

FIELD MANUAL

**TRANSPORTATION OF THE
SICK AND WOUNDED**

HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1970

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CHAPTER 1

GENERAL

1-1. Purpose and Scope

This manual describes the principal methods and means of transporting the sick and wounded on land, in the air, and on water.

a. The manual contains references to details of NATO agreements, STANAG No. 2087, Medical Employment of Helicopters in Ground Warfare; and STANAG No. 3204 and SOLOG No. 83, Aeromedical Evacuation. Specific references to these agreements are made wherever details are discussed.

b. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commandant, United States Army Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas 78234.

1-2. Medical Evacuation and Transportation

a. Medical evacuation and transportation is the process of moving any person who is wounded, injured, or ill to and/or between facilities. The medical evacuation, transportation, and treatment of the sick and wounded begins at the place of injury/onset of illness and continues as far rearward as the medical condition of the patient requires or the military situation permits. The military medical services accomplish these functions as rapidly, as orderly, and as effectively as possible, with the welfare of the patient as the primary concern.

b. It is the policy of the Department of Defense that, in both peace and war, the transportation of patients of the Armed Forces be accomplished by aircraft when air transportation is feasible and available and conditions are suitable for air evacuation unless medically inadvisable. Within a theater of operations, patients may be moved by manual means, litter, ground ambulance, watercraft, aircraft, ambulance train, or by a combination of these means.

From the theater of operations to the zone of interior, they are normally evacuated by aircraft, or by surface means, when air transportation is not available or advisable.

1-3. Relation of Transportation to the Medical Task

a. Transportation and treatment of sick and wounded personnel is the responsibility of the military medical services.

b. Air transportation of the sick and wounded within the combat zone is a mission of the Army Medical Department (AMEDD). The AMEDD is also responsible for transportation of patients by litter and manual means and by ground ambulance. Ground ambulance is used for patient transportation to medical treatment facilities, to airstrips for air transportation from the combat zone by Air Force aircraft, and from the combat zone to and within the communications zone. The Army also uses ambulance trains for patient evacuation. In general, ambulance trains are used for the transportation of patients who are unable to be moved by air because of their condition, or when aircraft transportation is not feasible or available for patient evacuation.

c. Patient evacuation by air over routes of sole interest to the Navy and within naval (including marine) combat areas is a function of the Navy. It is a responsibility of the Navy to provide water transportation for the sick and wounded from the theater of operations to the zone of interior. This means of transportation is used as a supplement to aircraft transportation and as an alternate means when aircraft transportation is not available or advisable. It is accomplished by the Military Sea Transportation Service (MSTS).

d. The Air Force is responsible for providing air evacuation of patients from airheads where airborne operations include air-landed logistical support provided by the Air Force, between zones in a theater of operations, and between theaters of operations (accomplished by the theater tactical/assault Airlift Force; and from the theater of operations to and within the zone of interior (accomplished by the Military Airlift Command (MAC)).

CHAPTER 2

MANUAL TRANSPORTATION

Section 1. INTRODUCTION

2-1. Handling the Patient

Careful and correct handling of the patient is of primary importance in the evacuation and transportation of the sick and wounded. If a patient is roughly or incorrectly moved, his injury may become more serious or even fatal.

2-2. Treatment of the Patient

Many lifesaving and life preserving measures are carried out before transporting the wounded to medical treatment facilities. Before any movement of the patient is attempted, the type and extent of the injury is evaluated. Measures are taken to stop bleeding, establish airway and give artificial respiration when needed, protect wounds, and prevent or treat for shock. If a patient has a fracture or a suspected fracture, the part should be immobilized before he is moved. Every precaution must be taken to prevent the broken ends of bone from cutting through muscle, blood vessels, nerves, and skin. If a patient has a serious leg injury, the leg should be splinted to prevent further injury even if the bone is not broken. For further discussion of emergency medical care and treatment, see TM 8-230.

2-3. Manual Carries

Manual carries are tiring for the bearer and involve the risk of increasing the seriousness of the patient's injury. In some instances, litters are not available and patients *must* be transported by manual carries. In these instances, the patients should be transferred to litters as soon as litters are available. In certain types of terrain and in some combat situations only manual transportation is feasible, and in some situations manual transportation is necessary to save a life.

a. Some of the carries discussed in this chapter may be used for unconscious patients. Others can be used only if the patient is conscious. Some of the carries must not be used if there is any evidence of a fractured arm, thigh, neck, back, or hip.

b. Manual carries are accomplished by one bearer or by two bearers. Two-man carries are used whenever possible. They provide more comfort to the patient, are less likely to aggravate injuries, and are also less tiring for the bearers, who are thus able to carry the patient farther.

c. The fireman's carry, which is one of the easiest ways for one man to carry another, is of especial importance since the preliminary steps of the carry are used in several other one-man carries. An unconscious or disabled person can be raised from the ground in the first three steps of the carry.

d. In this chapter, manual carries are described step by step and basic doctrine is explained. Certain flexibility is permitted in the application of the doctrine. In the discussion of the fireman's carry, the first three steps are described two different ways: starting at the back of the patient, and starting in front of the patient. The bearer, first determining the location of the patient's wound, can thus choose the method he believes to be the safer for the patient. The alternate (front) method of raising the patient should be used only when necessary. It should be used with care to prevent injury to the patient's neck caused by his head snapping back. In the discussion of some of the carries, the terms "left (right)" or "right (left)" are used to indicate that the various steps of the carry can be accomplished by starting from either the left or the right side.

Section II. ONE-MAN CARRIES



(Can be used if patient is unconscious.) Turn patient face down.

Figure 2-1. Fireman's carry (step one).



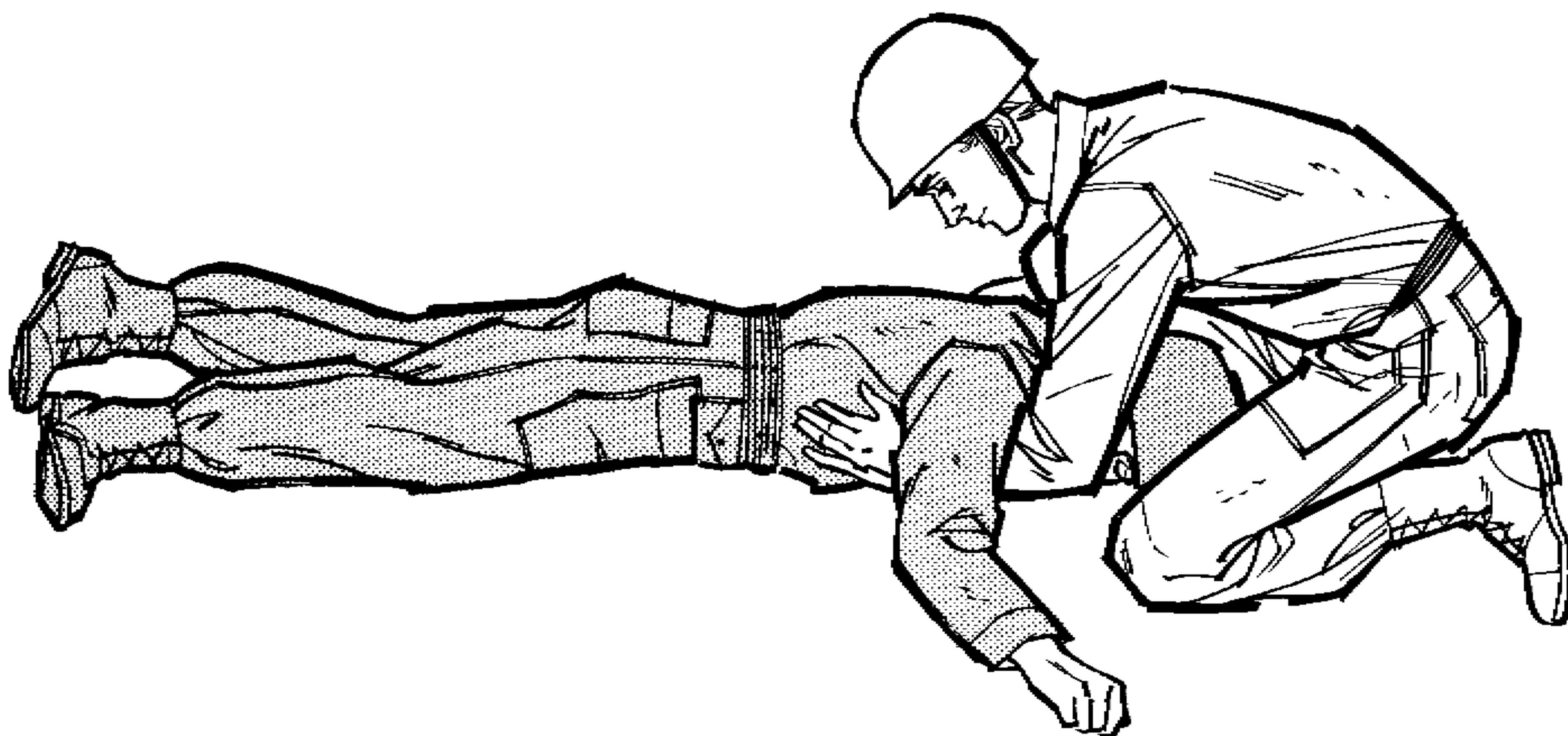
Support patient's head on his arm.

Figure 2-2. Fireman's carry (step two).



- Straddle patient.
- Grasp him by placing your hands under his armpits.
- Lift him first to his knees, get a better grip, and then raise him to a standing position until his knees lock.

Figure 2-3. Fireman's carry (step three).



- a. Turn patient face down on ground and, facing him, kneel on one knee at his head.
- b. Place both hands under patient's armpits and gradually work them down his side and across his back.

Figure 2-4. Fireman's carry (step one) (alternate method).



Raise patient to his knees.

Figure 2-5. Fireman's carry (step two) (alternate method).



Take firmer hold across patient's back and raise him to his feet.

Figure 2-6. Fireman's carry (step three) (alternate method).



Support patient by placing an arm around his waist, and move to patient's front.

Figure 2-7. Fireman's carry (step four).



- a. Place right foot between patient's feet, and grasp patient's right wrist with your left hand.
- b. Bending at the waist, pull patient's right arm around the back of your neck.
- c. Pull patient's right arm down so that his body comes across your back.
- d. Encircle patient's right leg at the knee with your right hand.

Figure 2-8. Fireman's carry (step five).



Lift patient while straightening up, holding patient's right wrist in your left hand and the patient's right knee in your right hand.

Figure 2-9. Fireman's carry (step six).



Grasp the patient's right wrist in your right hand, leaving your left hand free.

Figure 2-10. Fireman's carry (step seven).



(Use when patient is only slightly injured.)

- a. Raise patient from ground as in fireman's carry.
 - b. With your left (right) hand grasp patient's left (right) wrist and draw his left (right) arm around your neck. Place your right (left) arm around his waist.
- (The patient is thus able to walk, using you as a crutch.)

Figure 2-11. Supporting carry.



(Use only when patient is conscious.)

- a. Raise patient to upright position.
- b. Support patient by placing an arm around his waist, and move to patient's front.
- c. Have patient encircle his arms around your neck.
- d. Stoop, raise him upon your back, and clasp hands beneath patient's thighs.

Figure 2-12. Saddleback carry.



(A good way of carrying an unconscious patient. Do *not* use if there is a fracture or suspected fracture of arm, leg, neck, back, or hip.)

- a. Raise patient from ground as in fireman's carry.
- b. Support patient by placing an arm around his waist, and move to patient's front.
- c. Grasp patient's wrists and hoist him so that his armpits are over your shoulders.
- d. Do not cross the patient's wrists. Make sure his hands are positioned with the palms down before applying pressure.

Figure 2-13. Pack-strap carry.



(May be used for long distances without undue fatigue of bearer.) Link together two pistol belts to form a continuous belt under the patient's thighs and hips so that a loop extends from each side.

(Can be used with alternate equipment, such as one rifle sling, two triangular bandages, two litter straps, or any suitable material that will not cut or bind the patient's flesh and is long enough to pass around patient and be secured around carrier.)

Figure 2-14. Pistol-belt carry (step one).



- a. Lie between patient's extended legs and thrust your arms through the belt loops.
- b. Grasp patient's right (left) hand with your left (right) hand and the patient's (left) trouser leg with your right (left) hand.
- c. Bearer must be careful not to lie on patient's testicles.

Figure 2-15. Pistol-belt carry (step two).



- a. Rolling toward the patient's uninjured side, roll over to the prone position, carrying the wounded man onto your back.
- b. Make necessary adjustments of slings before proceeding.

Figure 2-16. belt carry (step three).



Rise to the kneeling position. (The continuous belt holds the patient firmly in position.)

Figure 2-17. Pistol-belt carry (step four).



Place one hand on your knee for support and rise to an upright position.

(The patient is now supported on your shoulders, held in position by the continuous belt. He will ride comfortably whether conscious or not.)

(You are ready to move, with your hands free for use in climbing steep banks or in surmounting obstacles.)

Figure 2-18. Pistol-belt carry (step five).



- (Can be used for very short distances only. Affords protection in combat, since bearer and patient remain close to ground. Do not use if patient is suspected of having a fracture of the neck, back, hip, or thigh.)
- Extend two pistol belts, or similar objects, their full length, and join together to make one continuous loop.
 - Roll patient on back.
 - Pass loop over patient's head and work into position across his chest under his armpits.
 - Cross belts nearest you.

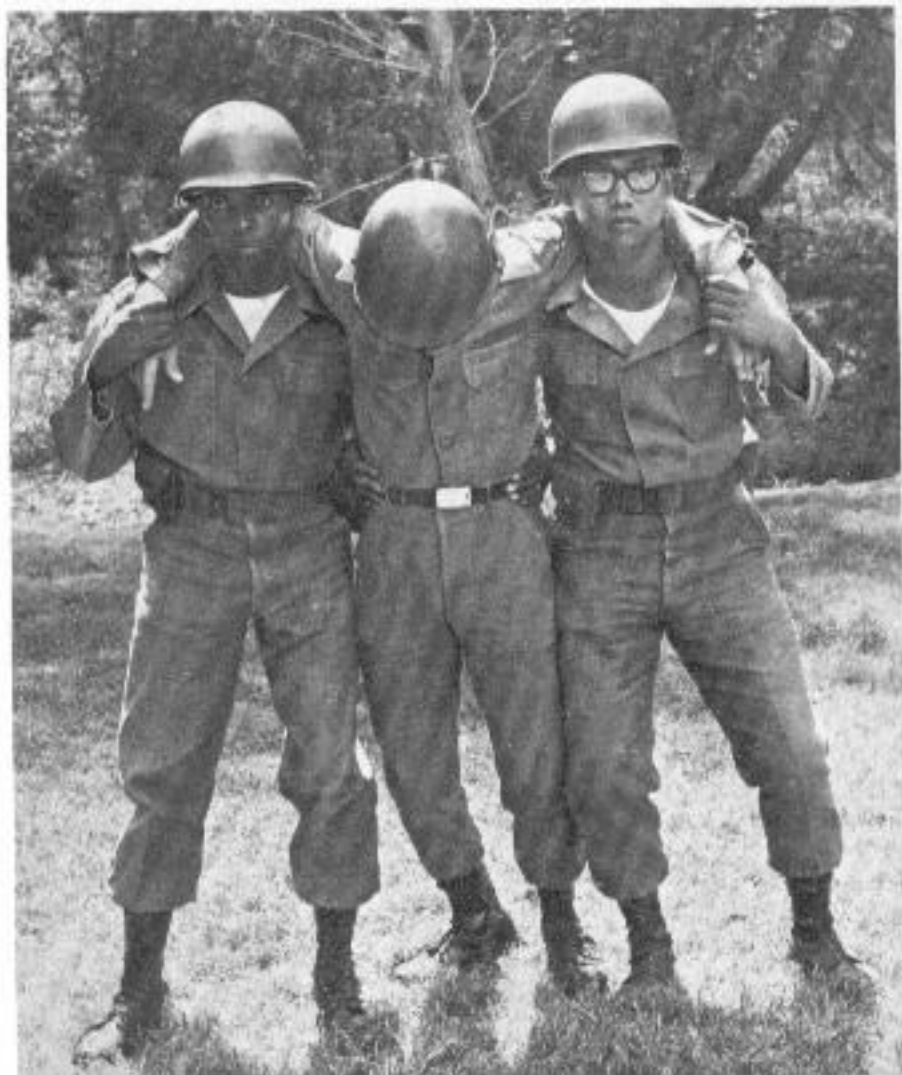
Figure 2-19. Pistol-belt drag (step one).



- (Lie down on side with back away from patient, resting on right elbow.)
- Slip loop over your arm and shoulder and turn over on abdomen.
 - Advance by crawling and drag the patient.

Figure 2-20. Pistol-belt drag (step two).

Section III. TWO-MAN CARRIES



(May be used for the unconscious patient. Do *not* use if there is evidence of a fractured arm, leg, neck, back, or hip.)

Method of accomplishment is similar to that for one-man supporting carry (fig 2-11), except that two men are used instead of one.

(When the patient is taller than the bearers, instead of supporting the patient around the waist, the bearers support the weight by using the inner arms placed behind the patient's knees.)

Figure 2-21. Two-man supporting carry.



(Particularly suited to lifting a patient onto a litter or other carrier.)

- a. The two bearers kneel at one side of the patient.
- b. One bearer places one arm beneath the patient's shoulders and the other arm beneath his back.
- c. The second bearer places one arm beneath the patient's hips and the other arm beneath his knees.

Figure 2-22. Two-man carry (step one).



Bearers lift the patient to their knees.

Figure 2-23. Two-man arms carry (step two).



Bearers rise together, lifting the patient and turning him in toward their chests.

(Carrying patients high on the chests lessens fatigue.)

Figure 2-24. Two-man arms carry (step three).



(A good method for carrying an unconscious patient a short distance. Do *not* use if there is a fracture or suspected fracture of the arm, leg, neck, back, or hip.)

- a. With patient lying on his back, front bearer spreads patient's legs, steps between them, faces away from the patient, kneels, reaches back, and grasps patient behind the knees.
- b. Rear bearer kneels at patient's head, and thrusts his arms under patient's armpits and across his chest, locking his hands together.

Figure 2-25. Two-man saddleback carry (step one).



Bearers rise together, lifting the patient.

Figure 2-26. Two-man saddleback carry (step two).



The patient sits on the interlocked hands of the bearers, supporting himself by placing an arm around each of their necks.

Figure 2-28. Four-hand carry (packsaddle carry) (step two).



(A good carry for patients with injuries of the head or feet. Patient must be conscious so he can hold on.)

Each bearer grasps his own left wrist with his right hand, and then grasps the other bearer's right wrist with his left hand.

Figure 2-27. Four-hand carry (packsaddle carry) (step one).



(May be used if patient is unconscious. Do not use if it is suspected that patient has a fractured neck, back, or hip.)

