regarnishing are given below.

In front lines, when the color or thickness of garnishing is wrong, the only alternative is to modify it by using natural materials.

The color of shrimp nets may be altered in rear areas or in training by dipping in or spraying with camouflage paint; or, as an expedient, by smearing with mud or, when the net is to remain in place for some time, by spraying with sand after dipping in an adhesive.

Standard Color Combinations		
Summer (temperate and tropical)	Winter (except in snow)	Desert (most barren areas)
70%—dark green	60%—earth brown	70%—sand
15%—light green	30%—olive drab	15%—earth yellow
15%—field drab	10%—earth red	15%—earth red

Materials and Labor Required to Garnish Nets			
Sizes of Issue Nets	Garnishing Strips (2" by 60")	Rolls of Materials 2" by 300' to Make Garnishing Strips	Man-hours for Weaving
15' by 15'	150-175	2-3	3
22' by 22'	275-325	5-8	9
29' by 29'	400-525	7-9	13
36' by 44'	525-700	9-12	19
45' by 45'	900-1400	15-24	36

DIGGING IN



FIGURE-57.—In front of the men is a vehicle, dug in and camouflaged to blend with the background. Spoil is slightly mounded around the excavation and gradually sloped to meet existing terrain level. Both vehicle and spoil are covered with a light screen made of chicken wire and cloth, over which is spread sand, a few rocks, and some brush.

In a desert, or in any open barren terrain, the lower an object is to the ground, the smaller is its shadow and the easier it is to conceal from aerial observation. When time and soil permit, every effort must be made to dig in important vehicles. Not only are they more easily concealed, but they are also protected from bomb and shell fragments.

Figure 58 illustrates the steps taken to conceal an important special vehicle in a theater of operations. An excavation is made, with a slanting approach. The vehicle is parked in this pit (a). Sandbags are used to form a revetment for protection against shell fragments (b), and the whole installation is covered with a garnished twine net (c). The net is sloped gently out to the sides and staked down. Finally, vehicle tracks to the position are brushed out or covered. The result shows that even in open terrain, a large vehicle can be given a good deal of concealment.

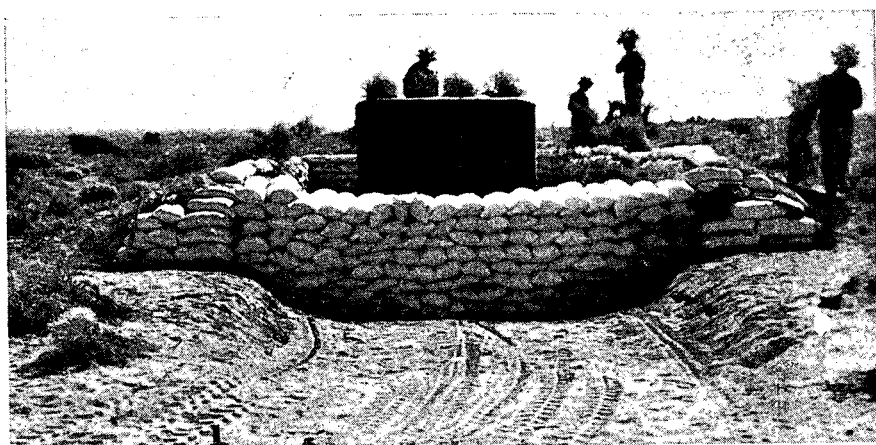
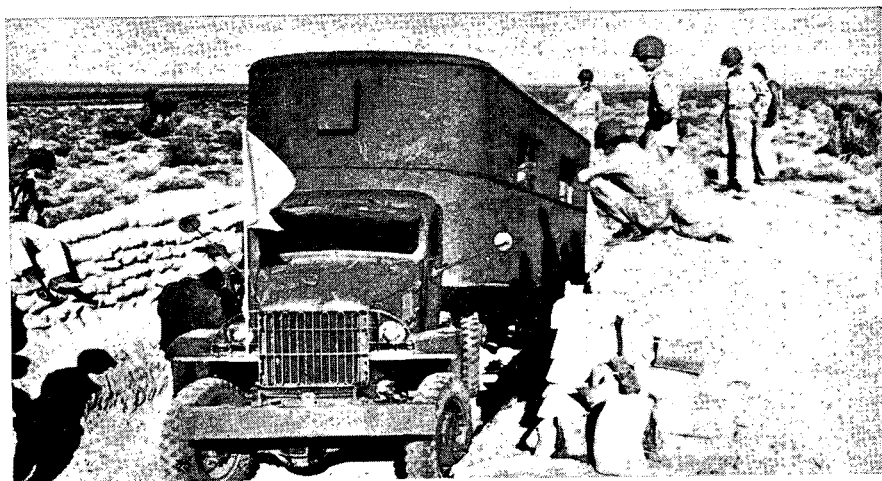


