CHAPTER 20

VEHICLE CAMOUFLAGE AND NUCLEAR, BIOLOGICAL, AND CHEMICAL OPERATIONS

This chapter implements STANAG 2002.

Actual operations prove that what you do in training you will also do during warfare. Part of this training will come through field exercises and maneuvers simulating warlike conditions. You must know what to do during passive defense and blackout driving and when driving under nuclear, biological, and chemical (NBC) conditions. The unit SOP contains warning systems; actions to take when under aircraft, guerrilla, and NBC attack; and conduct in a motor march or convoy. Learn what is expected of you so that you will automatically do the right thing at the right time.

VEHICLE CAMOUFLAGE OPERATIONS

Stationary Vehicle Camouflage and Concealment

A stationary vehicle can best be camouflaged by placing it under vegetation to break up the regular pattern of shadows and by covering all parts likely to reflect light noticeably. Use blankets, shelter halves, or pieces of dark burlap to cover the windshield, cab window, a wet vehicle body, light paint on insignia, and so forth. Use foliage to cover headlights. Fishnet or chicken wire scattered with artificial material or with vegetation can be used to cover the vehicle when trees or bushes are not available. When snow is on the ground, cover the vehicle with white cloth. Be sure that color and texture blend with the surrounding area. For information on drape net sizes, refer to TM 5-1080-200-13&P.

Camouflage Screen System

The camouflage screen system is the principal artificial expedient for camouflaging vehicles. Use it when concealment by natural methods or materials is not possible or to supplement natural methods and materials in sparsely vegetated or barren areas such as deserts, predominantly snow-covered areas, and thinly wooded areas.

The modular system consists of a hexagon screen, a diamond-shaped screen, a support system, and a repair kit. The screens are made of synthetic, lightweight, water-resistant material. Any number of screens can be joined together to cover an area. The screens are fastened together by a quick-connect-disconnect system to facilitate their joining or separation.

Radar-transparent screens (Type I screens) are identified by a five-sided tag attached to the screens at every other corner. (The tag identifies the screen as either woodland, snow, or desert.) The radar-transparent camouflage screen system, designed for use over active radar equipment, inhibits detection of the concealed items by visual and photographic means.

CAUTION

The radar-transparent screen can be placed over most active radar equipment. Camouflage screens induce interference in continuous-wave radar systems. Consult appropriate end item technical manual/order for any restrictions or limitations.

Radar-scattering screens (Type II screens) are identified by a rectangular tag attached to the screen at every other corner. (The tag identifies the screen as either woodland, snow, or desert.) The radar-scattering camouflage screen system can be temporarily placed over halted vehicles, weapons, and materials, and over semipermanent positions and installations. It prevents the enemy from locating and identifying the camouflaged items with visual, photographic, or radar devices.

NOTE: The woodland and desert screens come in seasonal patterns. One side of the screen has a spring-summer pattern; the other side, a fall-winter pattern. The desert screen has arid and semiarid sides.

Radar-scattering screens and radar-transparent screens are not visually different. The only difference between the two screens is that the radar-scattering screens have stainless steel filaments impregnated in the garnish material. Because of their minute size the steel filaments cannot be detected, but give the radar-scattering screen its radar-reflective capabilities. The procedures to erect, strike, or repair the radar-scattering and radar-transparent screens are the same.

The only difference between the woodland and desert screens are the pattern, incising, and colors. Use woodland screens in woodland environments; desert screens, in desert environments. The procedures to erect, strike, or repair the woodland and desert screens are the same.

The support system is used with radar-scattering or radar-transparent screen systems (Figure 20-1). The support system consists of —

- 12 aluminum pole sections (4-foot), which can be extended to various heights.
- **18** aluminum stakes.
- 18 batten spreaders, which support the screens. (Batten spreaders can be of different designs and are interchangeable.)
- A locking device called a spreader adapter assembly. (Batten spreaders and spreader adapter assemblies are made from a plastic material.)
- A carrying case for the support system.

The repair kit contains sufficient material for operator/crew personnel to repair the screen (Figure 20-2).

The screen system and support system have separate carrying cases. The camouflage screen systems should be stored in a cool, dry place.

Combat support units and combat troop units use the camouflage screen system to conceal stationary target signatures, weapons, vehicles, and semi-permanent positions when natural cover or concealment may be inadequate or absent.

The lightweight camouflage screen system can also help to conceal permanent noticeable objects and objects in a fixed pattern or array that present obvious targets. However, permanent installation camouflage usually requires construction of concealment features, such as false roofs, dummy buildings, and garnished wire netting.

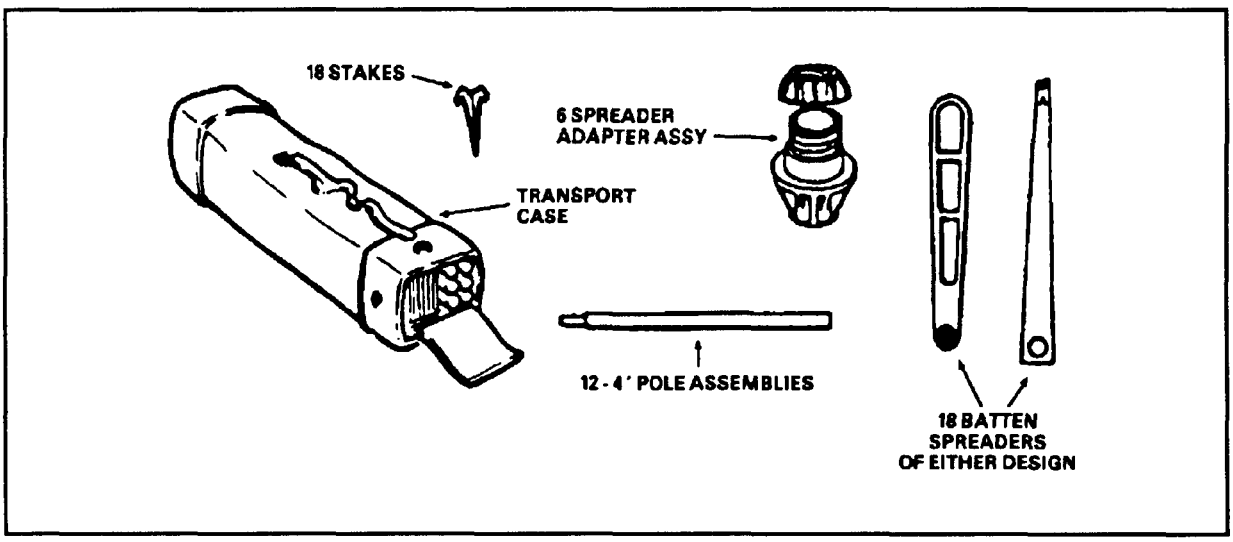


FIGURE 20-1. Support System Transport and Storage Case (With Components).