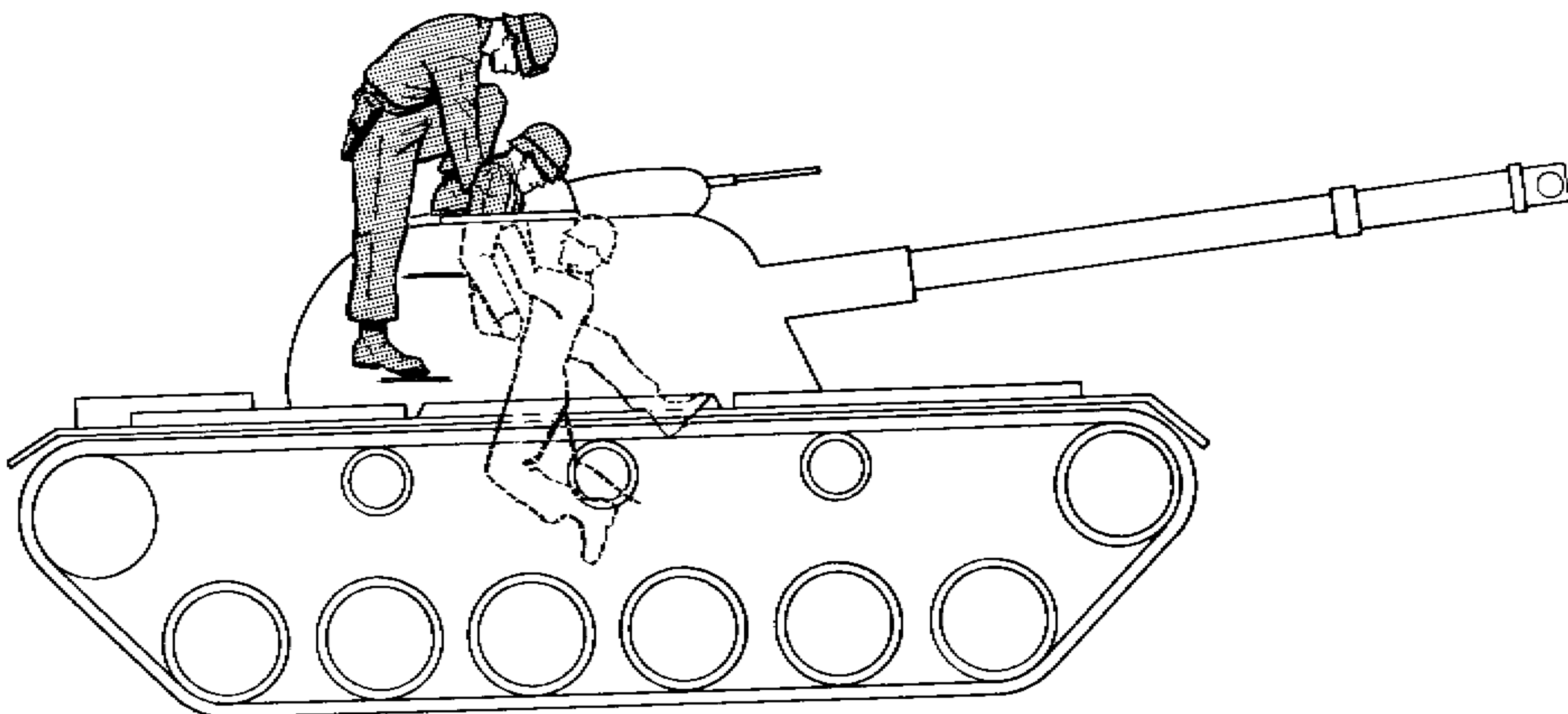
- a. With patient lying on his back, bearers kneel on opposite sides of the patient's hips.
- b. Each bearer passes his arms under the patient—one arm under the thighs and the other arm under the arms and behind the back—and then grasps the other bearer's wrist.
- c. The bearers rise together, lifting the patient.

Figure 2-29. Two-hand carry (position of arms under patient's arms and back).



Figure 2-30. Two-hand carry (front view).

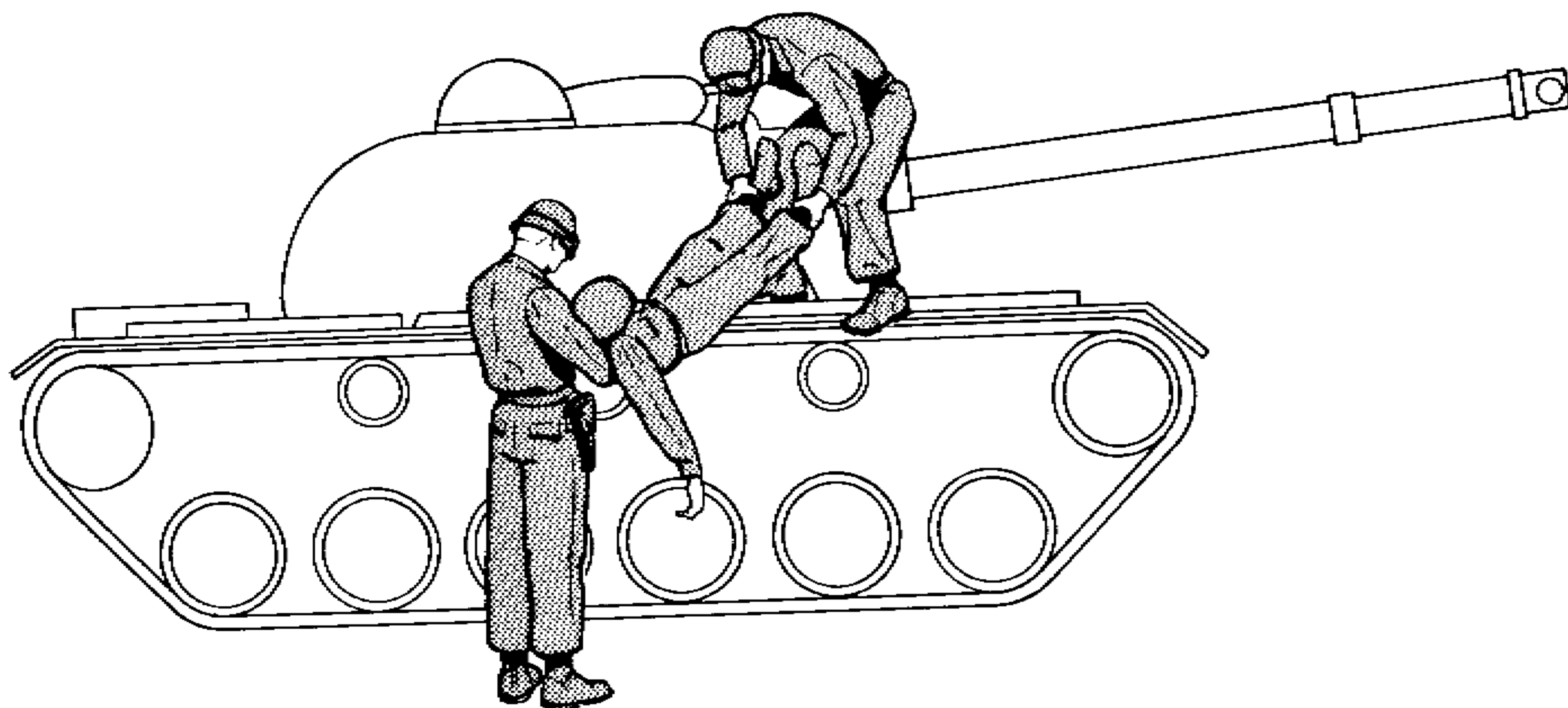
Section IV. SPECIAL MANUAL EVACUATION TECHNIQUES



(Task of removing wounded man from interior of tank is difficult and requires speed, since stationary tanks are good targets and all disabled armored vehicles are likely to explode. Two men, therefore, should be used. If only one is available, he uses a pistol belt, or similar device, to lift the injured man from the tank.)

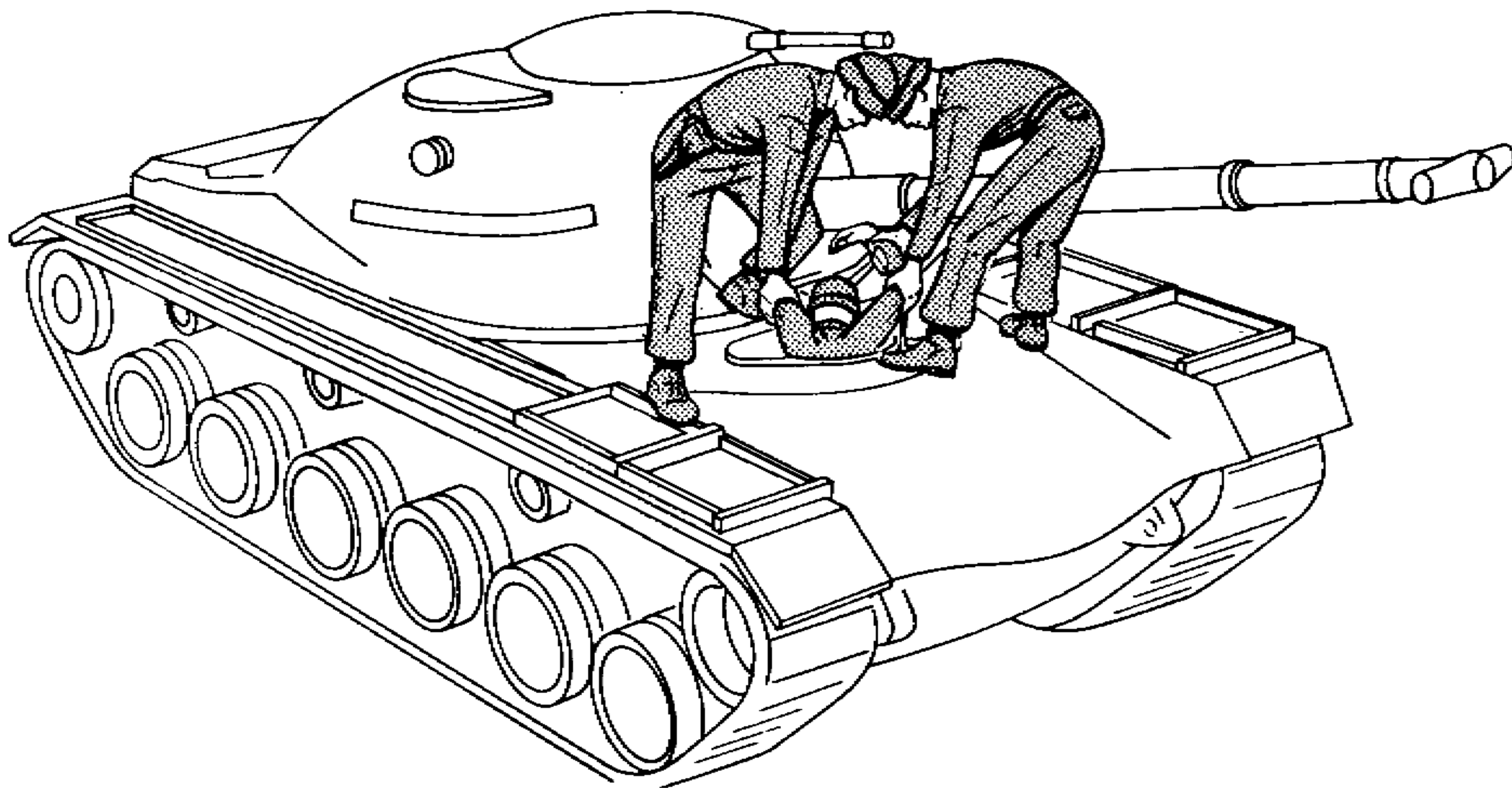
- a. One man goes into the tank and supports the wounded man from below.
- b. The second man stands on top of the turret and lifts the injured man through the hatch.

Figure 2-31. Removing patient from a tank turret (step one).



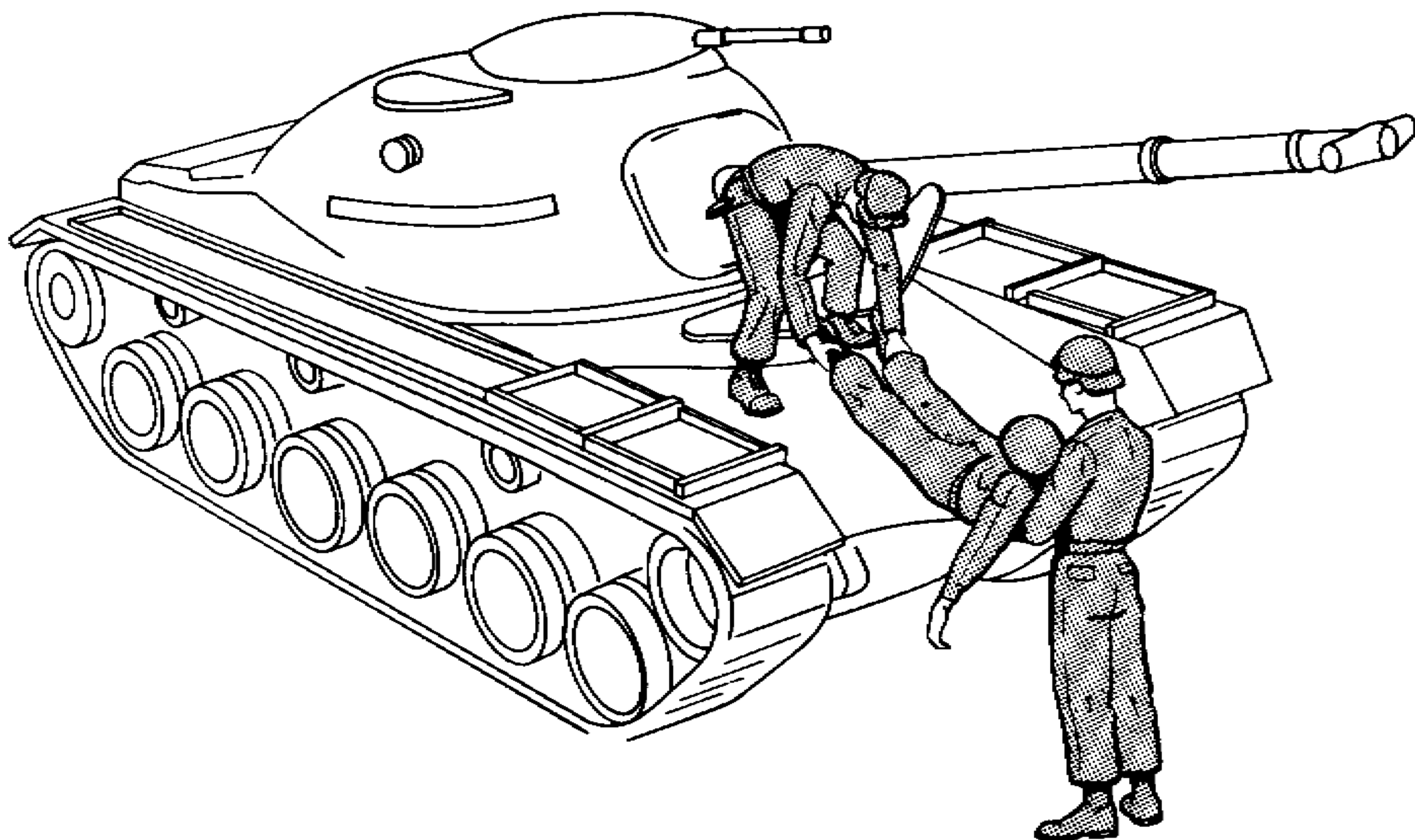
- a. The second man holds the patient in place on the hatch rim while stepping to the fender or stowage chest of the tank.
- b. He supports the patient until the first man can get out of the tank and jump to the ground.
- c. The second man then lowers the patient into the arms of the first man.

Figure 2-32. Removing patient from a tank turret (step two).



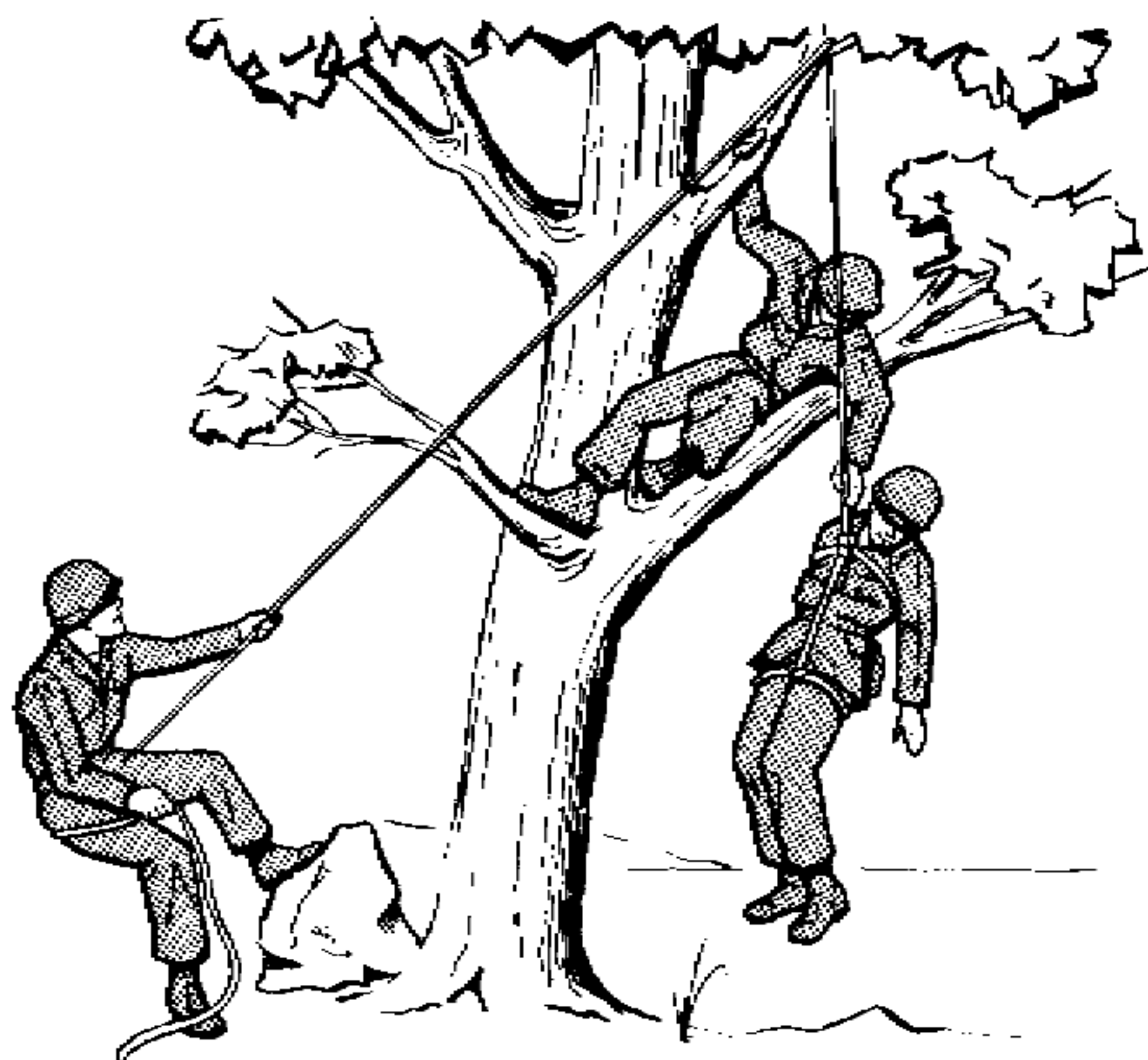
- a. The two men open the hatch, reach down, and hold the patient's arms across his chest.
- b. They turn the wounded man until he faces the rear.
- c. With one man standing on each side of the hatch, they lift the patient until he is sitting on the hatch rim.

Figure 2-33. Removing patient from driving compartment (step one).



One man jumps to the ground while the other lowers the patient down the front slope plate.

Figure 2-34. Removing patient from driving compartment (step two).



(During airborne and mountain operations, it may be necessary to remove the wounded from trees. The method to use will vary, depending upon the size of the tree, the foliage, the strength of the branches, the manner in which the injured man is wedged, and the help available. It is best to use two men for this type of evacuation.)

a. One man stands on the ground and holds one end of a rope.

b. The second man climbs the tree, taking the other end of the rope with him. He passes the rope over a branch of the tree above the position of the wounded man, and ties a bowline knot or some knot which will not slip. (If necessary, he administers emergency medical treatment.)

c. He slips one loop over each thigh of the patient, and then with the same rope ties a bowline around the patient's chest.

d. The man on the ground, holding the other end of the rope, lowers the injured man to the ground. The first man escorts the injured man in his descent and prevents his movement from being impeded by intervening limbs or branches.