FIGURE 58 (a), (b), and (c).

SNOW CAMOUFLAGE

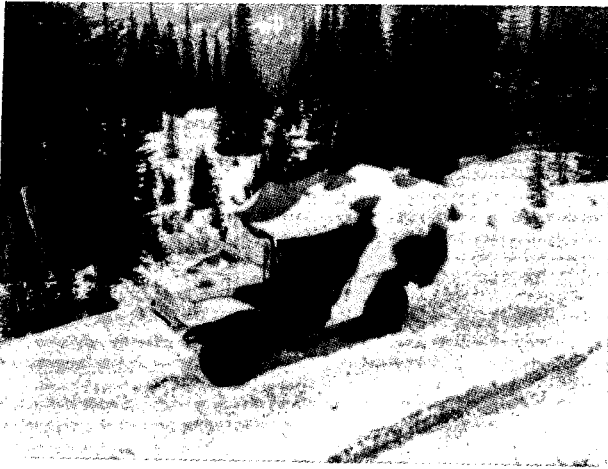


FIGURE 59.

From the air, snow-covered terrain is seldom entirely white, but is broken by dark areas of woods, scrub growth, and shadows made by irregularities in the ground surface, such as rock outcrops, ridges, and drainage lines.

Concealment of tracks is a major problem in snow-covered terrain, as unconcealed tracks point the way to concealed installations. In even light snow, tracks make strong shadow lines, visible from a long distance. Sharp turns by vehicles should be avoided because ridges of snow cast heavy shadows. Whenever possible, vehicles should follow shadow-casting terrain lines, staying on the side where shadows are constant throughout the day. It is important that all vehicles keep to the same tracks. Vehicles leaving a road may achieve a short period of track concealment by driving into or away from the sun. Shadows cast by these tracks will not be apparent until the sun strikes them from an angle. Short lengths of tracks which are not too deep may be trampled down with snowshoes.

Parked vehicles painted a solid olive drab can be concealed in snow if there are sufficient natural materials available. Park so shadow of vehicle falls on a bush or on another shadow, and break up shadow pattern of tarpaulin bows with cut foliage. If this is impossible, park facing sun or away from sun to reduce the size of the shadow cast by the vehicle. This shadow may be broken up by piles

of snow, by large snow balls, or by holes dug in the snow. Snow thrown on the wheels of a parked vehicle helps to disrupt this tell-tale area.

For vehicles which must operate in areas where snow is a daily problem, concealment is made much easier if they are painted with the snow pattern shown on page 41. Many field-expedient substitutes for paint can be used. Vehicles should be parked close to dark features of the terrain pattern. Concealment by shadows from buildings, ground formations, and trees, though effective in summer, loses much of its usefulness when snow is on the ground, as the white background lightens the shadows of those objects.

Nets are not recommended for draping in snow. They require excessive maintenance, cannot carry a heavy snow load, become wet, bulky, and hard to handle. Garnishing becomes wet, wrinkles, and loses coverage, increasing texture and darkening tone values. They must be removed entirely during snow and sleet storms.

Where nets are used for permanent overhead hammocks or to create permanent parking hides for vehicles, they should be garnished 100 percent. Where the terrain pattern is mottled, as during a thaw period, the perimeter areas of nets should be white; towards the center, apply patterns of slate gray, black, and olive drab. Site nets of this kind near trees, snow drifts, rocks, or other natural forms which cast shadows. Where nets are anchored directly to the ground, heap snow on the edges to relieve the irregularity of outline. All anchor stakes should be of wood. Metal stakes and driftpins conduct heat from the sun and thaw themselves free.

FIGURE 60.