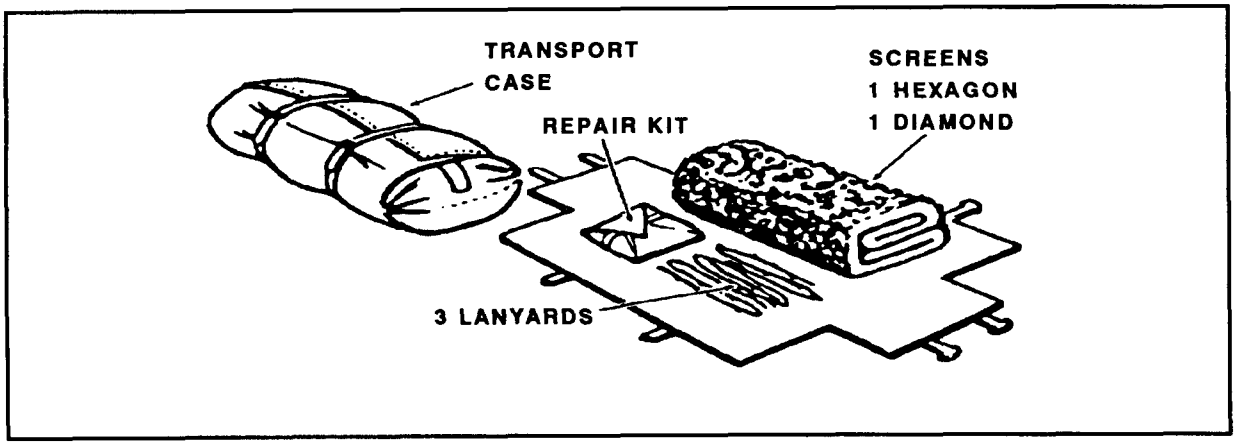


FIGURE 20-2. Screen Transport and Storage Case (With Components).

Dimensions of the screen system and support system are —

- Weight and cube of the packaged camouflage screen system: 70 pounds, 5.0 cubic feet.
- Weight and cube of the packaged support system 70 pounds, 3.1 cubic feet.

Erection of Camouflage Screens Over Vehicle

When erecting the camouflage screen over a vehicle, take extreme care to prevent the screen from snagging and tearing on any sharp corners or vehicle accessories, such as mirrors, bumpers, mounted armament, and so forth. When joining multiple screens, first spread the screens to be joined over a level ground site free from large rocks and sharp objects. Be sure the same pattern design on all screens is facing the same way.

CAUTION

Keep screens away from all exhaust systems including those on vehicles, heaters, and stoves. Screens can be damaged if not struck and removed from the back blast area of field artillery before tiring.

To effectively conceal a vehicle, maintain a minimum space of 2 feet between the screen and the top of the vehicle. Never drape screens over a vehicle. Use the support system at all times. Draping the screen shows the outline of the vehicle underneath and lets the enemy immediately recognize the vehicle, thus defeating the purpose of camouflage. Disguise the shape of the screens as much as possible by placing the support assemblies beneath the screens at various positions and heights.

To ease assembly and disassembly of the support pole sections, keep both ends of the pole free from dirt, mud, and foreign matter. Wipe both ends clean before assembly. Take care to prevent damage to the pole ends, which could cause an improper fit. Inspect the pole ends for burrs or damage before assembly.

If you must erect the screens in muddy area provide the support poles with a firm footing by placing them on top of any appropriate material available, such as a flat rock, boards, or brush. If such material is not available, you may need to add another 4-foot pole section in order to reach firm footing and then reposition the pole assemblies as required.

CAUTION

When multimodule configuration is used (8 feet high or more), the camouflage screens can be blown down when winds exceed 20 MPH. Equipment would be damaged

After screens are erected, check them daily for proper erection and retighten as required. Check the screens more frequently during high winds and heavy snowfalls. Do not let lots of snow or ice accumulate on screens. Remove snow or ice from the

screen as soon as it starts to sag and begins to show signs of stress or strain due to excessive weight.

Follow these special precautions when erecting the radar-scattering screen over whip antennas used on the AN/GRC-106 radio sets or similar radios with whip antennas:

- Mark a 16-inch diameter circle in the garnish material over the antenna. Use the antenna as the center of the circle.
- Cut the garnish material for a distance of approximately three-fourths of the circle's circumference. Do not completely cut the garnish material around the circle's circumference. Do not cut the netting.
- Lay the garnish material flap back to expose the netting. Temporarily secure the flap to the screen with plastic straps provided in the repair kit.
- Place the screen so that the radio antenna is located in the center of the exposed netting. Be sure to maintain approximately 8 inches between the antenna and garnish material at all times.
- Place all aluminum support poles at least 4 feet from the antenna.
- After the antenna is removed repair the screen by removing the plastic straps holding down the garnish flap. Reposition the **garnish** flap to its original position and secure it in place with plastic straps.

WARNING

FLAMMABLE MATERIAL: The radar-scattering screen will ignite and burn if it comes near or touches the whip antennas on the AN/GRC-106 radio sets or similar sets with whip antennas when the radio is transmitting.

CAUTION

Do not place the radar-scattering screen system over active radar equipment. It will seriously interfere with the operation of any radar equipment.

The procedures to erect a two-module camouflage screen system are shown in Figure 20-3. Figures 20-4 and 20-5 show how to fold screens for storage.

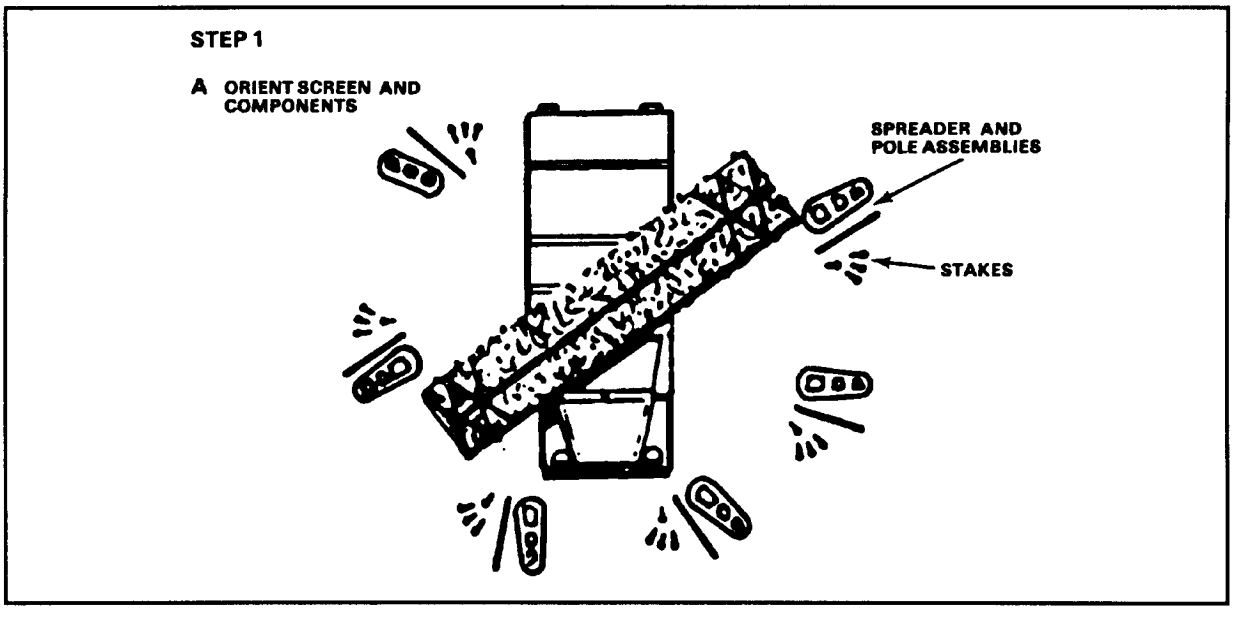
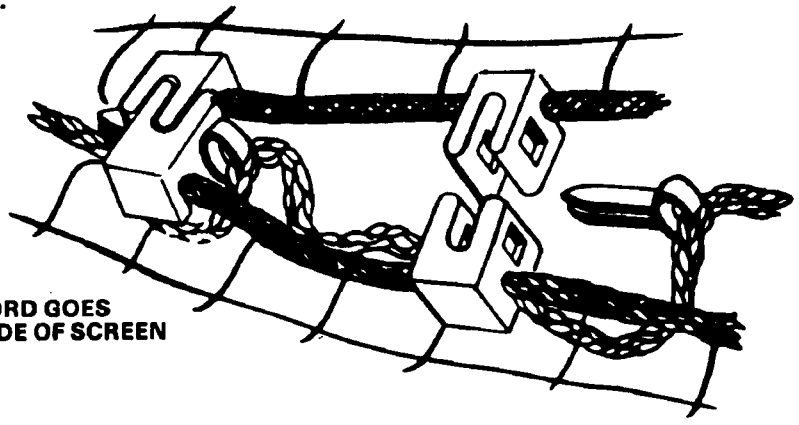