(When only one man is available, he can climb the tree, attach the rope, climb down to the ground, and lower the injured man to safety.)

Figure 2-35. Removing the wounded from trees.

CHAPTER 3

LITTER TRANSPORTATION

Section I. LITTERS

3-1. General

Patient transportation by litter is a task of AMEDD personnel which is begun at the critical point in the process of evacuation—the area between the patient on the field and the most forward ambulance or medical treatment installation. After being picked up in a forward area by litter bearers, patients may be moved on litters by surface or air vehicles to points as far rearward as fixed medical treatment installations. The patient who requires litter accommodation while in transit is referred to as a *litter (stretcher) patient*. The patient who is able to walk and requires only sitting accommodation in vehicles while in transit is a *walking (ambulatory) patient* (STANAG No. 3204 and SOLOG No. 83).

3-2. Types of Litters

(fig 3-1—3-6)

A litter may be a standard product, designed for the purpose of carrying a patient, or it may be a substitute improvised from certain available materials. A standard litter consists of a frame, a cover, and accessories, such as poles, stirrups, litter straps, and patient securing straps. The medical services of the Armed Forces use several types of standard litters, of which the most widely used is the durable straight aluminum litter.

a. Two types of litters have lightweight aluminum poles and are of the same general dimensions when open. One type has rigid poles; the second type has folding poles, which permit the litter to be folded to one-half its length. This standardization allows a patient to travel in various vehicles on the same litter, minimizing the possibility of further harm to the patient and saving valuable time.

b. Other types of litters have been developed for special purposes—the Stokes metal litter,

the semirigid poleless litter, and the mountain basket-type rigid litter.

c. The stretcher, ambulance, two-level, is designed for use in the metropolitan ambulance. It is not used in the field.

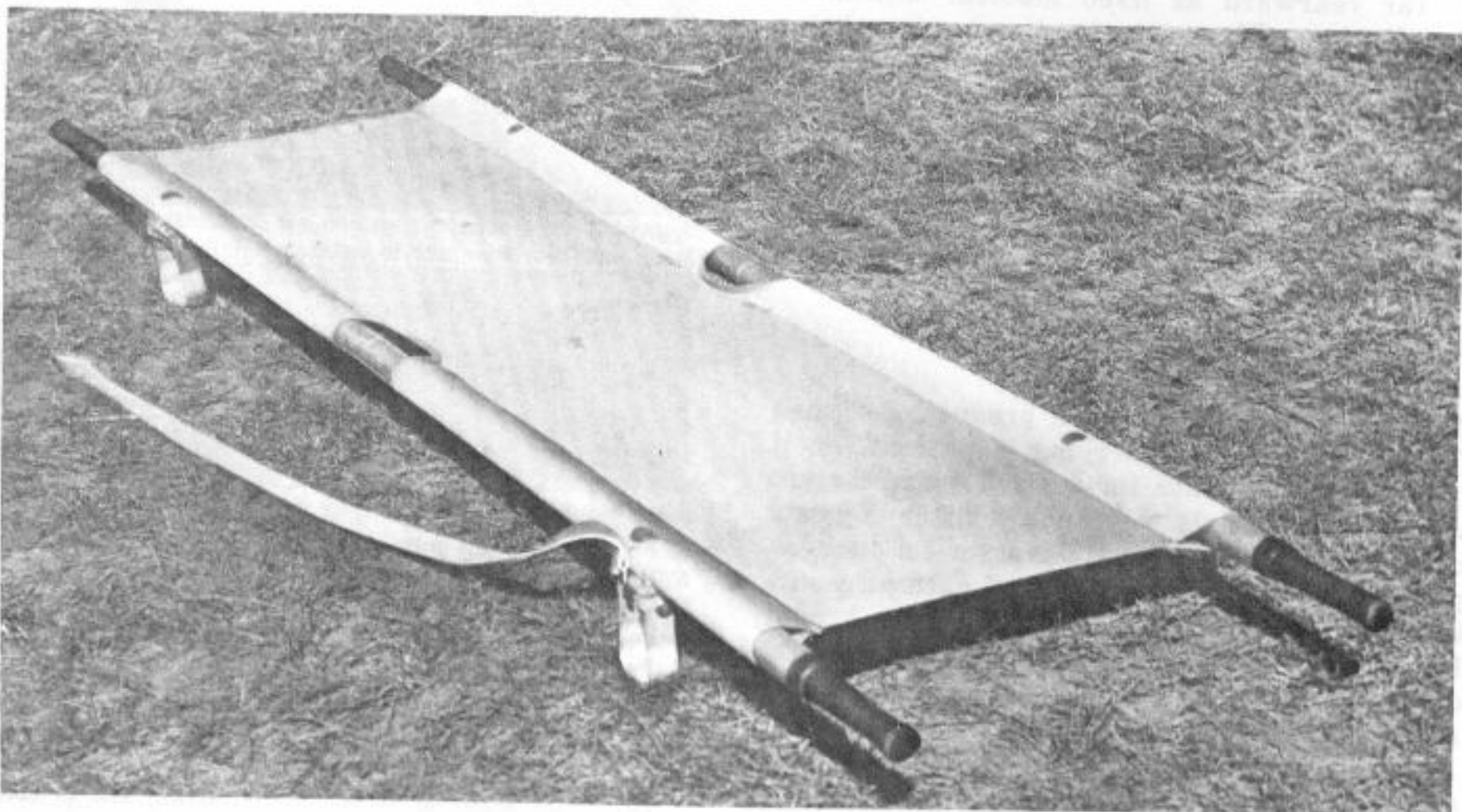


- a. Folds in long axis only.
 - b. Basic components are two rigid, lightweight aluminum poles and a cover (bed) of cotton duck.
 - c. Four wooden handles are attached to poles.
 - d. Four stirrups, one bolted near the end of each pole, support litter when placed on ground.
 - e. Two spreader bars, one near each end of litter, extend crosswise at stirrups to hold cover taut when litter is open.
 - f. Two litter securing straps are attached, one to each pole at stirrup bolts, to strap litter when closed.
 - g. Two or four patient securing straps may be used as accessories.
- (Overall length—90 inches
Overall width—22 7/8 inches
Bed length—72 inches
Bed width—22 7/8 inches
Weight—15 pounds)

Figure 3-1. Straight aluminum litter.



① Closed, folded, and strapped



② Open

- a. Folds in both long and short axes. Is therefore easy to handle and store.
- b. Used in airdrops and airborne operations.
- c. Is similar to straight aluminum litter, except that poles are hinged in the middle and stirrups fold flat against poles when litter is collapsed.
 (Overall length—90 inches
 Overall width—22 7/8 inches
 Bed length—72 inches
 Bed width—22 7/8 inches
 Weight—18 3/4 pounds)

Figure 3-2. Folding aluminum litter.

Section II. LITTER SQUAD

3-3. Composition

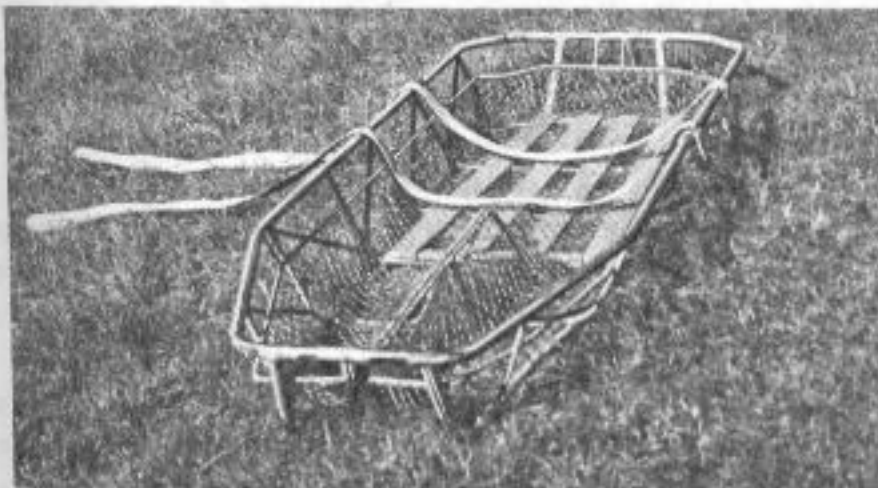
A litter squad ordinarily consists of four litter bearers. The fatigue produced by long and frequent carries is difficult to withstand when the weight of the loaded litter is shared by fewer than four men.

3-4. Instruction and Drill

In the instruction and drill of the litter squad in handling the litter, each bearer is given a numerical designation, which carries with it the responsibility for certain duties. The squad is drilled first in handling the unloaded litter and then in handling the loaded litter. Section III contains a drill guide, the use of which promotes uniformity and accuracy of methods and economy of valuable training time.

3-5. Designation and Duties of Bearers

A squad of litter bearers in line are numbered consecutively from right to left.



Affords maximum security for patient when litter is tilted.

a. Is a steel or aluminum tabular frame supporting a bed of wire mesh netting which has wooden support slats for support of patient's back.

b. Lower half is divided into two compartments to accommodate legs of patient.

c. Has four webbing patient securing straps and one extra strap.

d. Ropes and/or cable or steel rings are usually attached as required for suspension operations (fig 5-25).

(Length—84 inches

Width—23 inches

Weight—31 1/2 pounds)

Figure 3-3. Stokes metal litter.

a. The bearer designated as No. 1 is the squad leader.

b. In the absence of No. 1, No. 4 assumes the duties of leader.

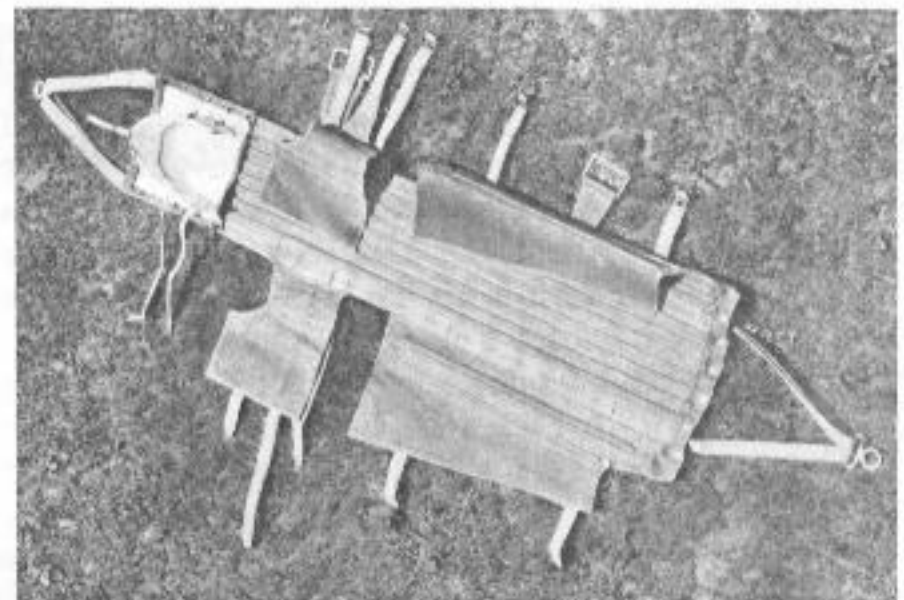
c. If both No. 1 and No. 4 are absent, No. 3 becomes the leader.

d. In the absence of No. 3 and No. 2, their duties are assumed by No. 1 and No. 4, respectively.

e. If No. 4 is absent, his duties do not require replacement.

3-6. Instruction in Reduced Squads

Under exceptional circumstances, when two-bearer squads are being instructed, the instruction will be as for No. 2 and No. 3 of the four-bearer squad.



a. Especially useful in evacuating patients from ships and in mountainous areas. Holds patient securely in position and facilitates movement of patient in vertical direction.

b. Made of semirigid cotton duck cloth with wooden supports.

c. Has four webbing handles, two at each end, for four-man carries.

d. Has four loops for inserting poles for carrying purposes, headpiece to support patient's head, and seven patient securing straps to secure patient to litter.

(Overall length—83 3/4 inches

Width—22 3/4 inches)

Figure 3-4. Semirigid poleless litter.

Section III. LITTER DRILL

3-7. Commands

Litter drill is not to be considered a precision

drill; however, certain preparatory commands and commands of execution should be used to facilitate instruction. A preparatory command



- a. Designed for use in mountain operations. Affords security for patient when litter is tilted. Can be pulled on ground without injury to patient.
- b. Is a steel tubular frame supporting a bed of wire mesh netting with a base of four runner boards.
- c. Has four webbing straps.
(Overall length—84 3/4 inches
Width—22 3/4 inches)

Figure 3-5. Mountain basket-type rigid litter.

states the movement or formation to be carried out and mentally prepares the individual for its execution. A *command of execution* tells when the command is to be carried out. The use of these commands in actual operations is not contemplated. For purposes of identification in the discussion of the different types of litter drill, preparatory commands will be in lower case with initial capital letters and commands of execution will be in capital letters.

3-8. Litters

When a litter is not open, it may be referred to in one of the following ways:

- a. *Litter, closed*—when the two poles are brought together and the canvas is evenly and smoothly doubled upon itself.
- b. *Litter, folded*—when, after closing, it is doubled upon itself along the long axis at the hinges provided for that purpose. (Some litters have two pairs of hinges. Not all litters can be folded.)
- c. *Litter, strapped*—when, after closing (and folding, if a folding-type litter), it is secured by cross-straps.

3-9. General Rules for Moving Patients

- a. In moving a patient, either with or without a litter, every movement should be made deliberately and as gently as possible. The command

STEADY should be used to prevent undue haste and other irregularities.

- b. The rear bearers should watch the movements of the front bearers and time their own with them, so as to insure ease and steadiness of action.

- c. The litter must be kept as nearly level as possible at all times. Care must be taken to do this in passing obstacles and ditches.

- d. As a rule, the patient should be carried on the litter feet foremost, but in going uphill or upstairs his head should be forward.

- e. In case of fractures of the lower extremities, the patient is carried uphill or upstairs feet foremost, and downhill head foremost. This prevents the weight of the body from pressing upon the injured part.

3-10. Basic Guides for Litter Drill

- a. Several squads may be instructed simultaneously by one individual, or each squad may be instructed separately by an instructor or by the squad leader (No. 1).

- b. For purposes of instruction, the unloaded open litter is handled as a loaded litter.

- c. In the instruction with loaded litters, some men are designated "patient." These men should be frequently rotated with the men carrying the litters so that all may participate in each phase of the instruction.

- d. To facilitate instruction in the handling of the different types of injuries, patients wear moulages, bandages, and splints to simulate actual disabilities.

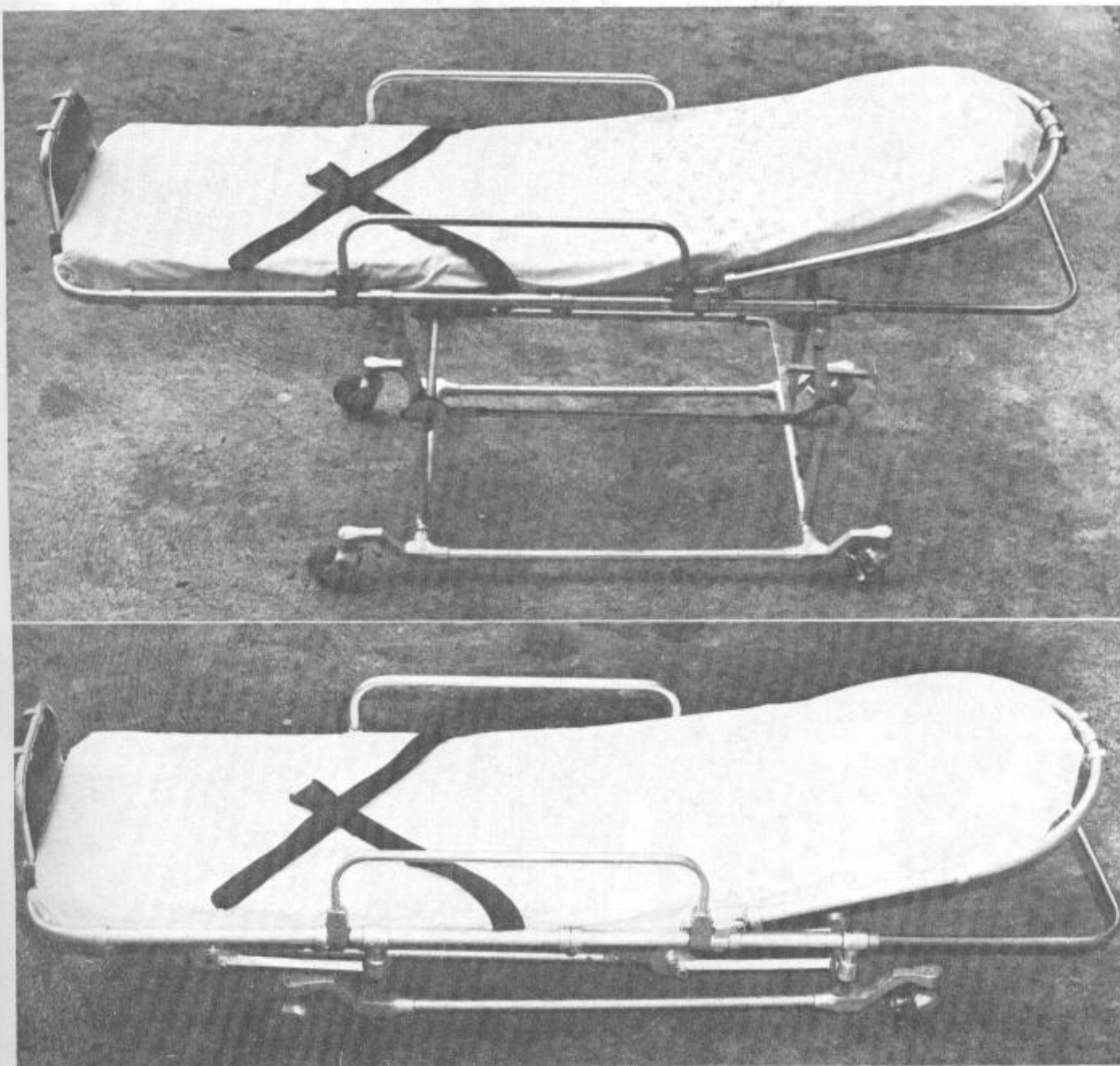
- e. In the early phases of instruction, patients may be positioned on the ground at suitable intervals near the line of litters, first with the head and later with the feet toward the litters. As the instruction progresses, their positions may be varied. Last, they may be dispersed or concealed to simulate positions the wounded might occupy on the battlefield.

- f. When patients are loaded on litters, their equipment is carried by No. 1 and No. 4, or it is placed on the litter.

3-11. Formations

- a. *Formation for Instruction.* Appropriate drill commands are used to form and aline the unit in a single file for instruction in litter drill and to return the unit to its normal formation after completion of instruction.

- b. *Formation of Litter Squads* (fig 3-7). To form litter squads (with the unit in single file and facing the front), the commands are By Four, Count, OFF.



Top. In raised position

Bottom. In lowered position

- a. Not used in forward areas. Designed for use in the metropolitan ambulance and truck, ambulance, light, 4 X 2.
- b. Consists of an aluminum frame which is manually adjustable for raising and lowering, automatic locking and release device, mattress, footrest, and adjustable backrest and side rails. It is mounted on four swivel casters with rubber tires.
(Length—75 inches
Width—22 inches)

Figure 3-6. Stretcher, ambulance, two-level.

c. *Designation of Squads.* To designate squads by number, the commands are By Litter Squad, Count, OFF. At the command Count, OFF, No. 1 man of each squad, except the right squad, executes Eyes, RIGHT; and beginning at the

right, counts in consecutive order ONE, TWO, THREE, etc., until all squads have counted. Each No. 1 man turns his head and eyes to the front as he counts.