FIGURE 20-3. Procedures for Erecting a Two-Module Camouflage Screen System.

STEP 1 (Cont)

NOTE: WHEN USING MULTIPLE MODULE TECHNIQUE, CONNECT ALL SCREENS TO BE USED BEFORE ERECTING.

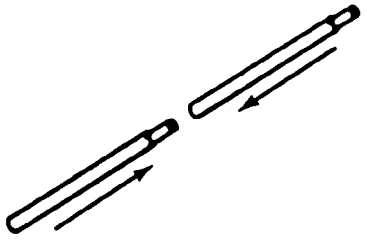
B TO JOIN SCREENS, CLIP EDGES TOGETHER WITH LANYARD CORD. ALL PINS SHOULD POINT IN THE SAME DIRECTION.



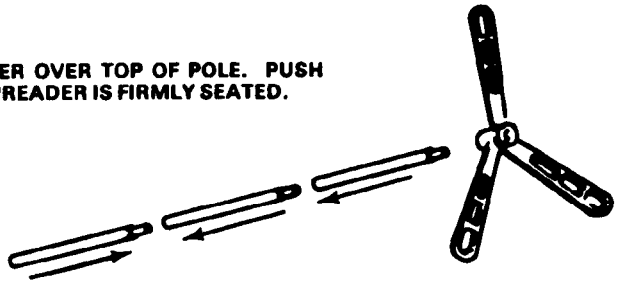
LANYARD CORD GOES ON UNDERSIDE OF SCREEN

STEP 2

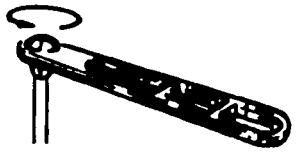
A TO EXTEND POLES TO DESIRED LENGTH, REMOVE SECTIONS FROM TRANSPORT CASE AND INSERT SMALL END OF ONE POLE INTO LARGE END OF OTHER POLE.



B PLACE SPREADER OVER TOP OF POLE. PUSH DOWN UNTIL SPREADER IS FIRMLY SEATED.



C TO INSTALL SPREADERS, LOOSEN TOP NUT.



EXTEND ARMS OF SPREADER AND TIGHTEN TOP NUT.

FIGURE 20-3. Procedures for Erecting a Two-Module Camouflage Screen System (Continued).

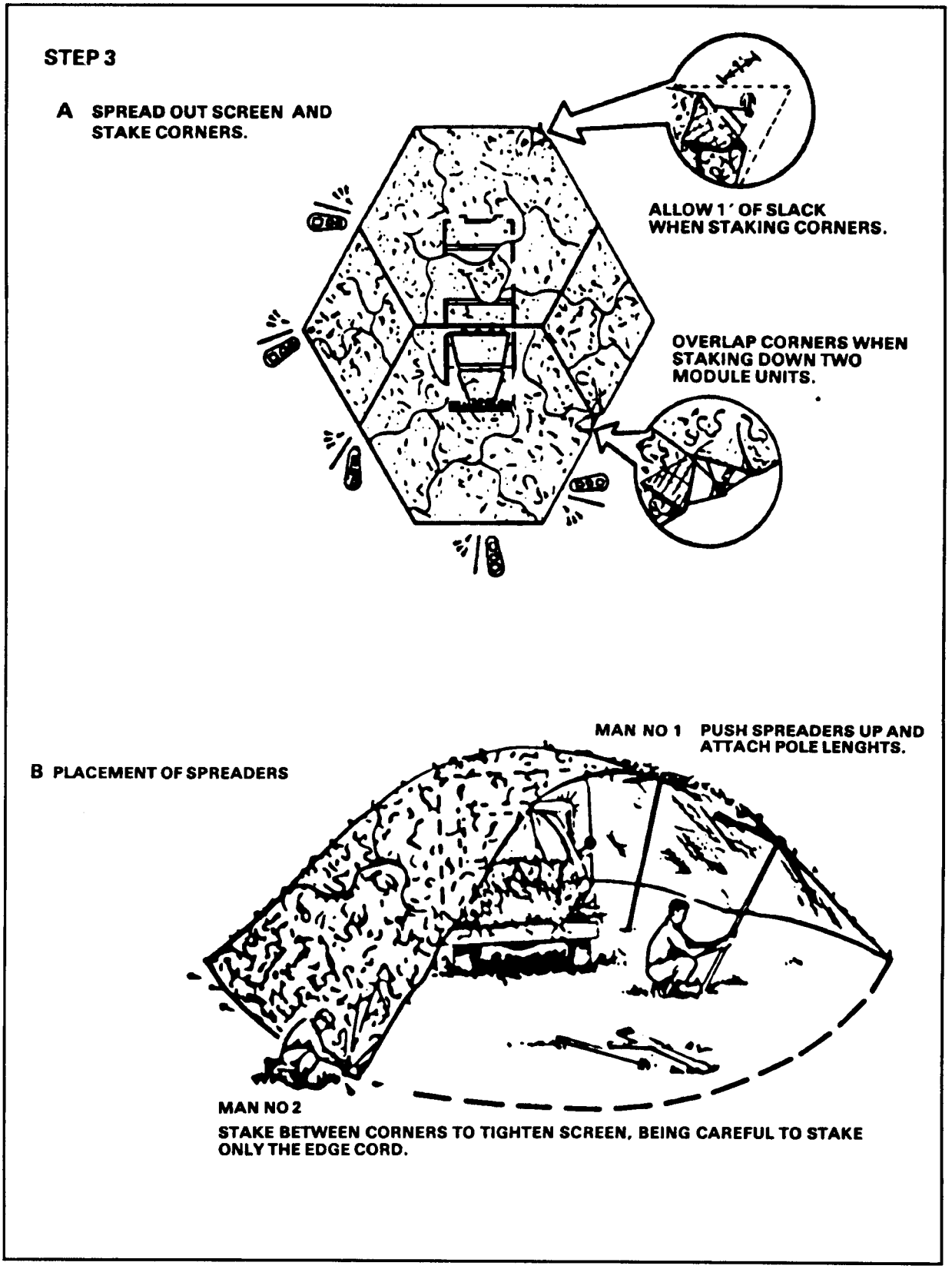


FIGURE 20-3. Procedures for Erecting a Two-Module Camouflage Screen System (Continued).

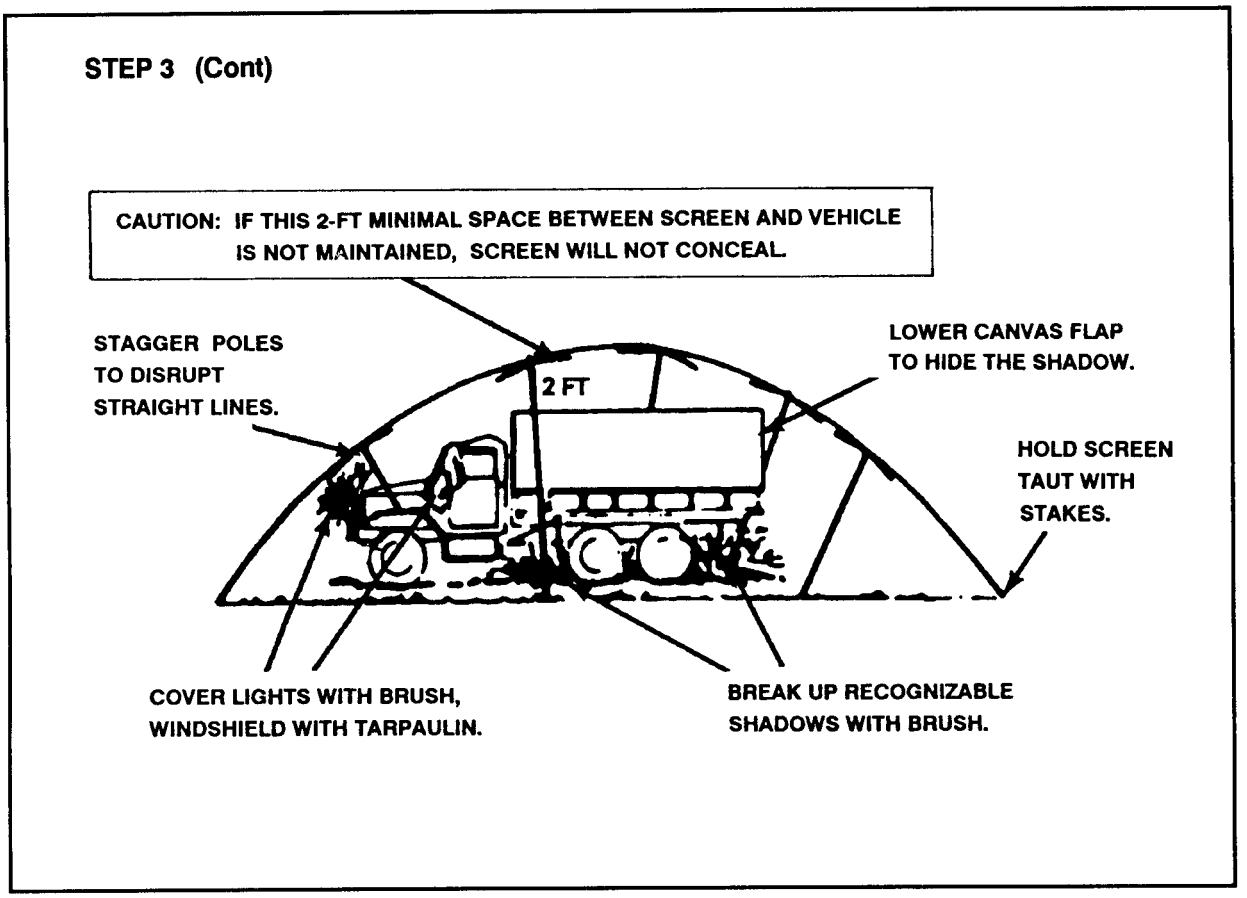


FIGURE 20-3. Procedures for Erecting a Two-Module Camouflage Screen System (Continued).