Figure 3-7. Formation of litter squad.

3-12. Procedures

a. *Litter at High Port.* In this position the litter is carried diagonally across the body with the left wrist in front of the left shoulder and the right wrist near the right hip (fig 3-8).

The litter is carried at high port any time a closed litter is moved.

b. *To Procure Litter.* Litters are available in the immediate vicinity. Commands are Procure, LITTER.

c. *To Return Litter.* Instruction in the use



Figure 3-8. Litter at high port.

of the litter having been completed, litters are returned to the place of procurement. Commands are Return, LITTER. The procedure is as for Procure, LITTER, in reverse.

d. *To Ground Litter.* Being "at the carry," to ground litter, the commands are Ground, LITTER (fig 3-9 and 3-10).

e. *To Change Bearers.* Being "at the carry," to change bearers while marching, the commands are Change Bearers, MARCH. Bearers move in a clockwise direction. (Being "at the ground," closed, and "at the ground," open, bearers change positions as "at the carry") (fig 3-11).

f. *To Open Litter.* Being "at the carry," litter strapped, to open litter, the commands are Open, LITTER (fig 3-12 and 3-13).

g. *To Strap Litter.* The litter being closed or open, to strap litter, the commands are Strap, LITTER. At the command of execution, No. 1 and No. 4 face the litter and No. 4 supports the litter at the center. No. 2 and No. 3, assisted by No. 1, fold canvas by doubling it smoothly on top of poles. (If litter is open, litter is closed and canvas folded.) No. 2 and No. 3 secure folded canvas and poles by fastening cross-straps at each end, and all bearers assume posts "at the carry." (In the field, the litter should be carried closed and strapped, and opened only upon reaching the patient.)

h. *To Lift Open Litter, Loaded or Unloaded.* The litter being "at the ground" with bearers at litter posts, to lift the litter, the commands are Prepare to Lift, LIFT (fig 3-14 and 3-15). (At the command Lower, LITTER, team members lower litter to the ground, allowing the knee closest to the litter to rest on the ground, and automatically resume the standing position.)

i. *To Rotate Litter.* To rotate litter, the commands are Prepare to Rotate, ROTATE (fig 3-16).

j. *To Carry Loaded Litter.* If it is desired that the four bearers carry the loaded litter while marching, the commands are Four-Man Carry, MOVE (fig 3-15). Commands for the two-man carry are Two-Man Carry, MOVE (fig 3-17).

k. *To Load Litter* (fig 3-18—3-21).

(1) *Position for lifting patient.* The patient has been located, the general nature of the wounds determined, emergency treatment given, and a litter is open and available. To place bearers in proper position to lift patient, the commands are Right (Left) Side, POSTS.

(2) *To lift patient and place litter in position.* The bearers are at posts. To lift patient preparatory to placing him on the litter, the commands are Lift, PATIENT.

(3) *To lower patient on litter.* The patient is on the knees of three bearers, and the litter is in the proper position to receive the patient. To lower patient on litter, the commands are Lower, PATIENT. At the preparatory command, the free bearer (No. 1) resumes his former kneeling position opposite the other three bearers and prepares to assist in lowering the patient. At the command of execution, the patient is lowered gently upon the litter and made as comfortable as possible. Without further orders, all bearers rise and resume their positions at litter posts.

l. *To Unload Litter.* The patient is on the litter. To unload litter, the same commands



With litter squad in formation, No. 1 takes one step forward with right foot and places litter on ground, allowing it to rest on stirrups.

Figure 3-9. Ground, LITTER (Position of RECOVER).

are given and the actions of the bearers are the same, except that, after the patient has been lifted to the knees of the three bearers, the free bearer removes the litter from beneath the patient.

m. To Load and Unload Litter (Three Bearers). In the absence of one man from the litter squad, No. 2 or No. 3 is replaced by No. 4. With three bearers, the litter is placed as usual and, at the prescribed commands, the bearers take their proper positions (fig 3-22 and 3-23).

n. To Load and Unload Litter (Two Bearers).

(1) *With bearers on same side.* To load and

unload, posts are taken in the same way, at the proper commands (fig 3-24—3-27).

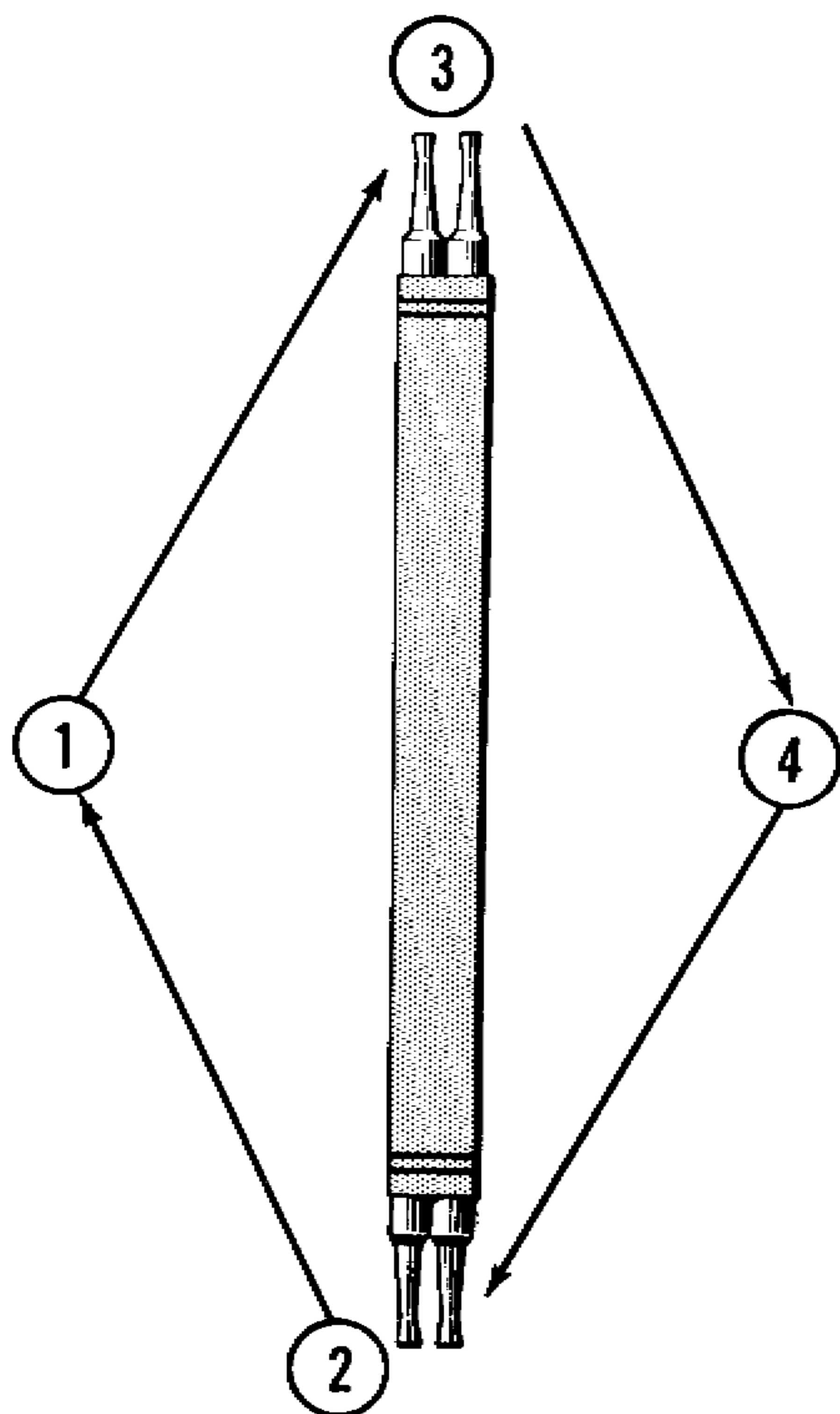
(2) *With bearers on opposite sides.* If patient is conscious and able to cooperate in the movement, bearers take positions on opposite sides of the patient. To carry out this movement, the commands are Right (Left) Side, POSTS; Lift, PATIENT; and Lower, PATIENT (fig 3-28—3-31).

o. To Load and Unload Patients With Back Injuries. To avoid aggravating the condition of patients with actual or suspected back injuries, the procedures described in figure 3-32 will be followed.



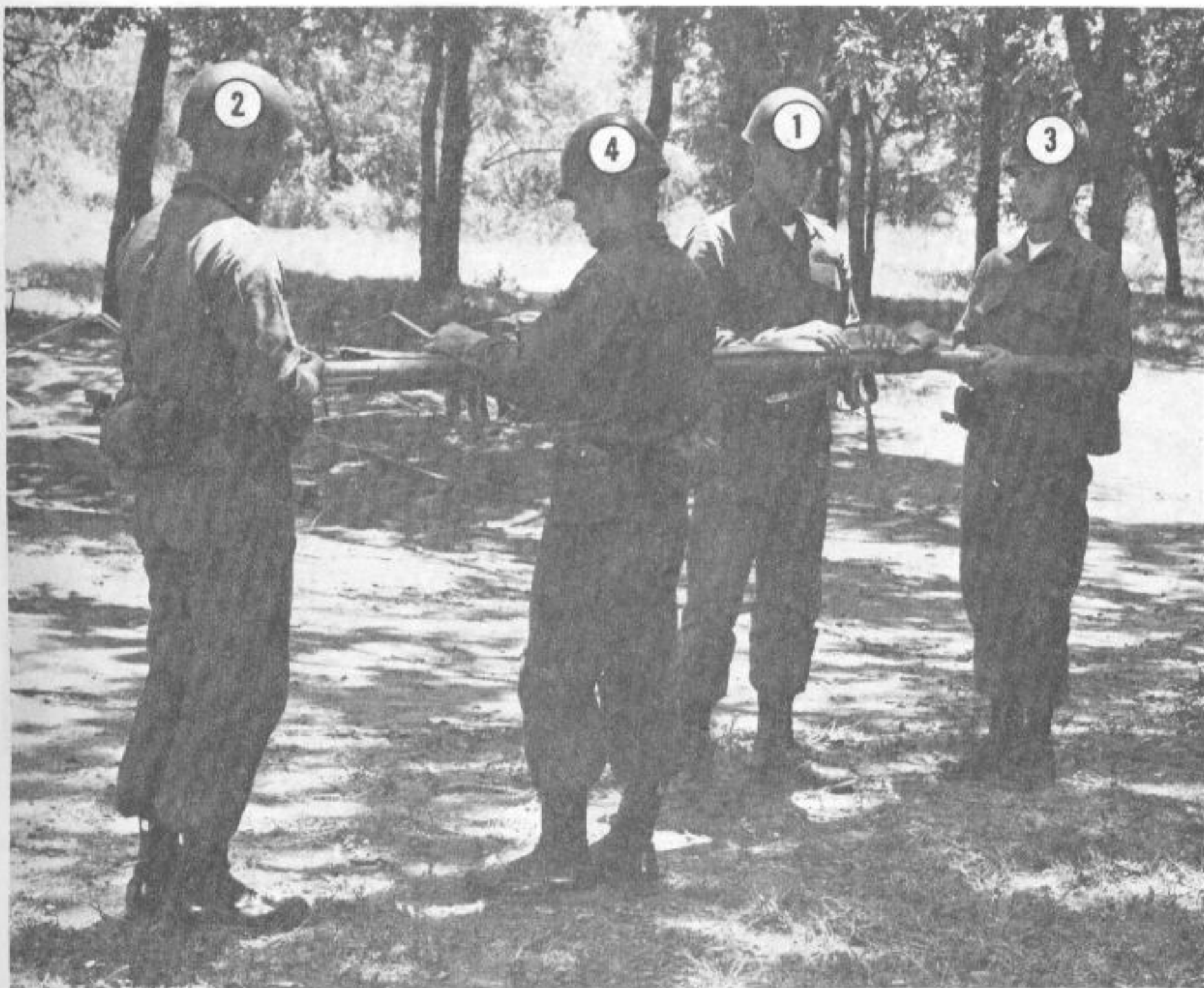
At the command of execution, team members take proper positions, with No. 1 and No. 2 on the right side and No. 3 and No. 4 on the left.

Figure 3-10. Positions of team members (Position of litter, POST).



- a. At the command of execution, No. 1 and No. 4 step to the right rear and left front of the litter, respectively, and grasp the handles relinquished by No. 2 and No. 3.
- b. No. 2 and No. 3 assume positions vacated by No. 1 and No. 4, respectively.

Figure 3-11. Change bearers, MARCH.



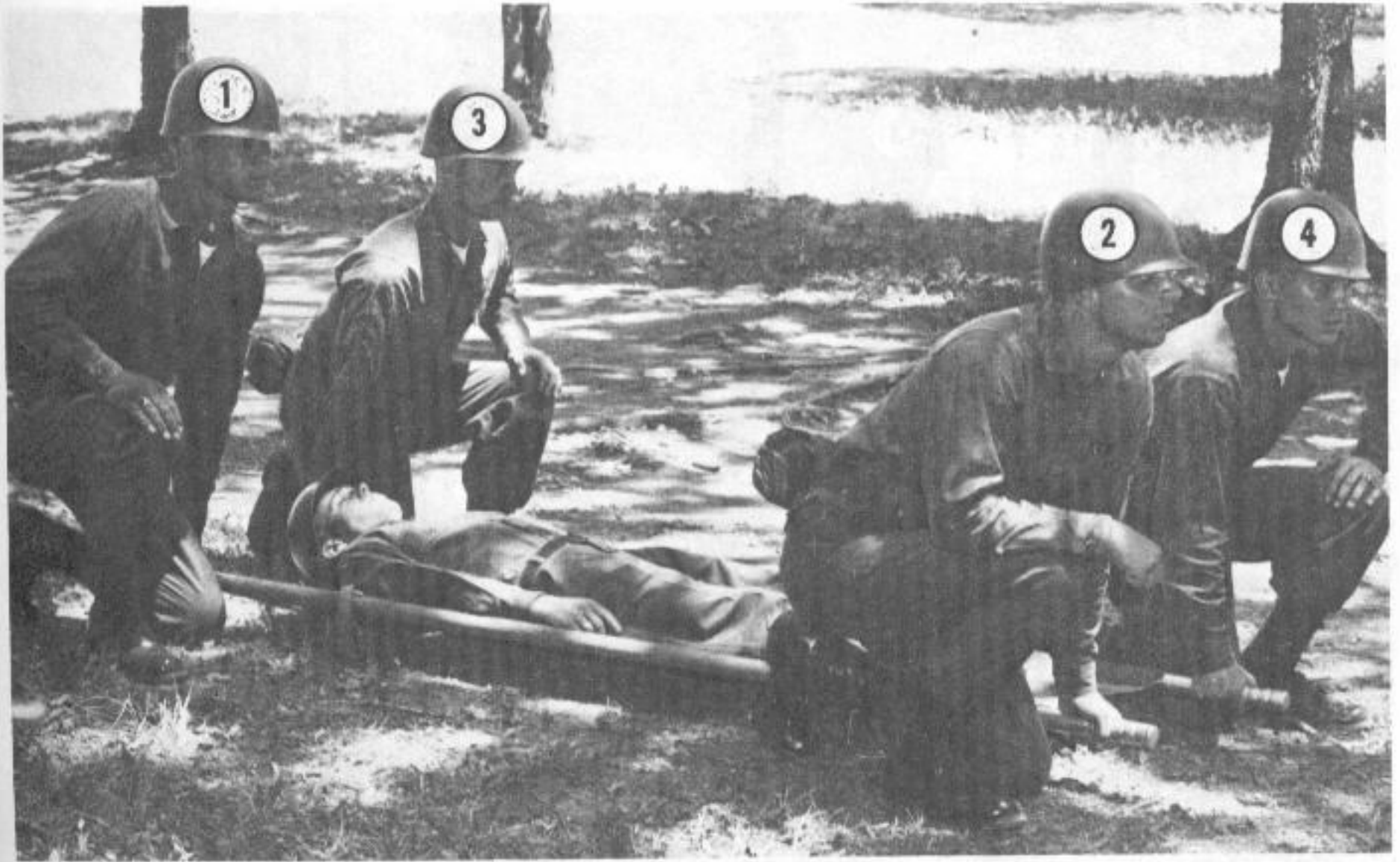
- a. At the command of execution, all bearers face litter, with No. 2 and No. 3 holding the litter at each end.
- b. No. 2 and No. 3 support the litter on each end, and No. 1 and No. 4 unfasten the straps.

Figure 3-12. Open, LITTER (step one).



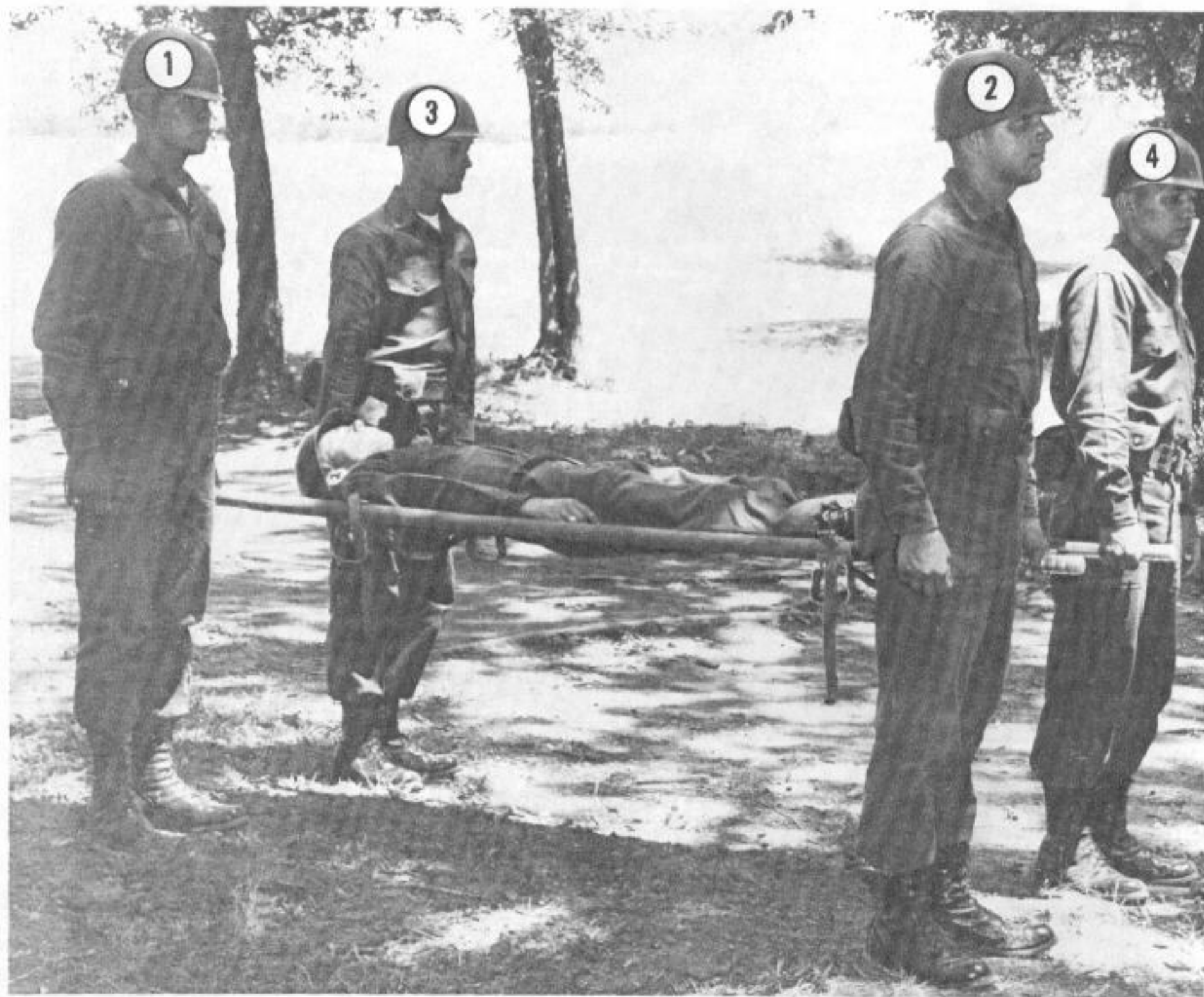
- a. No. 2 and No. 3 extend litter by pulling handles apart, canvas up.
 - b. No. 2 lowers his end of the litter to the ground.
 - c. No. 3 raises his end of the litter until litter is standing vertical.
 - d. No. 3 then extends the spreader bar to a locked position by pushing with his foot, reverses litter, and extends second spreader bar.
- (No. 3 lowers litter to the ground, canvas up. All men return to their positions at litter posts.)