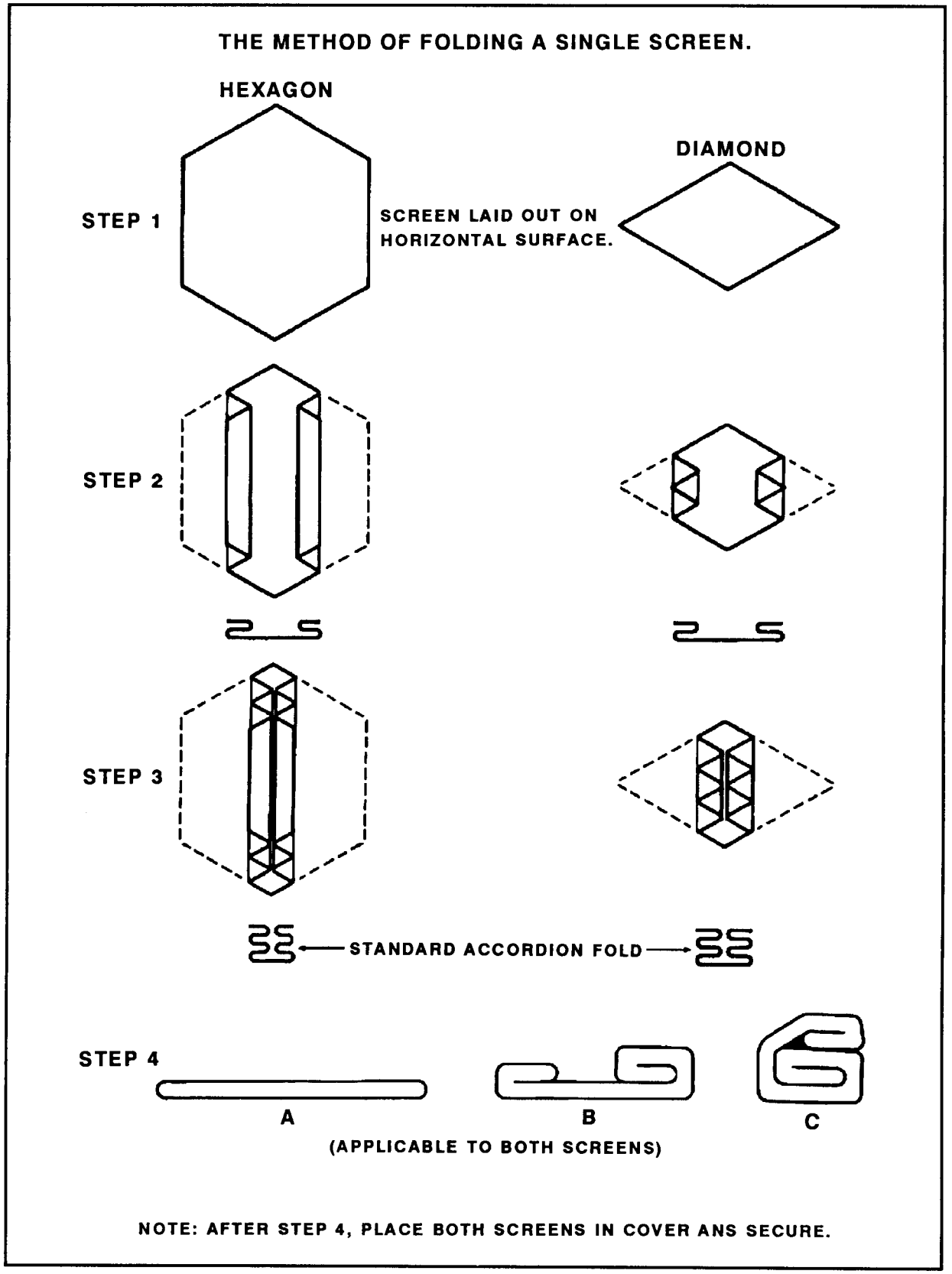


FIGURE 20-4. Method of Folding a Single Screen.

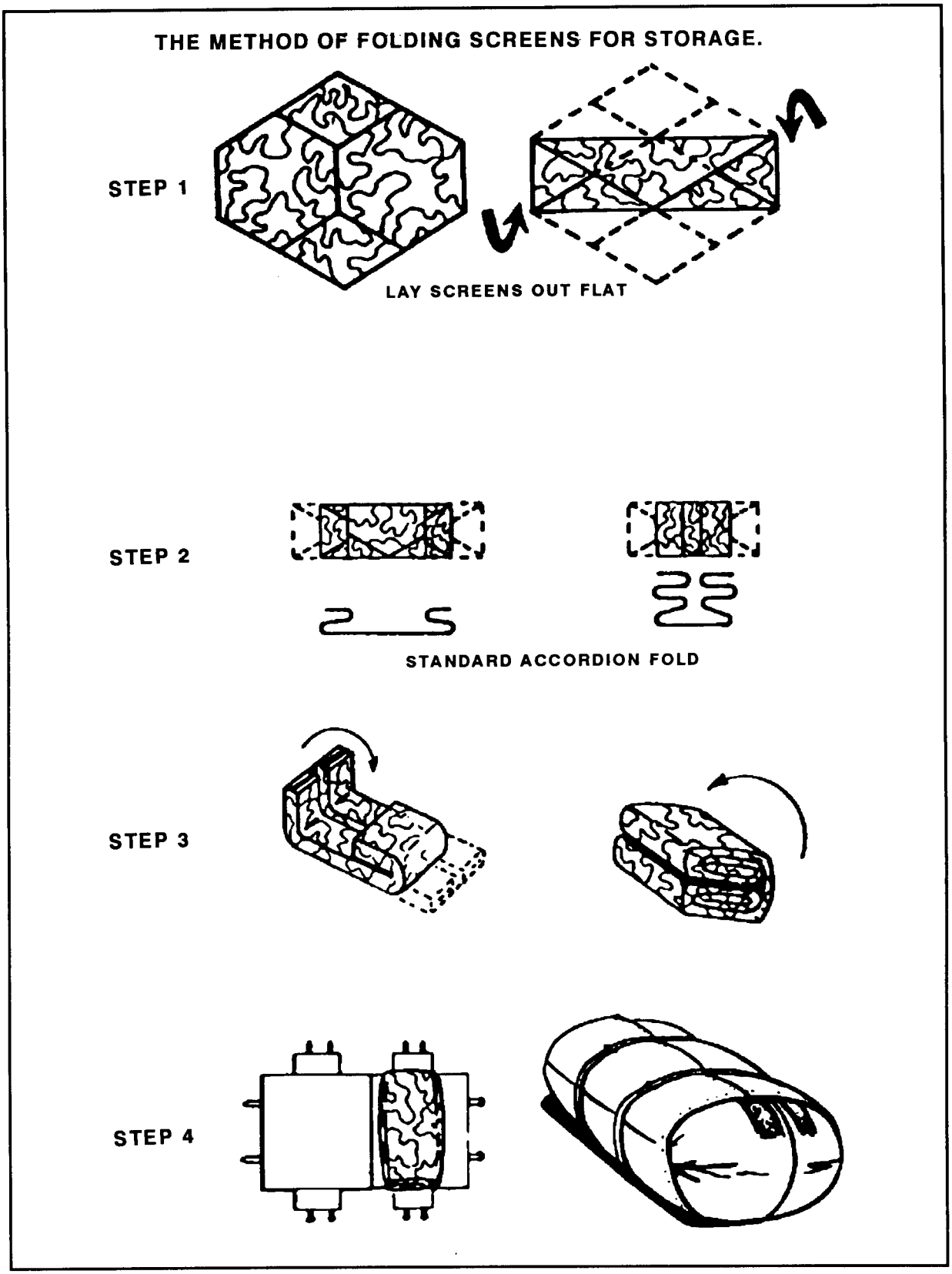


FIGURE 20-5. Method of Folding Screens for Storage.

OPERATIONS UNDER NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) CONDITIONS

After a suitable period following NBC contamination of an area, you may operate your vehicle through the area safely using the protective measures you have been taught. Time limits vary depending on the use of protective clothing, temperature, nature of the contaminant, type of soil and terrain, and task to be performed. If your mission requires you to operate your vehicle in a radiologically contaminated area, your commanding officer must decide the maximum dose to which you will be exposed.

Practices for Operating Vehicle in Contaminated Area

The following practices are helpful in carrying out your mission:

- Before entering chemically contaminated areas, put on protective clothing and the protective mask.
- Use hard-surface roads, if available.
- Avoid unnecessary splashing if roads are muddy.
- Clean the wheels of your vehicle after crossing the area.
- Guard against splashes from tree branches.
- Move through the area as rapidly as safety rules wi11 allow.

Vehicle Operation While Wearing Protective Masks

Under combat conditions, situations change. You may be moving forward with assault troops, in a foxhole, or standing by in a replacement area some distance from the combat area. In any of these situations, you are subject to enemy gas attack. Therefore, always remember your mission comes first. Thus, you may be operating your vehicle while wearing your protective mask. Although wearing your protective mask may be inconvenient and slightly uncomfortable, the ease with which you can wear it for an extended period improves with practice and self-discipline. Train yourself to drive while wearing the mask. Above all, keep it on until instructed to remove it. The undisciplined soldier, feeling terribly sick, uncomfortable, and ill at ease, will remove his mask and die. A well-trained disciplined soldier will keep his mask on and live. Trucks must move. If you remain calm and do not panic, you have a much better chance of completing your mission.