Figure 3-13. Open, LITTER (step two).



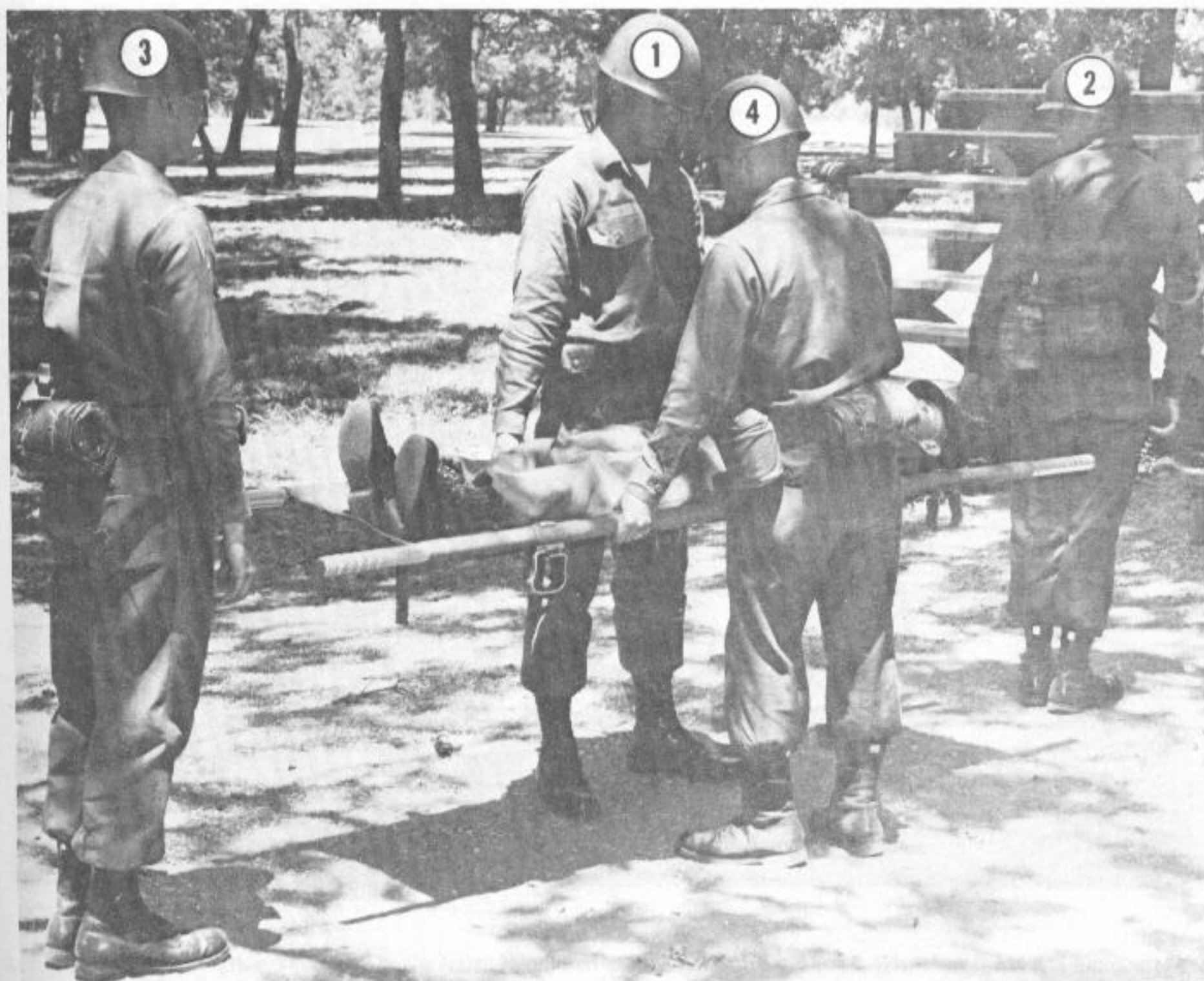
At the preparatory command, each team member bends, places the knee closest to the litter on the ground, and grasps a handle, facing in the direction of travel.

Figure 3-14. Prepare to Lift, LIFT (step one), squad at Prepare to Lift.



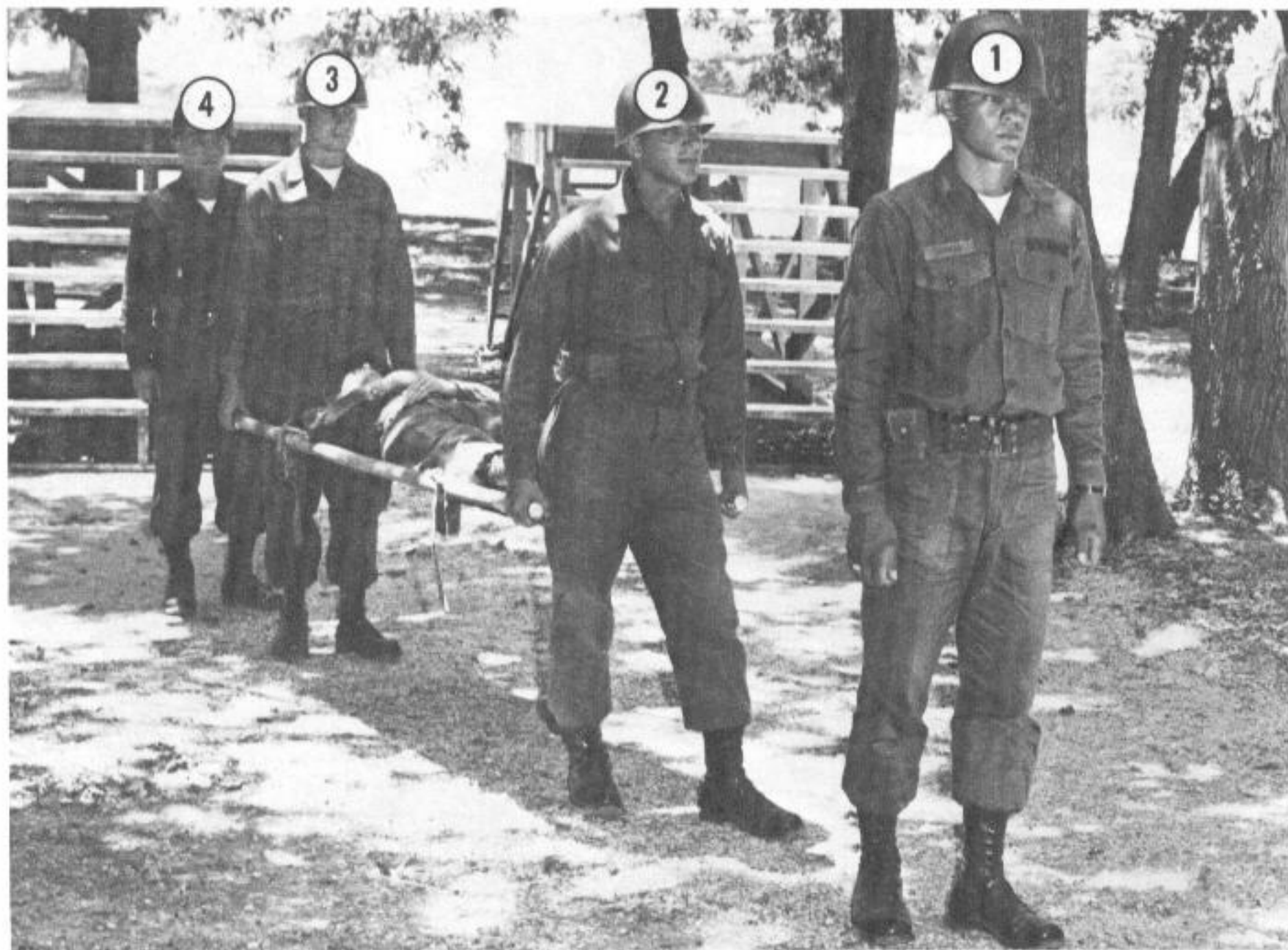
At the command of execution, all team members rise as a team, keeping the litter level. (This position of four-man carry is used over smooth terrain. If it is necessary to pass under low obstacles, such as fences or barbed wire, the team remains in the four-man carry, but on hands and knees. They extend the litter forward one arm's length, move up to the litter handles, extend it forward another arm's length, and continue this process until they have passed under the obstacle.)

Figure 3-15. Prepare to Lift, LIFT (step two), litter lifted.



- a. From position of four-man carry, team members move into position of litter post carry.
- b. At the preparatory command, No. 2 and No. 3 release handles at head and foot of litter, allowing No. 1 and No. 4 to support litter in positions at litter sides.
- c. At the command of execution, No. 1 and No. 4 rotate litter 180°, counterclockwise.
- d. After litter has been rotated, No. 2 and No. 3 automatically resume positions between litter handles.

Figure 3-16. Rotate, LITTER (for ambulance loading or uphill or stairs).



- a. At the command of execution, No. 2 and No. 3 step in between handles of litter.
- b. No. 1 goes out in front of the team to lead.
- c. No. 4 falls to the rear and follows the team.

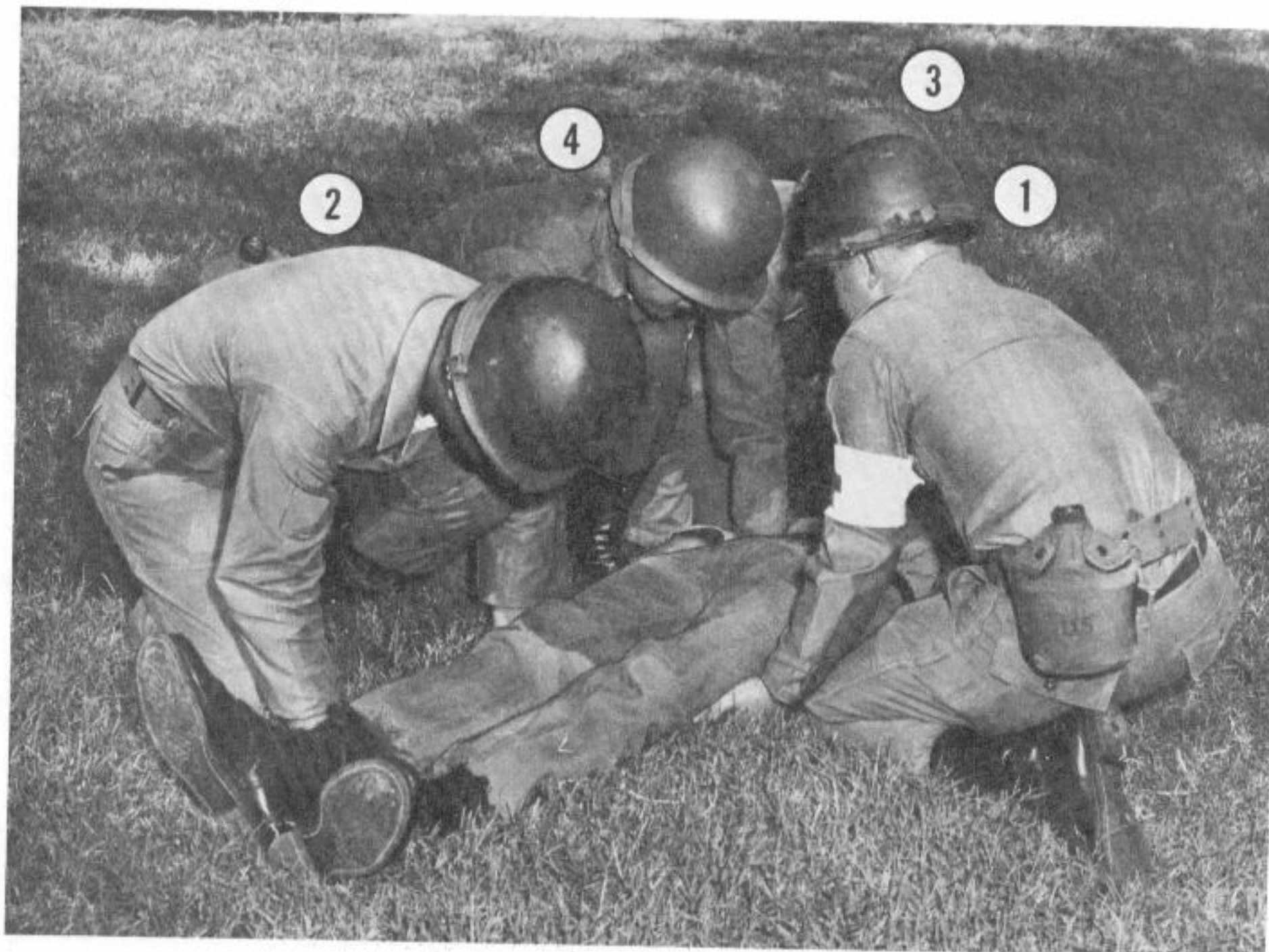
Figure 3-17. To carry loaded litter (two bearers) (for narrow trails and passages).



At the command of execution, bearers take the following positions:

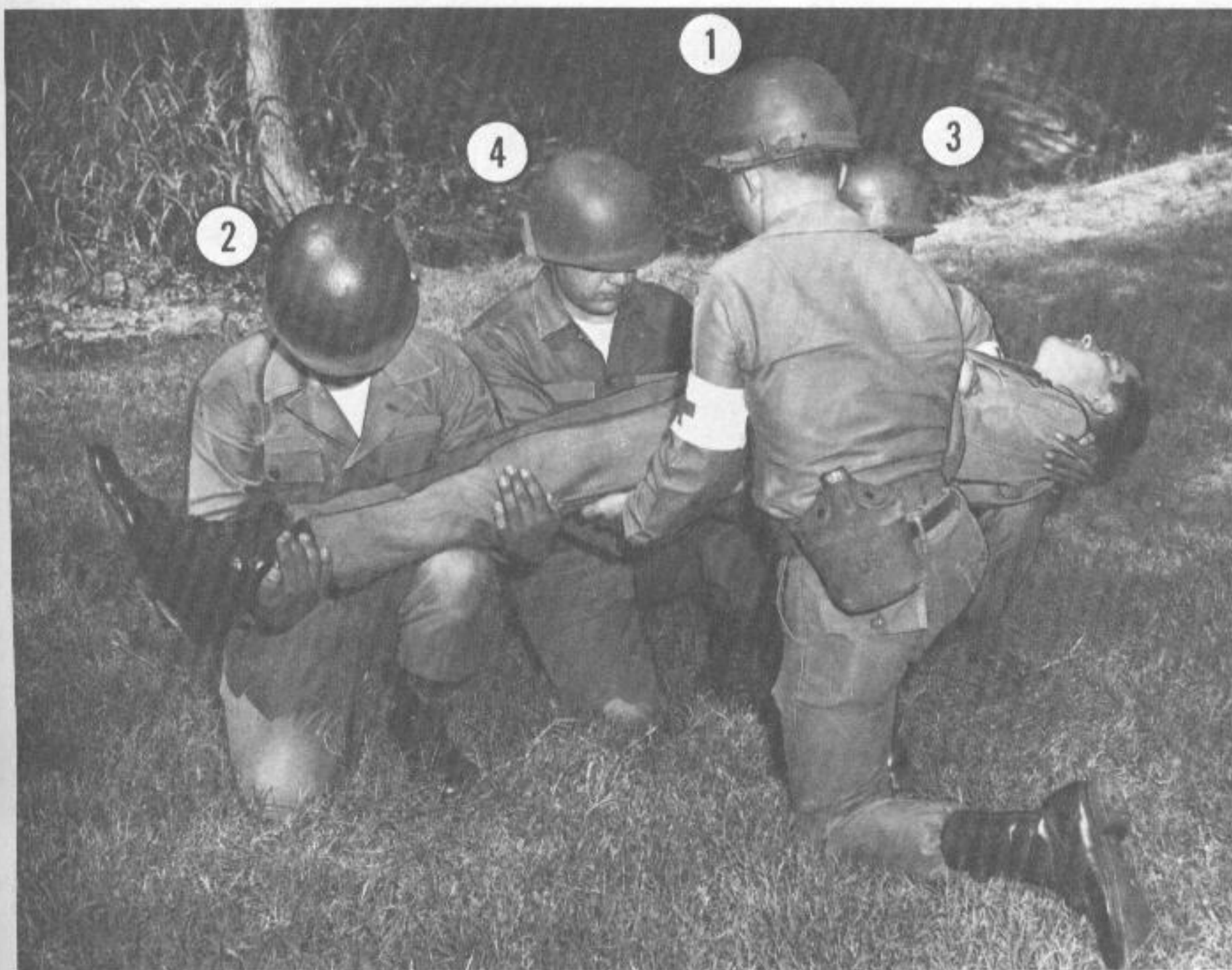
- a. No. 2 at the right (left) ankle.
 - b. No. 3 at the right (left) shoulder.
 - c. No. 4 and No. 1 at the right and left hips, respectively.
- (All are facing the patient.)

Figure 3-18. Loading litter (step one) squad at right side, POSTS.