Marker Descriptions

Use the triangular signs described in this chapter and Appendix C (STANAG 2002) to mark NBC contaminated areas, chemical minefield, booby traps, and unexploded munitions unless the area is to be abandoned to threat forces. The colors of the signs indicate the nature of the contamination or danger. These include the primary color and the secondary color (Figure 20-6). The primary color is used for the background of the front surface and for the entire back surface. The secondary color is used for additional markings and inscriptions on the front surface.

Areas containing more than one type of contamination or other hazard are marked with the relevant signs placed close to each other. However, the sign GAS MINES is assumed to include the presence of high-explosive mines and booby traps as well as chemical mines. Simulated contaminated areas are marked exactly as if they were real.

The signs are the shape of a right isosceles triangle (90 degrees by 45 degrees by 45 degrees). They are made of plastic, wood, metal, or other rigid material with holes or "ears" that are used to hang them above the ground. They are placed on wire boundary fences, poles, trees, or rocks. STANAG 2002 prescribes the coloring and markings of the signs. The signs may be mass-produced by major commands for distribution to subordinate units or may be made locally. The base of the triangle is about 28 centimeters (11 inches); the opposite sides, about 20 centimeters (8 inches) each (Figure 20-7).

Chemical Contamination Marker. This triangle is yellow on both sides. The word GAS in red 5 - centimeter (2-inch) block letters is placed on the front side of the marker facing away from the

contamination. Use fluorescent paint, if available. Place the name of the agent (if known) and the date and time of detection on the front of the marker with paint, marking pencil, or grease pencil at the time of emplacement.

Biological Contamination Maker. This triangle is blue on both sides. The letters BIO in red 5-centimeter (2-inch) block letters are placed on the front side of the marker facing away from the contamination. Use fluorescent paint, if available. Place the name of the agent (if known) and the date and time of detection on the front of the marker at the time of emplacement.

Radiological Contamination Marker. This triangle is white on both sides. The word ATOM in black 5-centimeter (2-inch) block letters is placed on the front side of the marker facing away from the contamination. Place the dose rate, date and time of reading, and the date and time of burst (if known) on the front of the marker at the time of emplacement.

Chemical Minefield Marker. This triangle is red on both sides. The words GAS MINES in yellow 2.5-centimeter (l-inch) block letters with a horizontal yellow 2.5-centimeter (1-inch) stripe underneath the lettering are placed on the front side of the marker facing away from the contamination. Use fluorescent paint, if available. You may inscribe the name of the chemical agent in the mines and the date of emplacement on the front of the marker if the commander desires.

Booby Trap Marker. This triangle is red on both sides. A white 4-centimeter (1.6-inch) horizontal stripe is painted on the front side of the marker facing away from the booby-trapped area.

Unexploded Munition Marker. This triangle is red on both sides. A white bomb at least 10 centimeters (4 inches) tall is painted on the front side of the marker facing away from the dangerous area.

Special Radiological Marking Procedures

The marking of radiologically contaminated areas merely indicates a hazard. Newly arrived troops must determine its extent using instrument readings, surveys, and information from other units.

At the commander's discretion, a radiologically contaminated area need not be marked when it is a military advantage to not do so. In this case, take positive measures to warn other friendly forces of the radiologically contaminated area.

Place signs on all probable routes leading into contaminated areas at the points where the dose rate reaches 1 rad per hour (rad/hr) measured 1 meter above the ground.

Levels of radiation less than 1 rad/hr normally are not marked even though long stays in areas of old contamination might produce significant doses. Units planning prolonged stays in any area during a nuclear war must check the area with radiac instruments even if it is marked.

DANGER	PRIMARY COLORS	SECONDARY COLORS	
		MARKINGS	INSCRIPTIONS
RADIOLOGICAL CONTAMINATION	WHITE	NONE	BLACK
BIOLOGICAL CONTAMINATION	BLUE	NONE	RED
CHEMICAL CONTAMINATION	YELLOW	NONE	RED
CHEMICAL MINEFIELDS	RED	YELLOW STRIPE	YELLOW
BOOBY-TRAPPED AREAS	RED	WHITE STRIPE	NONE
UNEXPLODED MUNITIONS	RED	WHITE (BOMB)	NONE

FIGURE 20-6. Primary and Secondary Colors.