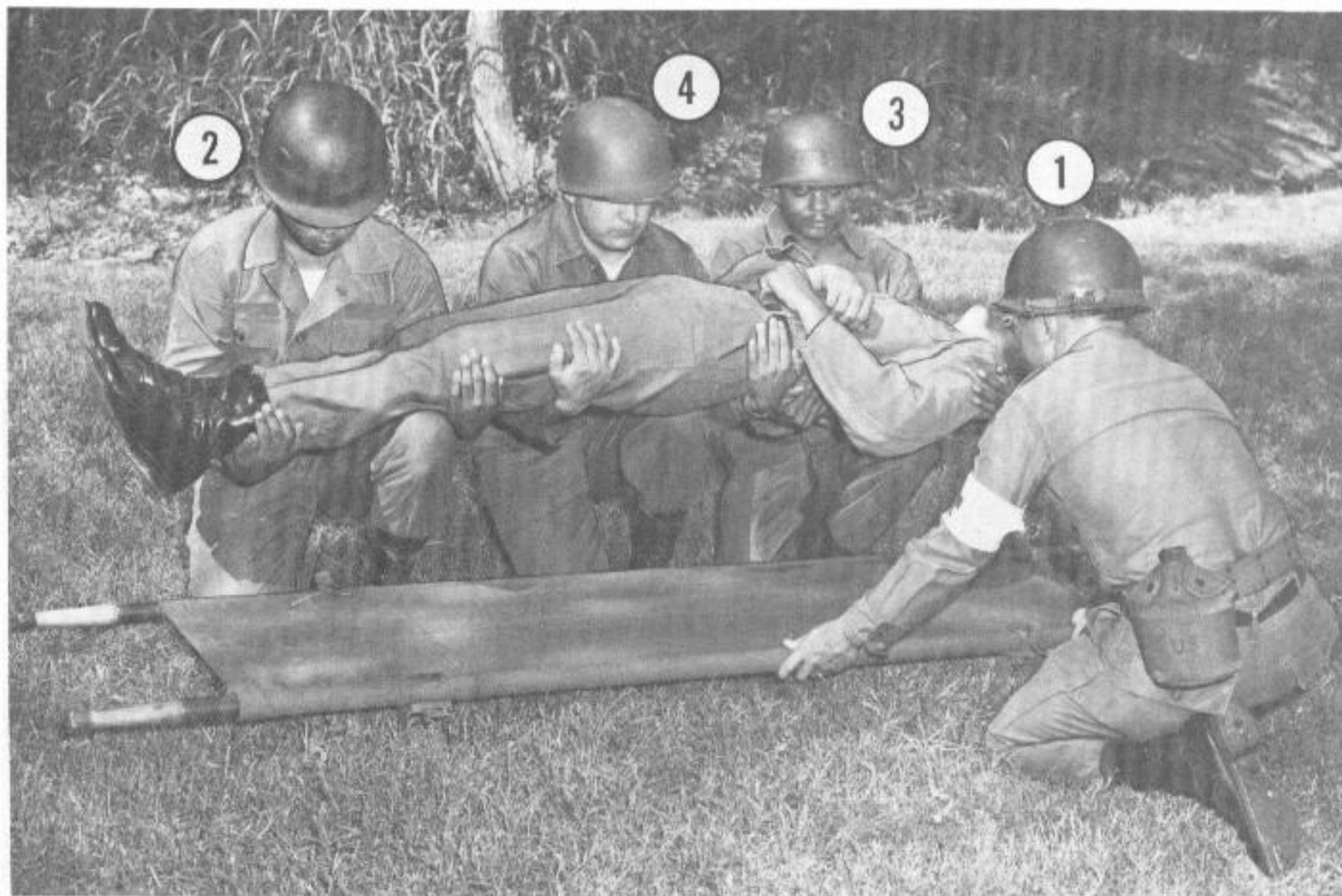
- a. At the preparatory command, bearers kneel on the knee nearest the patient's feet.
- b. No. 2 passes his forearms under the patient's legs, carefully supporting the fracture, if there is one.
- c. No. 1 and No. 4 place their arms under the small of the patient's back and thighs, without locking hands.
- d. No. 3 passes one hand under the patient's neck to the farther armpit, with the other supporting the nearest shoulder.

Figure 3-19. Loading litter (step two) squad at lift.



At the command of execution, all lift together, slowly and carefully, and place the patient upon the knees of the three bearers who are on the same side.

Figure 3-20. Loading litter (step three) patient lifted.



As soon as the patient is firmly supported there, the bearer on the opposite side (No. 1) relinquishes his hold, proceeds quickly by the nearest route to the litter, which he takes and, returning rapidly, places under the patient and against the ankles of the three bearers.

Figure 3-21. Loading litter (step four) litter placed beneath patient.



Having been lifted by the three bearers, the patient is supported on the knees of the two on one side, while the third (No. 1) places the litter in position.

Figure 3-22. Loading litter (three bearers) (step one).



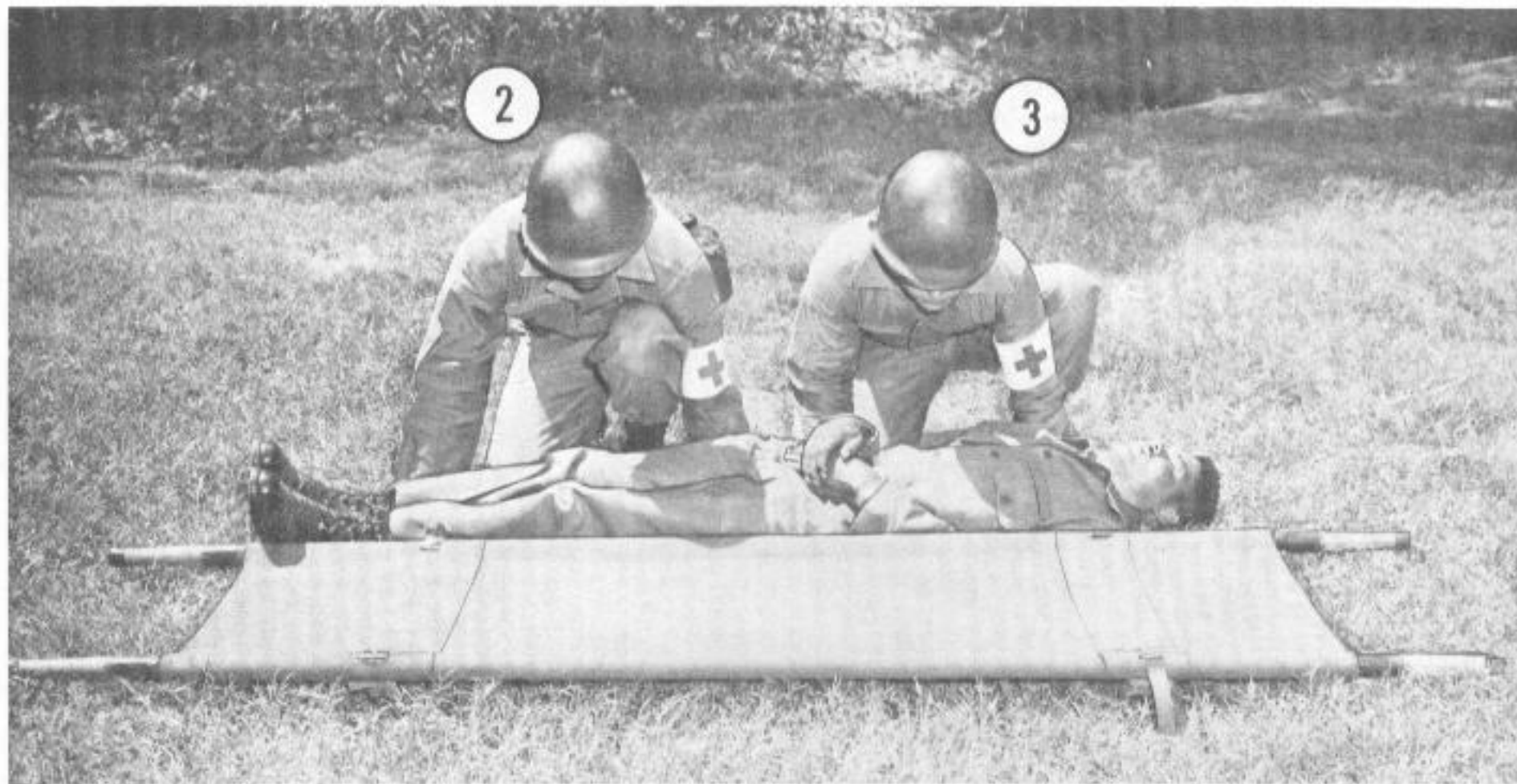
Patient is lowered on litter. (To unload litter, the procedure is reversed).

Figure 3-23. Loading litter (three bearers) (step two).



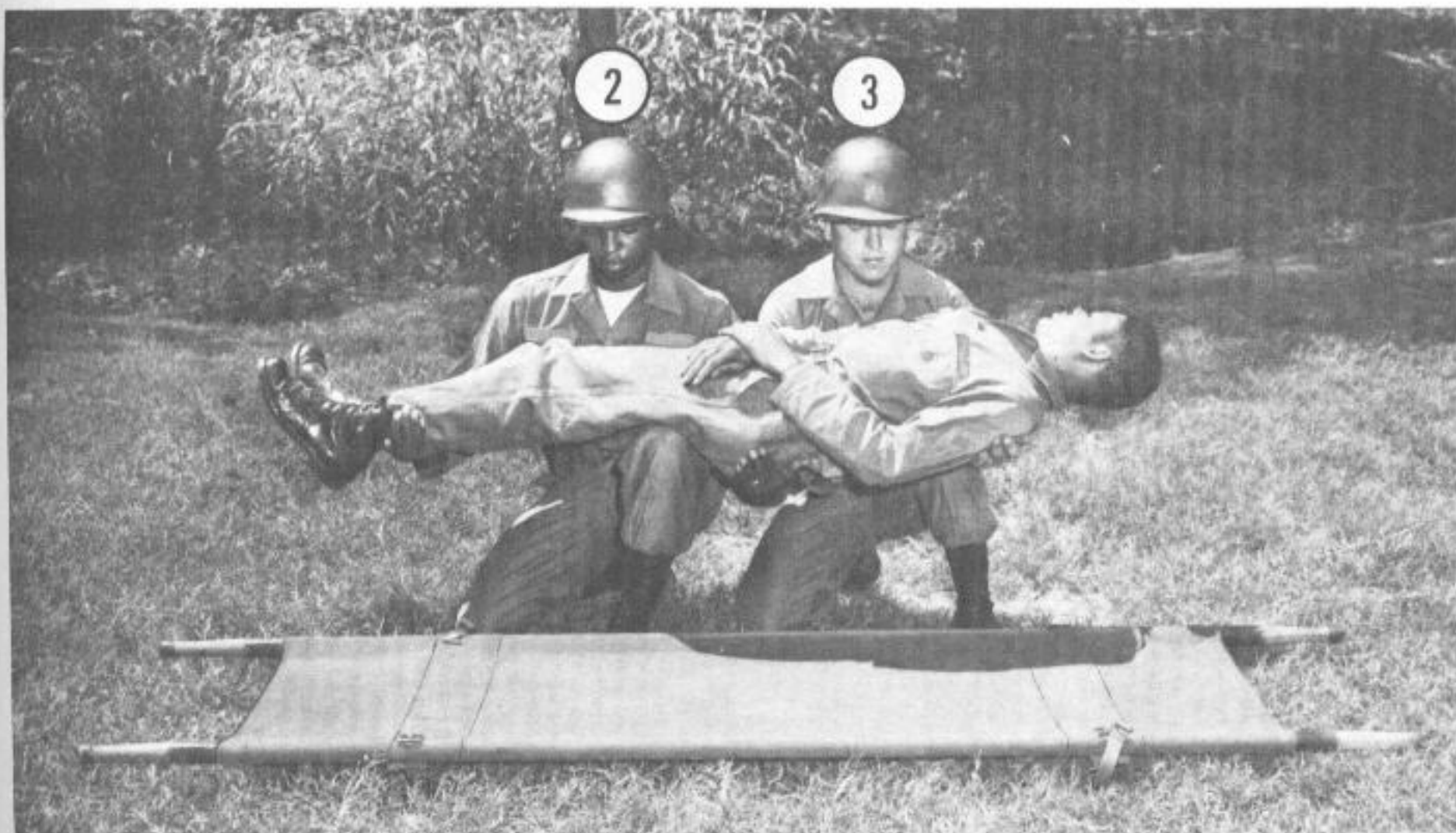
At the command POSTS, No. 2 and No. 3 take positions at patient's right (left) thigh and shoulder, respectively.

Figure 3-24. Loading litter (Two bearers, on same side) (step one).



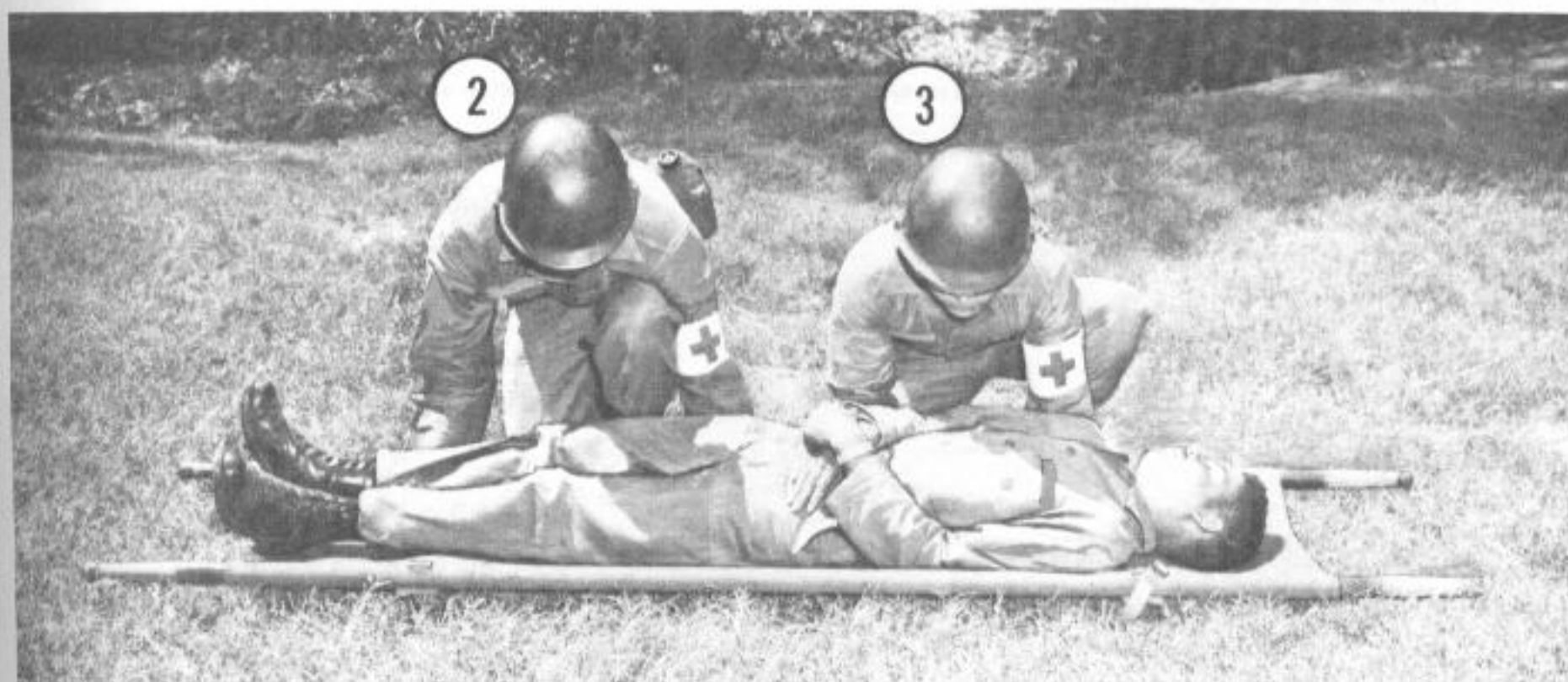
- a. At the command Lift, bearers kneel on the knee nearest patient's feet.
- b. No. 2 passes his arms beneath patient's hips and knees.
- c. No. 3 passes his arms beneath patient's shoulders and small of the back.

Figure 3-25. Loading litter (two bearers, on same side) (step two).



- a. At the command **PATIENT**, they lift together, raising patient upon their knees.
- b. Readjusting their holds, they rise to their feet and carry the patient to the side of the litter.
- c. At the command **Lower, PATIENT**, bearers kneel and place patient on their knees.

Figure 3-26. Loading litter (two bearers, on same side) (step three).



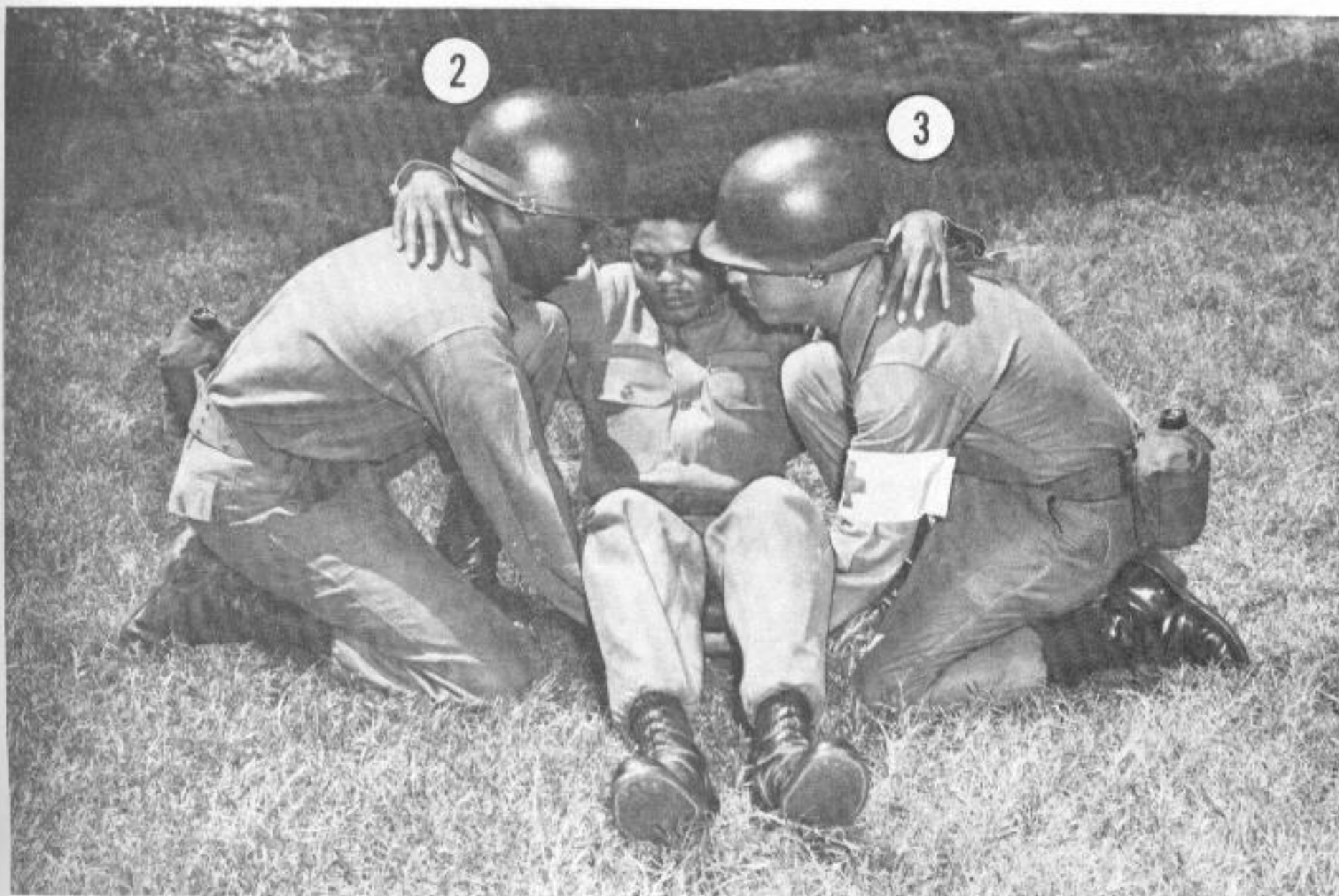
Bearers stoop forward and place patient on litter, then rise and assume position of Litter, POSTS, without command.

Figure 3-27. Loading litter (two bearers, on same side) (step four).



At the command POSTS, No. 2 and No. 3, facing patient, take positions at the patient's right and left hips, respectively.

Figure 3-28. Loading litter (two bearers, one at each side) (step one).



At the command *Lift*, bearers kneel on the knee opposite patient's feet, raise him to a sitting position, and pass their arms around his back and under his thighs, locking hands. (The patient, if able, clasps his arms around bearers' necks.)

Figure 3-29. Loading litter (two bearers, one on each side) (step two).



At the command **PATIENT**, they lift patient, both rising together, and carry him to center of litter.

Figure 3-30. Loading litter (two bearers, one on each side) (step three).