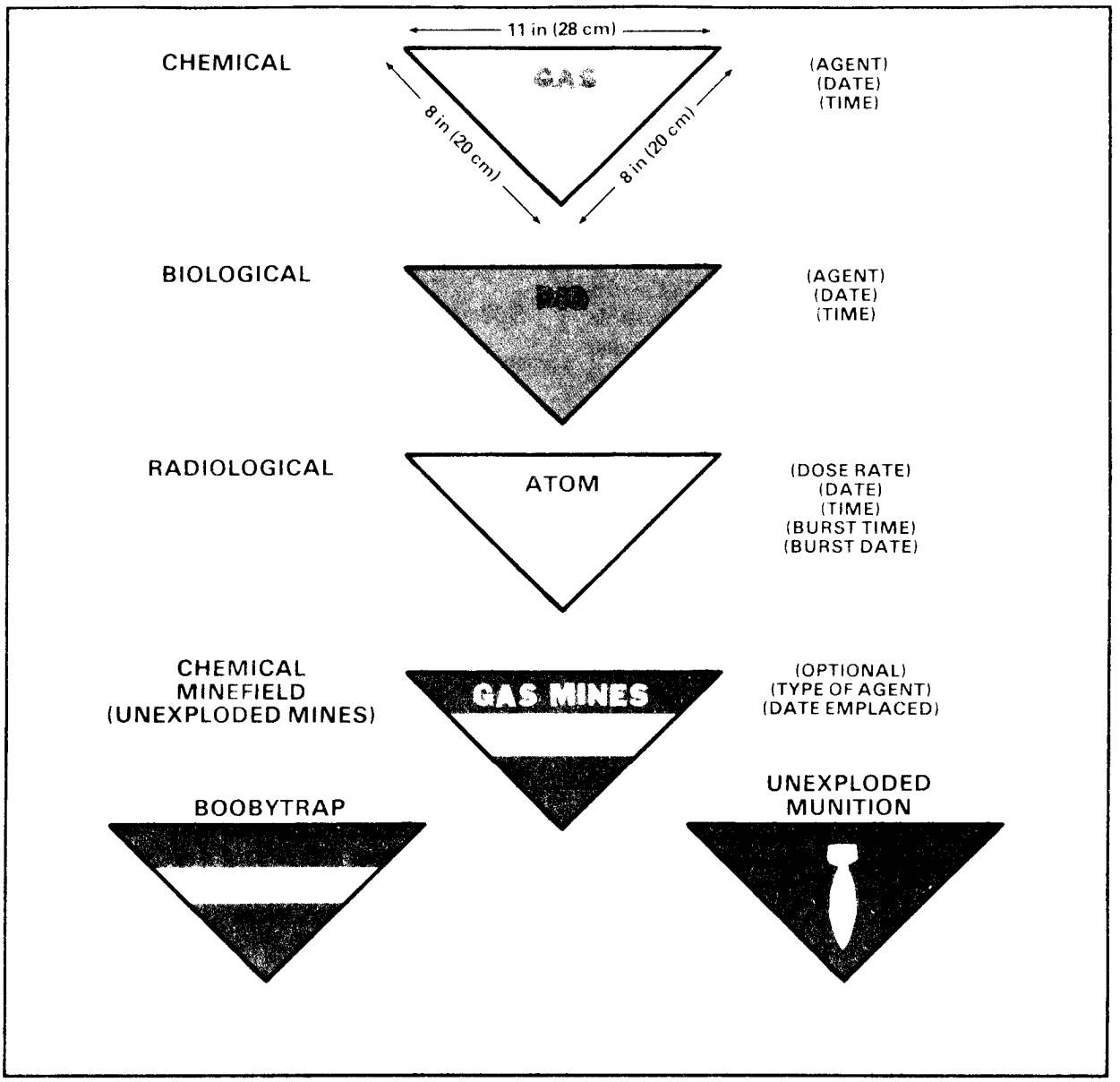


FIGURE 20-7. Markers of Contaminated or Dangerous Land Areas.

NOTE: The unit responsible for the area corrects or moves signs periodically to account for radioactive decay.

Commanders leaving an area or otherwise giving up responsibility for an area should leave perimeter signs in place – unless the area is being abandoned to threat forces. The commander taking over the responsibility for the area will continue the periodic correction or movement of the signs and remove them when they are no longer necessary.

Mark dumps for radiologically contaminated material at intervals around the perimeter with signs that are visible from one another.

Equipment Decontamination

As soon after contamination as the situation permits, decontaminate unit equipment is as follows.

Vehicles. Each tactical vehicle is authorized one M11 portable decontaminating apparatus that will hold 1 ½ quarts of decontaminating agent DS2.

The M11 apparatus is not intended to decontaminate of the entire vehicle. One filling of DS2 is sufficient for emergency decontamination of the operator controls. Tank crews and armored personnel carrier drivers use the M11 to decontaminate those parts of their vehicles that personnel will touch during a mission; for example, areas touched when entering or leaving the vehicle. If sufficient DS2 is not available, use mud rags or any other expedient. Decontaminate contaminated wood surfaces and tires with slurry.

> **NOTE:** If the driver of a vehicle realizes the vehicle is contaminated, all occupants mask and continue their mission until the situation permits decontamination.

Decontaminate the vehicle with DS2, soapy water, solvents, or slurry. (Lightly contaminated vehicles may be decontaminated by airing.)

Crew-Served Weapons. Decontaminate these weapons using the methods described above. If considered necessary, decontaminate the bore by using cleaning solvent or hot soapy water. Decontaminate ammunition DS2 solution, wiped with gasoline-soaked rags, and then dried.

If DS2 is not available, ammunition may be washed with cool soapy water, rinsed, and dried thoroughly. Dispose of ammunition corroded from contact with chemical agents, particularly if the brass cannot be cleaned. Do not use dry super tropical bleach (STB) on ammunition contaminated with mustard-type blister agents because when mixed they may ignite and start a fire.

Optical Instruments. Decontaminate optical instruments by blotting with rags, wiping with an organic solvent (only lens-cleaning solvent is used for the lens), and then allowing them to air-dry. If available, hot air may be used to decontaminate most optical instruments.

Communications and Radar Equipment. Decontaminate communications and radar equipment using hot air, if available. The next best method is by airing or weathering. The metal parts of field telephones and radios are decontaminated by the heat given off during operation.

> **NOTE:** Any metal surface decontaminated with DS2 must then be cleaned to remove the DS2, which is corrosive.

Support-Level Equipment Decontamination Stations

Equipment decontamination stations are located as far forward as possible. A specialized decontamination team or unit normally runs them. A typical layout for such a station is described in FM 3-100. Collapsible tanks may be used to store water. Use standard decontaminating materials and equipment, if available. Brooms, mops, and pails may be used if the standard equipment is not available. Dispose of contaminated wash water in such a way that it is not a hazard. (A sump pit is one means of disposing of the wash water.)

Personnel Decontamination Stations (PDSs)

Large-scale personnel decontamination stations (Figure 20-8) may be of three types: permanent, semipermanent, and field expedient. The permanent PDS is located in a building specifically designed and built for this purpose only. The semipermanent PDS is normally set up in an existing structure that has been modified to serve the purpose. These two types of PDSs are usually established at higher levels of command where locations will be relatively static. See FM 3-100 for details and sample layouts of these two PDSs.

The field expedient PDS may be established in many configurations depending on the available equipment and location. If water is not available, a mobile PDS can be established using the M12A1 power-driven decontamination apparatus (PDDA). The field expedient personnel decontamination stations are normally located as far forward as possible and near a medical aid station, if possible. A clothing exchange facility and a first aid and monitoring facility are operated in conjunction with the field expedient PDS. In addition, the field expedient PDS should be located in an area that provides concealment from air and ground observation and where contaminated water can be disposed of safely.

In an emergency when a PDDA is not available, you may need to establish a field expedient PDS to

decontaminate personnel units that cannot be withdrawn from combat. The PDS provides fresh clothing, equipment, and a means to dispose of contaminated clothing, equipment, and water.

An uncontaminated area near a source of water (such as a stream, well, or water storage facility) is selected, if possible. If the area is contaminated first decontaminate it by turning or removing a top layer of soil or sand or by using available decontaminating agents. Preferably, the area selected should have overhead cover. If not, provide this cover to protect against chemical attack. The area should be located to take advantage of any available cover and concealment and camouflaged to hinder enemy detection.