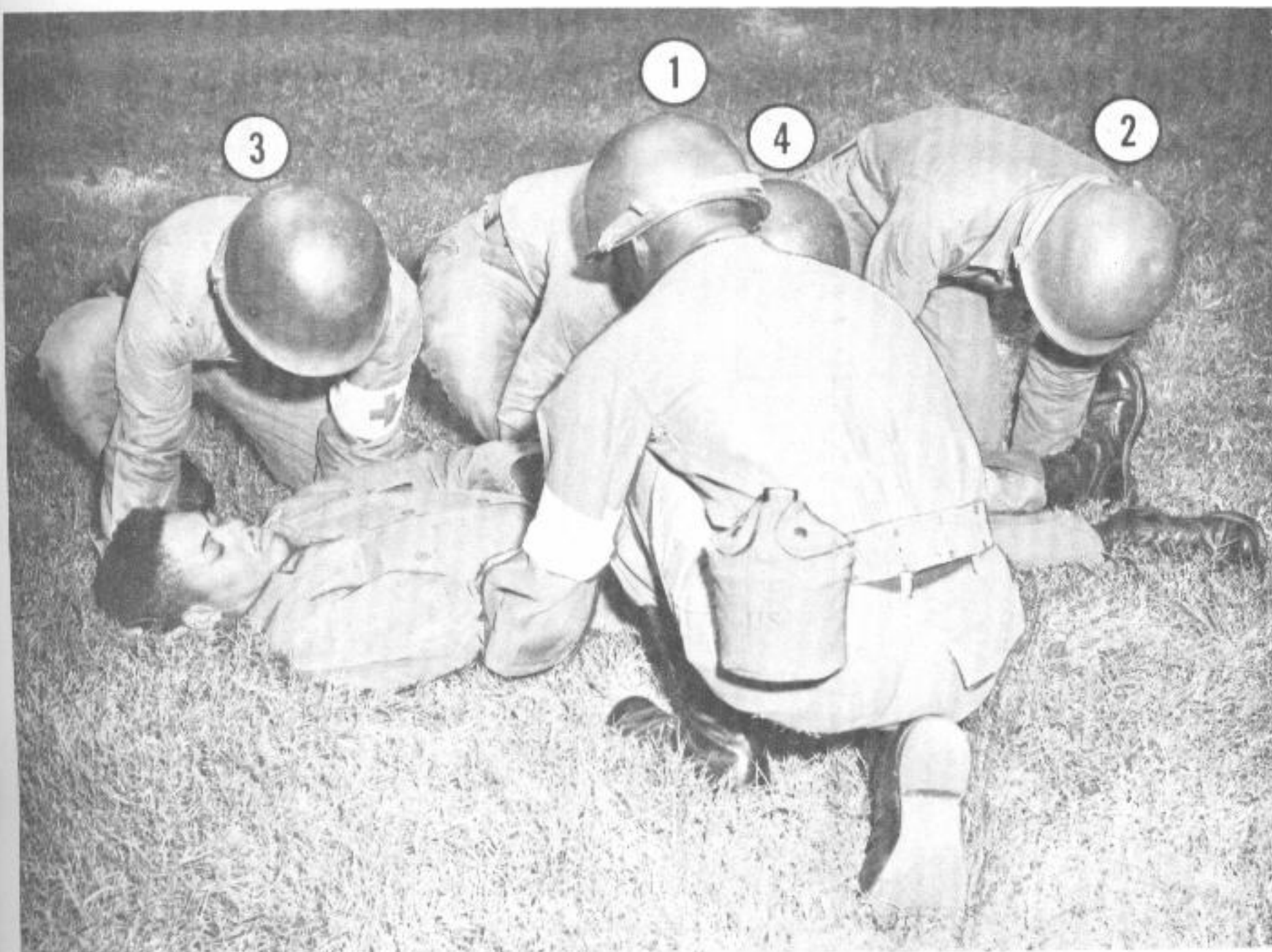


a. At the command **Lower, PATIENT**, they stoop and lower patient upon the litter in a sitting position, and the patient releases his hold on the bearers' necks.

b. Both bearers assist the patient to lie down upon the litter after which they take the position of Litter, POSTS, without commands.

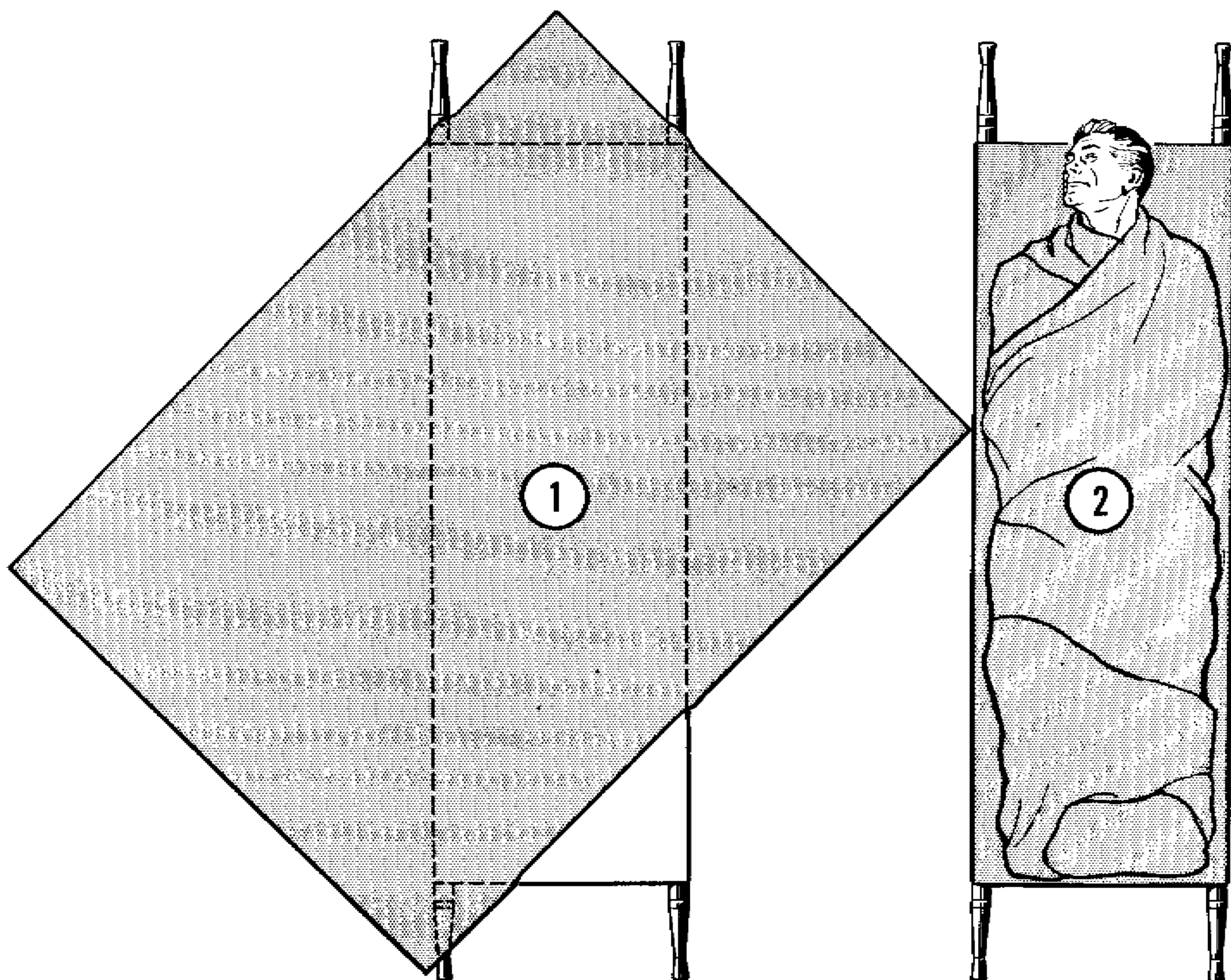
(Unloading is performed in reverse order at the proper commands.)

Figure 3-31. Loading litter (two bearers, one on each side) (step four).



- a. No. 1 places blanket, coat, or jacket arranged in a firm roll or fold about 2 feet long and 6 inches in diameter on the litter in a position to support the arch of the patient's back. No. 3 places one hand under the patient's head and the other under his shoulders. No. 4 places his hands under the small of the back and buttocks. No. 2 places his hands under the thighs and calves. No. 1 assists No. 4 at the small of the patient's back. All kneel on the knee nearest the patient's feet.
 - b. At the command **Lift, PATIENT**, all gently lift patient off ground about 8 inches, making sure that proper alignment of the patient is maintained. No. 1 places litter under the patient, and adjusts the roll under the patient's back.
 - c. At the command **Lower, PATIENT**, the three bearers lean forward and lower patient to litter, with the aid of No. 1.
- (If patient is unable to hold his hands on the litter, his arms should be tied in front of him before placing him on the litter in order to prevent injury to his arms.)

Figure 3-32. Lifting patient with broken back.



- a. Place blanket diagonally over litter.
- b. Place patient on blanket, wrap the sides about his body, and tuck in at the head and feet.

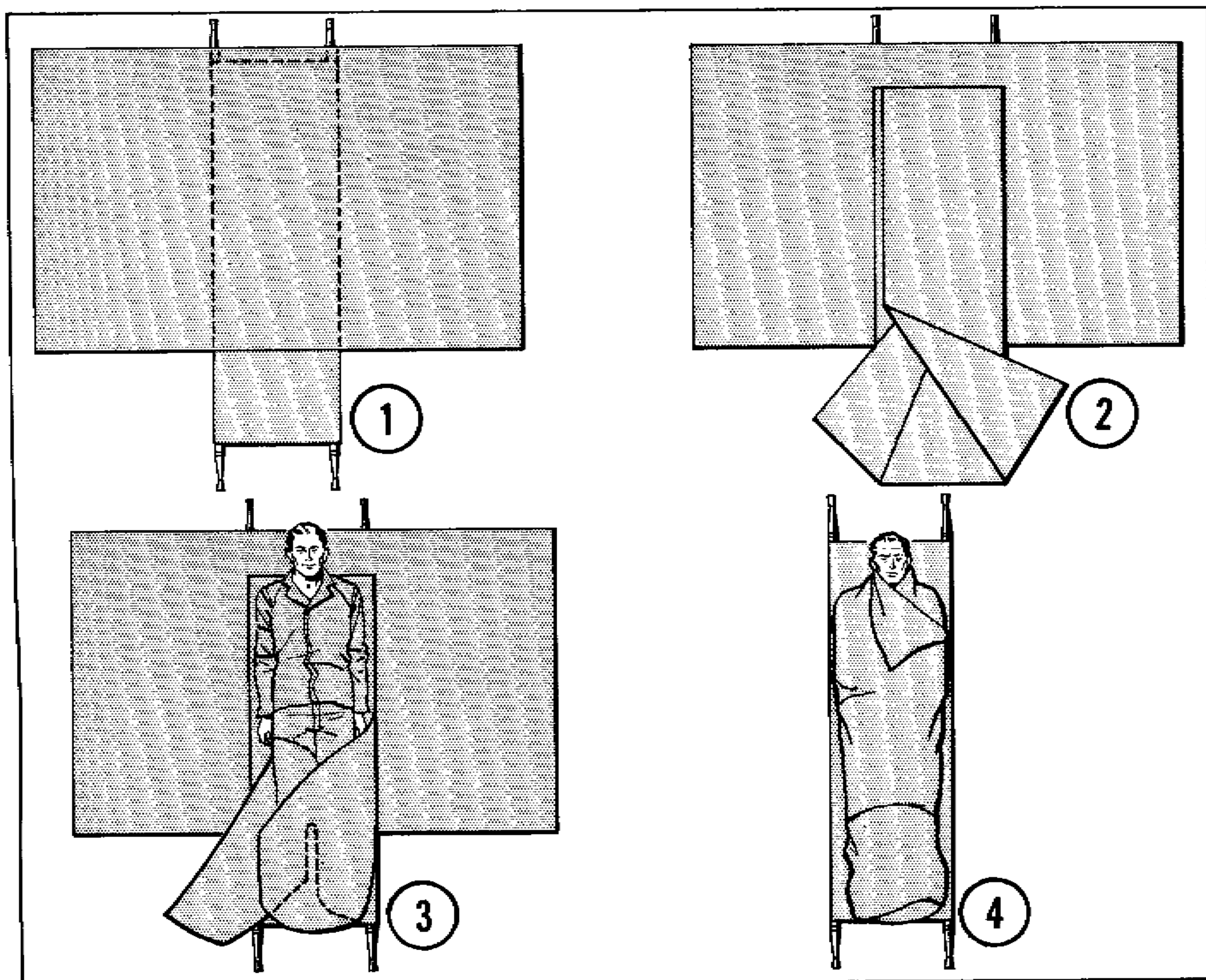
Figure 3-33. Dressing the litter (with one blanket).

Section IV. DRESSING THE LITTER

3-13. General

The litter is dressed with one, two, or three

blankets to reduce the danger of shock and to afford warmth and comfort during transport (fig 3-33—3-35).



- a. Place the first blanket lengthwise across litter with the blanket edge close to or just beyond the head end of litter.
- b. Fold second blanket in thirds, lengthwise, and place over the first, the upper edge of this folded blanket being about 10 inches below the upper edge of the first blanket. The exact position of the second blanket depends upon the height of the patient.
(Place lower on litter for taller men.) Open folds on second blanket for about 2 feet at the foot end.
- c. To wrap patient, place him in position on the second blanket. Bring bottom of blanket up over the patient's feet, with a small fold between the feet. Tuck the two open folds closely over and around the feet and ankles.
- d. Finally, wrap first one side, then the opposite side of the first blanket over patient.

Figure 3-34. Dressing the litter (with two blankets).

Section V. LITTER OBSTACLES

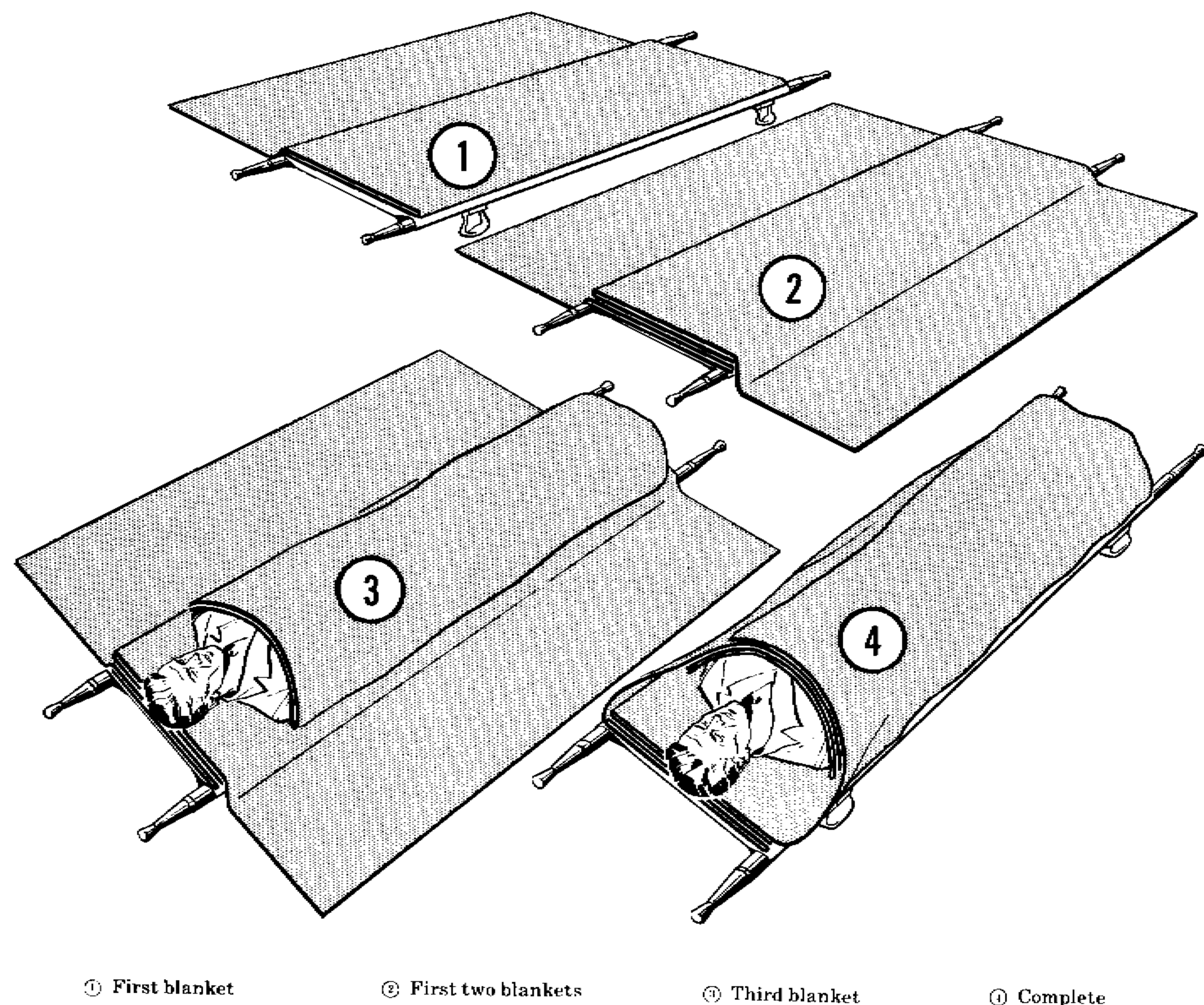
3-14. General

In litter transportation, bearers may be confronted with several types of natural or artificial impediments which must be surmounted. Orders for surmounting separate obstacles are neither necessary nor feasible. Hence, flexibility in the execution of orders concerning obsta-

cles must be maintained, common sense dictating the details of action most suited to the situation.

3-15. Litter Obstacle Course

A litter obstacle course is useful, not only in presenting obstacles of all kinds and teaching



- Place first blanket on litter lengthwise so that one edge corresponds with outer pole of the litter and the upper edge is even with the head of the canvas. Fold blanket back upon itself once so that the folded edge is along the inside pole of the litter and the outer edge overhangs the outside pole.
 - Place second blanket lengthwise on the first so that one edge corresponds with the inner pole of the litter and the upper edge is again even with the head end of the canvas. Then fold the blanket back upon itself so that the folded edge overhangs the inside pole.
 - After placing patient on litter, fold third blanket once lengthwise and place it over the patient, one end under his chin. Then fold the free or overhanging edges of the first two blankets over the third and secure it in place with safety pins or litter securing straps.
- (This method of dressing the litter gives four thicknesses of blankets over and under the patient, thus giving additional warmth and thereby assisting in the prevention of shock.)

Figure 3-35. Dressing the litter (with three blankets).

the proper methods for surmounting them, but in conditioning bearers physically for the arduous tasks they will encounter in combat. It can be constructed to simulate most of the natural and artificial obstructions that litter bearers are likely to meet. Where construction of a litter obstacle course is impracticable, many

of the obstacles can be simulated from existing facilities.

3-16. Obstacles

(fig 3-36—3-38)

- Minor obstacles include wide, shallow



- a. No. 2 and No. 3 support the litter by the front and rear handles, respectively.
- b. No. 1 and No. 4 close in and grasp the sides of the litter.
- c. All four bearers then proceed, making their way over the obstacle and supporting the litter together.

Figure 3-36. Minor obstacles (rough terrain) (litter post carry).

streams, rough or cultivated ground, or similar obstacles.

b. Major obstacles include fences, ditches, and similar obstacles.