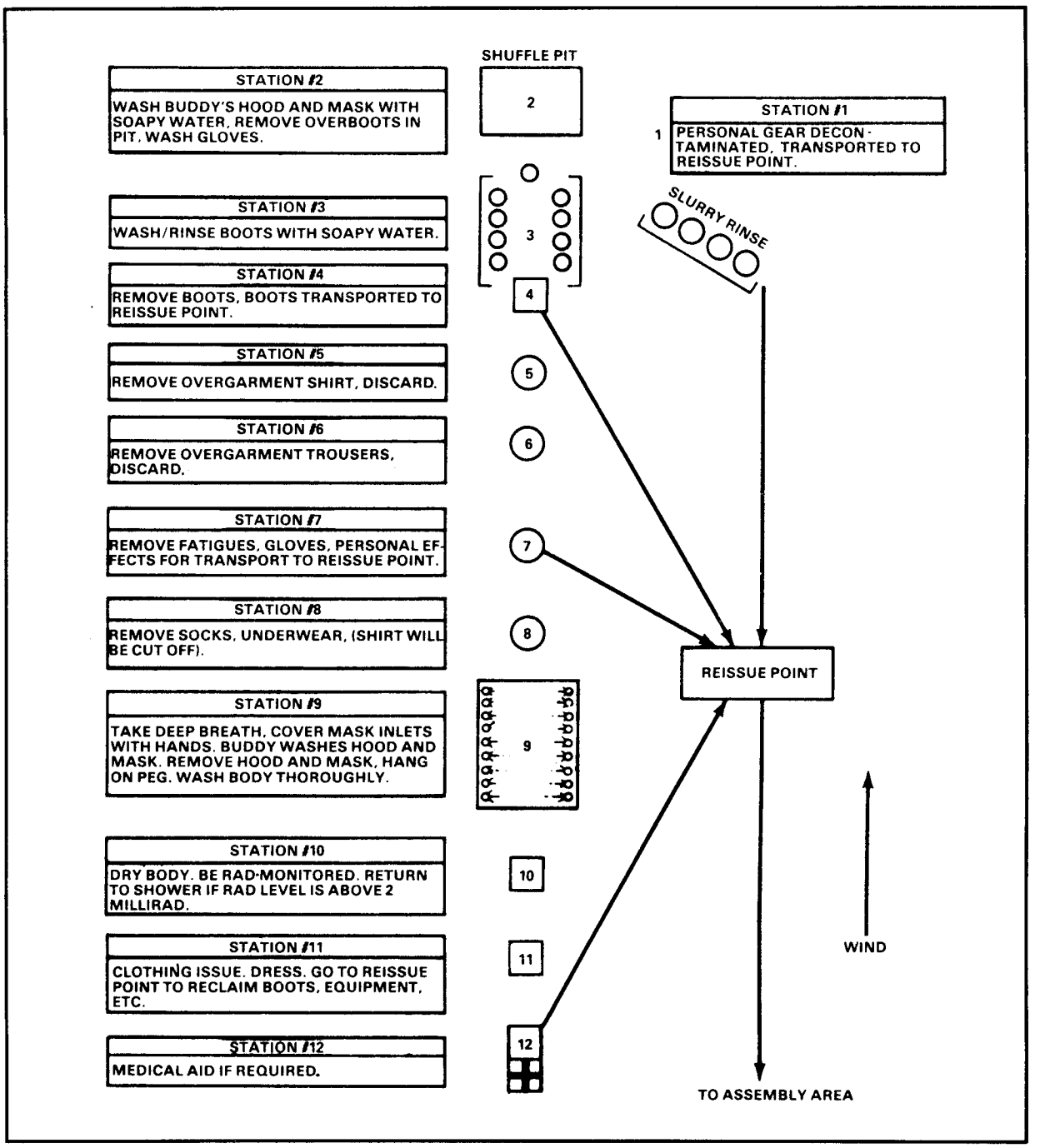


FIGURE 20-8. Personal Decontamination Station.

The following materials and equipment can be used

- Containers (such as GI cans, boxes, or plastic bags) in which to put contaminated clothing as it is removed.
- Water pump and hose (if PDDA is not available).
- Water heater, improvised (if an M1 or M2 water heater is not available).
- An overhead pipe with shower heads (ordinary pipe or rubber hose with holes can be used).
- Lumber and nails for benches and walks.
- Pails of soapy water and clear water with brushes to decontaminate of boots and masks.
- Tarpaulin or any other material to use as overhead cover.
- Medical tent or substitute.
- Clothing exchange tent or substitute.

Assistants are required at the various stations within the PDS to supervise and help personnel going through the line.

FM 3-100 details a recommended undressing procedure. However, the undressing procedure should be modified according to the facilities and conditions at the specific PDS.

The unit SOP should include a personnel decontamination station annex that gives guidance on the following

- Organization of the decontamination line.
- Personnel required at stations on the line and their duties.
- Supplies required.
- Description of boot-cleaning buckets and instructions for use, frequency of contents renewal, disposal of contaminated waste, and replenishing buckets.
- Undressing procedure, including a practical unmasking procedure for personnel going through the line.
- Procedures for decontaminating individual equipment and reissue before departure from the PDS.
- Coordination for disposing of contaminated clothing.

If units with both male and female personnel need to be decontaminated, the PDS may be set up to provide separate facilities for males and females. To do this, establish two lines of decontamination points (shower heads) separated by a canvas tarpaulin. Female assistants, if available, would assist the females; and male assistants, the males. HOWEVER, IF SUCH ARRANGEMENTS ARE NOT AVAILABLE, THE PRIMARY CONCERN MUST BE THE PRESERVATION OF LIFE AND THE IMMEDIATE REMOVAL OF THE CONTAMINANT FROM ALL PERSONNEL WITHOUT REGARD TO GENDER. In either case, once personnel have departed the shower area (are no longer in a life-death situation), separate dressing areas should be provided for men and women.

Decontamination Materials and Their Use

STB Decontaminating Agent (Bleach). Super tropical bleach can be applied undiluted but should be used either as a dry mix (with earth) or a wet mix (with water). Do not leave it on contaminated surfaces for longer than 24 hours because it corrodes metals. STB neutralizes liquid chemical agents by chemical action. Dry bleach in direct contact with liquid blister agents reacts violently and can cause flame and heavy vapor. STB is chemically active, causing vigorous corrosion of metals. Wet mix is effective against biological agents.

DS2 Decontaminating Agent. Ready-to-use solution is available in 1 1/3-quart cans and 5-gallon drums. DS2 can be applied easily with the M11 decontaminating apparatus, a broom, or a swab. One application of DS2 should be made to the contaminated surface and flushed with water after 30 minutes. The solution is effective at temperatures from -26° to 52° C (-15° to 125° F). DS2 neutralizes all known chemical agents and most biological agents. It reacts with G-agents, V-agents, and blister agents to reduce their hazards within 30 minutes after application.

Washing Soda (Sodium Carbonate). Make a solution by stirring 2 pounds of washing soda into 2 ½ gallons of water. Then apply it to the contaminated surface. Washing soda neutralizes most chemical agents and is especially effective against G-agents. It is used as a washing agent for blister agents. Decontamination is faster with concentrated solutions.

Caustic Soda (Lye). Make a 5 percent solution by stirring 1 pound of lye into 2 ½ gallons of water. Then apply it to the contaminated surface. Caustic soda neutralizes chemical agents and biological agents. It is especially effective against G-agents. Decontamination is faster with concentrated solutions.

Fuels and Solvents. Fuel is applied to contaminated areas and ignited. Solvents (like gasoline, kerosene, or carbon tetrachloride) are applied with swabs, taking care not to spread the contamination. Ignited fuels destroy agents. Solvents merely remove them, but sufficient solvent can dilute most dangerous contamination.

Water or Steam. Water or steam is applied under high pressure. The action of hot water is speeded by using soap or other detergent. Hot water may also be applied with swabs. Water or steam removes dirt or grease containing chemical agents or radioactive material. Hot soapy water removes G-agents and physically removes other chemical and radiological contamination.

CAUTION

Use temperature and air velocities that are safe for the particular equipment involved. Effluent air will be contaminated.

Hot Air. Hot air is used in special situations, such as decontamination of delicate instruments contaminated with liquid agents or decontamination of aircraft cabins, using the engine heaters. Hot air evaporates liquid chemical contaminants.

WARNING

Drain water and condensed steam into a properly marked sump pit. If you must drain into a stream, notify friendly units downstream.