3-17. To Carry Loaded Litter Upstairs and Downstairs

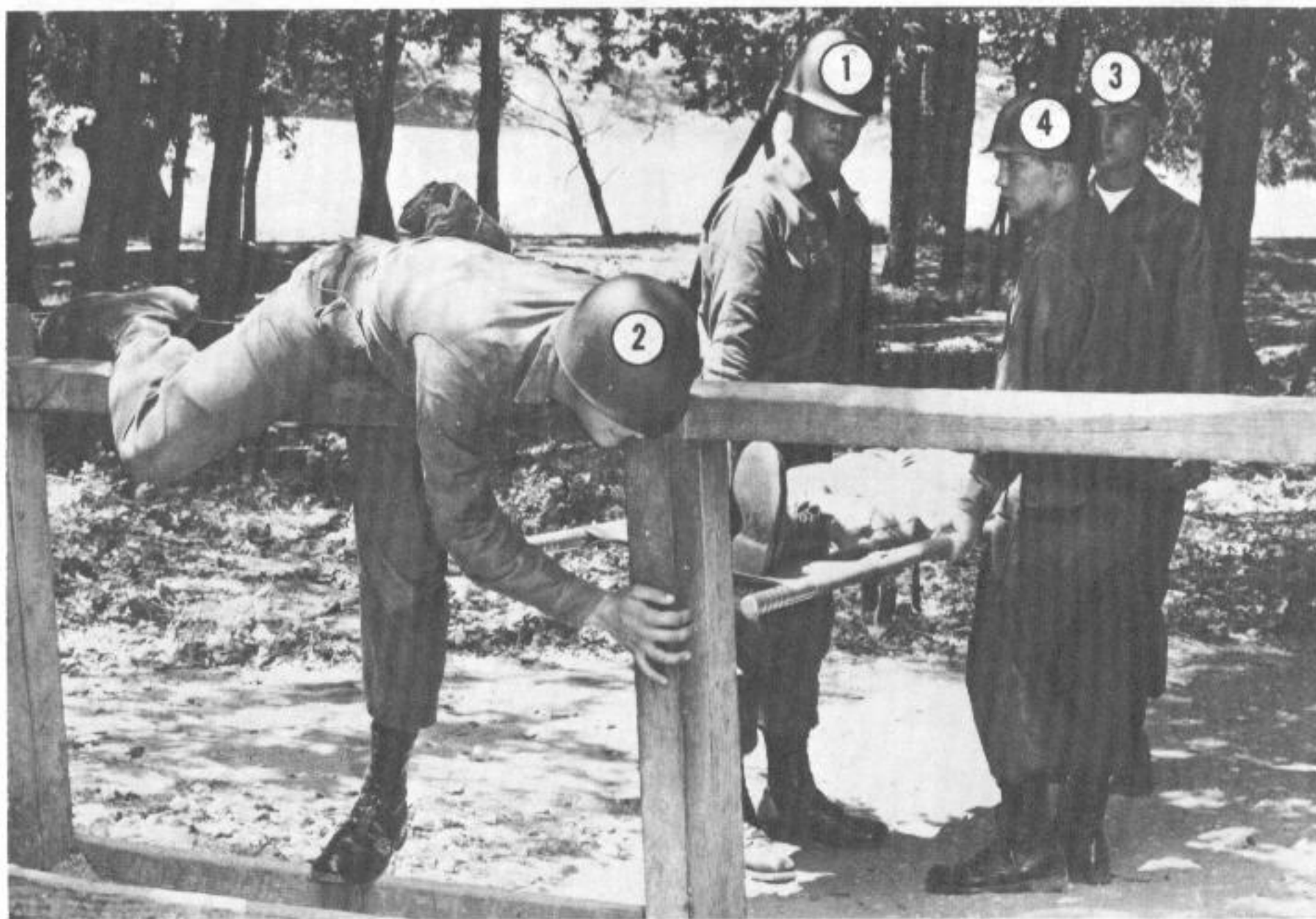
(fig 3-19—3-40).

a. *Upstairs Carry.* Normally, a loaded litter is carried upstairs head first (para 3-9c). The litter is rotated so that the patient's head is in the direction of travel (fig. 3-16).

b. *Downstairs Carry* (fig 3-41 and 3-42). Normally a loaded litter is carried downstairs feet

first (para 3-9d); thus, when upstairs and downstairs obstacles are combined, the litter whenever possible should be wheeled about at the top of the obstacle before descending. The commands are Downhill (steps) Carry, MOVE.

c. *Carrying Patients with Leg Fractures.* When the patient being transported has a fracture of the leg or, if, for any reason, it is considered desirable to carry the patient upstairs feet first or downstairs headfirst, the bearers are reversed. In the former case No. 2 and in the latter case No. 3 become the front bearer.



- a. No. 1 and No. 4 close in and grasp litter poles at the rear of No. 2.
 b. No. 2 then relinquishes his grasp of the front handles and crosses the obstacle, maintaining a low silhouette.
 (The other three bearers then advance the litter until No. 2 can resume his grasp of the front handles.)

Figure 3-37. Major obstacle (low hurdle) (step one).

3-18. Overhead Carry

(fig 3-43 and 3-44).

The command for overhead carry is Overhead Carry, MOVE. The command for recovering from overhead carry is Four-Man Carry, MOVE.

3-19. Negotiating a Staircase Having Small Landings

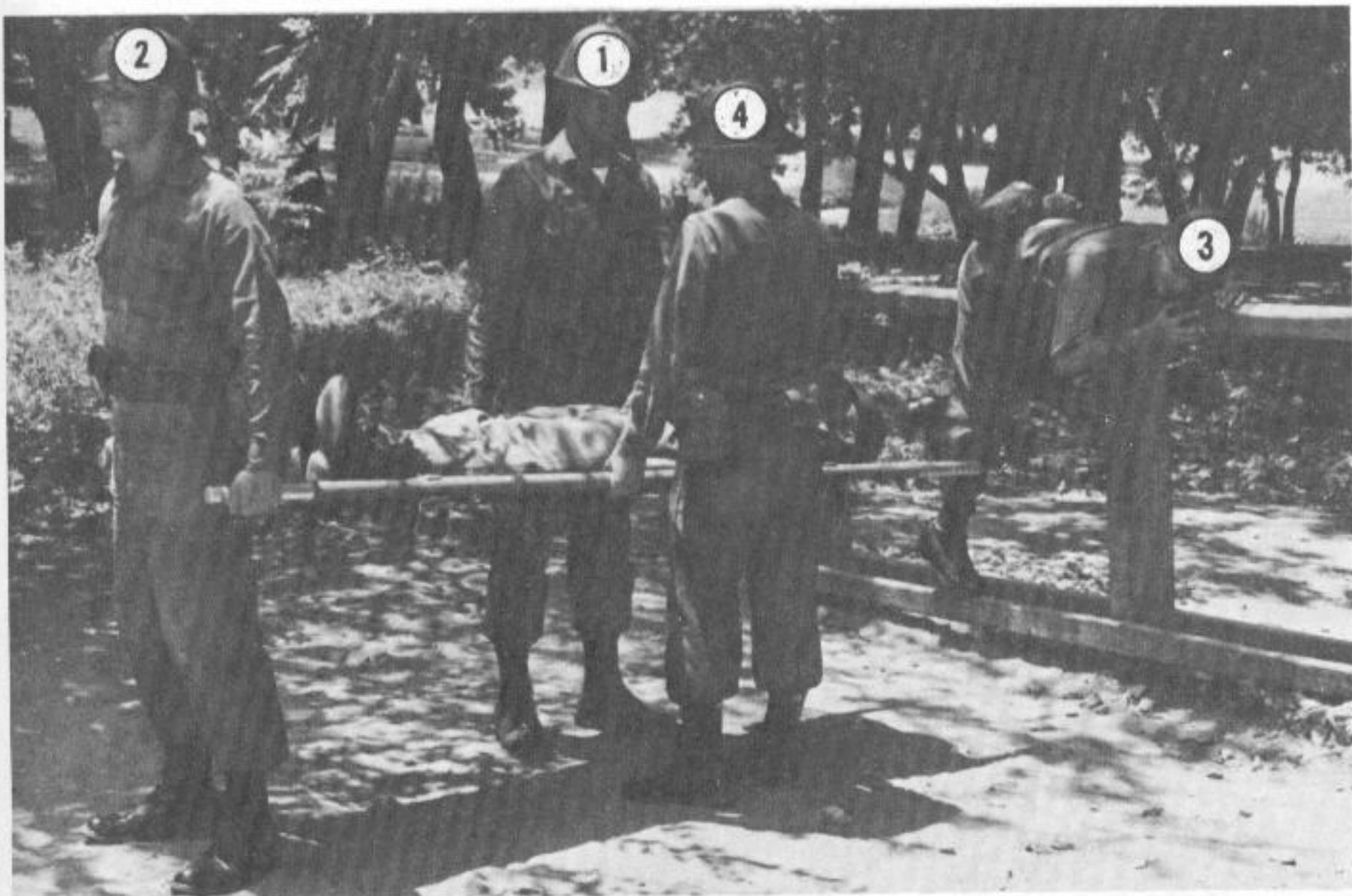
a. *Upstairs Carry.* When carrying a loaded litter up a flight of stairs where there is not sufficient room on the landings to wheel the litter around, the procedure is as illustrated and described in figures 3-45 through 3-48. The patient must first be secured to the litter.

b. *Downstairs Carry.* When carrying a loaded

litter down a flight of stairs where there is not sufficient room on the landings to wheel the litter about, the procedure is as illustrated and described in figures 3-49 through 3-51. The patient must first be secured to the litter.

3-20. Trenches, Dugouts, and Other Excavations

To negotiate obstacles, such as narrow trenches and dugouts, No. 2 and No. 3 maintain their positions at the handles and, assisted by No. 1 and No. 4, lift the litter over their heads and above the narrow trench. Number 1 and No. 4 then step beneath the litter, grasp the litter poles, and assist in supporting the litter as all advance.



(No. 2 and No. 3 support the litter by the front and rear handles, respectively, while No. 1 and No. 4 cross the obstacle in a low silhouette.)

- a. Having passed the obstacle, No. 1 and No. 4 grasp litter poles at the rear of No. 2.
- b. No. 3 then releases his hold of the rear handles and crosses over the obstacles, maintaining a low silhouette.
- c. Having crossed, he again grasps the rear handles, and No. 1 and No. 4 return to their posts.

Figure 3-38. Major obstacle (low hurdle) (step two).

3-21. Culverts, Tunnels, and Large Pipes

To negotiate culverts, tunnels, large pipes, and similar obstacles, No. 2 faces the litter and backs through the obstacle, No. 3 maintaining hold of the rear handles. No. 1 precedes and No. 4 follows the litter.

3-22. Narrow Bridges, Gangplanks, Catwalks, and Narrow Paths

In carrying a litter across any obstacle too narrow to permit bearers to advance in normal positions, No. 1 precedes and No. 4 follows the litter as No. 2 and No. 3 maintain their usual positions of carry.

Section VI. IMPROVISED LITTERS

3-23. General

At times a patient may have to be moved when a litter is not available. The distance may be too long for manual carries, or the patient may have an injury, such as a fractured neck, back, hip, or thigh, which would be aggravated by manual transportation. In these situations, litters may be improvised from certain materials at hand. Improvised litters must be well con-

structed to avoid the risk of dropping or further injuring the patient. Improvised litters are emergency measures, however, and must be replaced by standard litters at the first opportunity, so as to provide maximum comfort and safety for the patient.

3-24. Types

In most instances there will be material available with which a litter can be improvised.



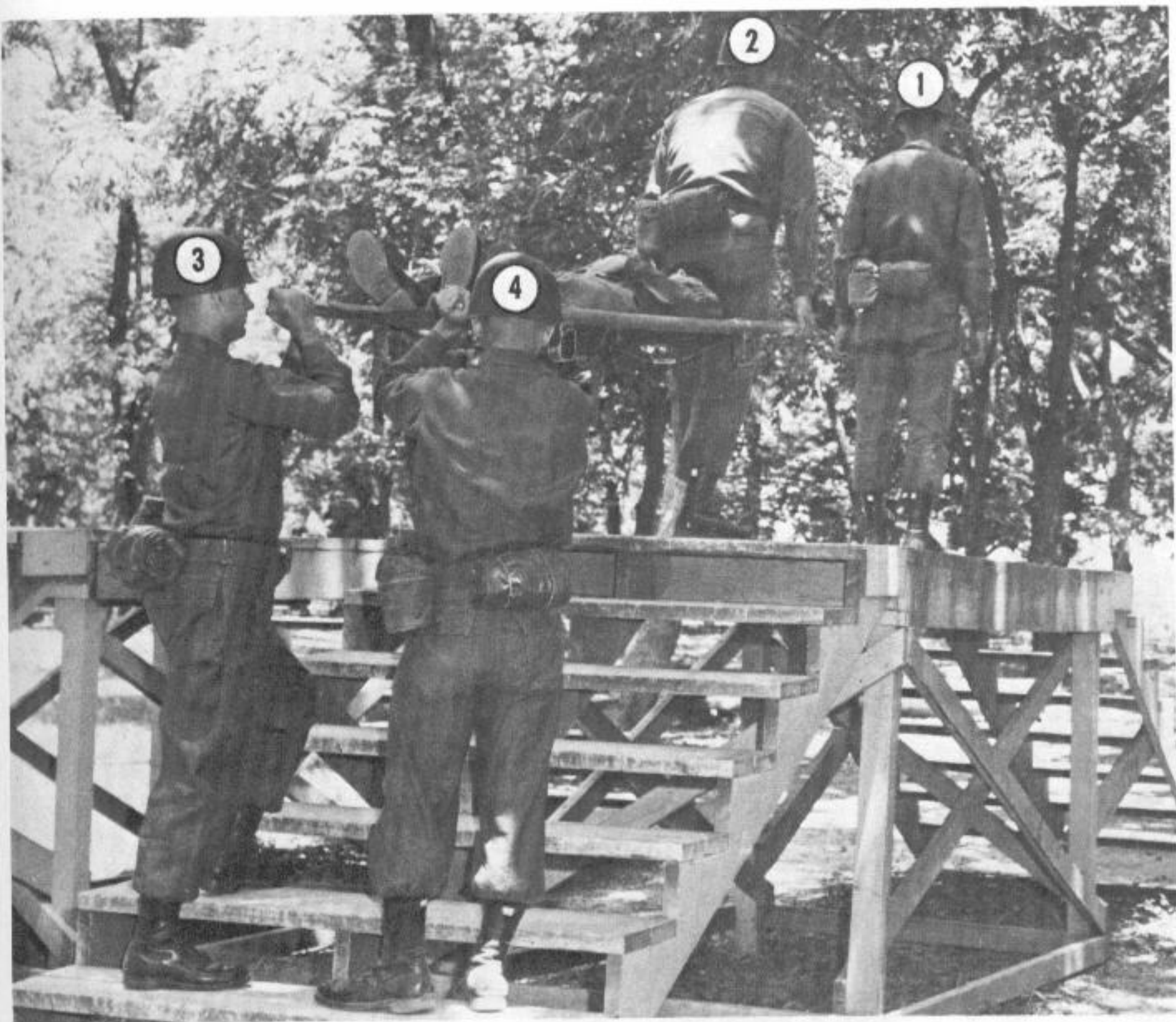
(With litter turned so that the head of the patient is toward the stairs, team halts at the foot of stairs. When only three bearers are used, litter must be placed on ground while bearers change positions at foot of stairs.)

- a. No. 2 steps in between litter handles at patient's head.
- b. No. 3 and No. 4 each support a litter handle at patient's feet.
- c. No. 1 precedes team.
- d. Team begins to ascend.

Figure 3-39. Upstairs carry (step one).

Many types of litters may be improvised, depending upon the materials available. Poles with blankets, jackets, shirts, or ponchos may

be used. Several of these are described and illustrated in figures 3-52 through 3-58.



Team continues to top of stairs.

Figure 3-40. Upstairs carry (step two).

Section VII. AIDS IN LITTER TRANSPORTATION

3-25. General

The manual transportation of a loaded litter is one of the most tiring tasks of the AMEDD personnel. Since it is performed at the critical

point in the process of evacuation, every effort is made to minimize the task and thus speed evacuation. Any mechanical devices, issued or improvised, that will contribute to this effort are used (fig 3-59—3-66).

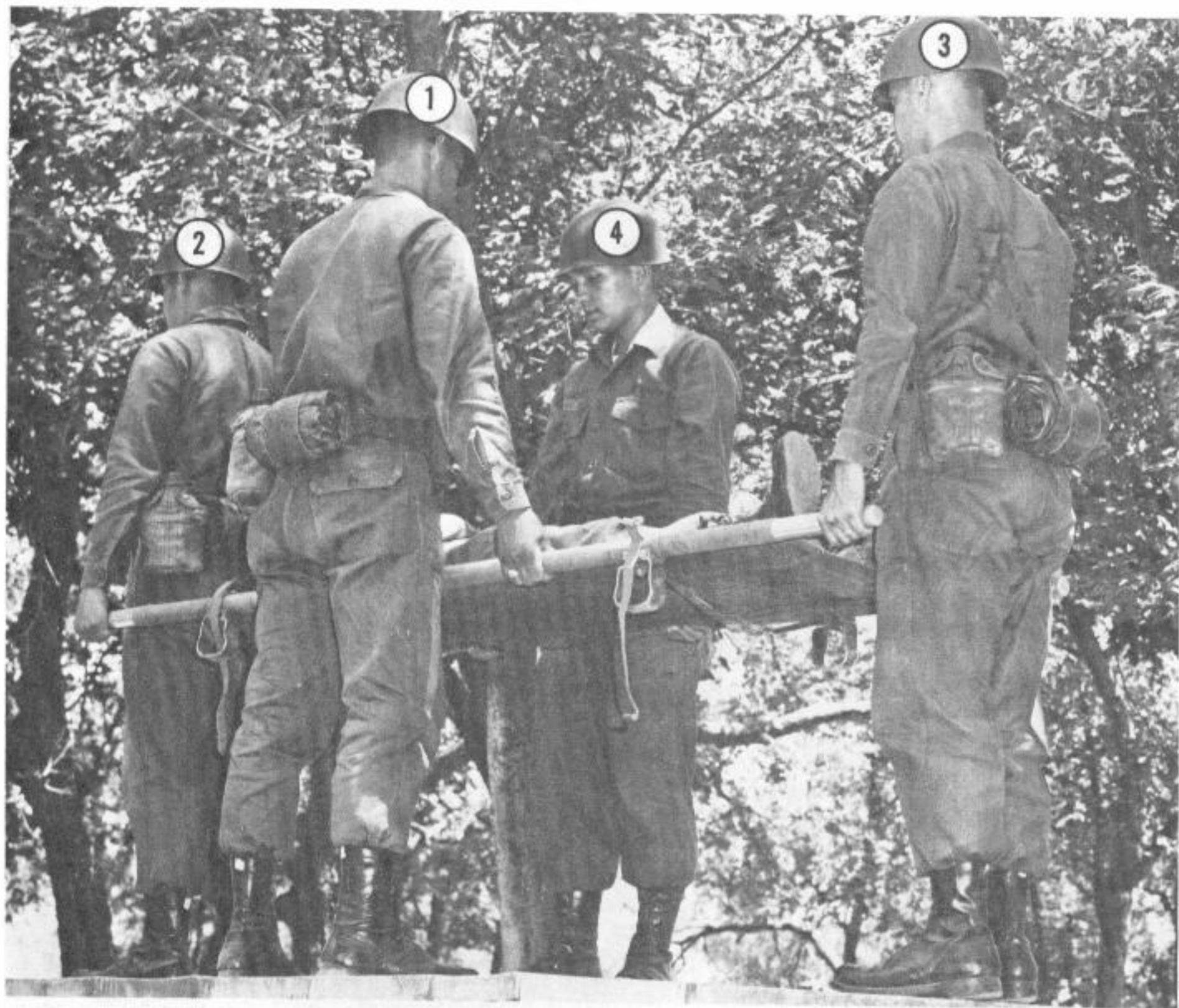
Section VIII. LITTER EVACUATION IN SNOW AND EXTREME COLD

3-26. General

Under conditions of extreme cold and deep snow, prompt collection of patients and rapid evacuation to locations where they can be kept

warm is mandatory. Cold hastens the progress of shock and lessens the chances of recovery if a patient is exposed for any length of time.

a. The emergency medical treatment given



Litter is turned into feet-first position for descent.

Figure 3-41. Downstairs carry (step one).

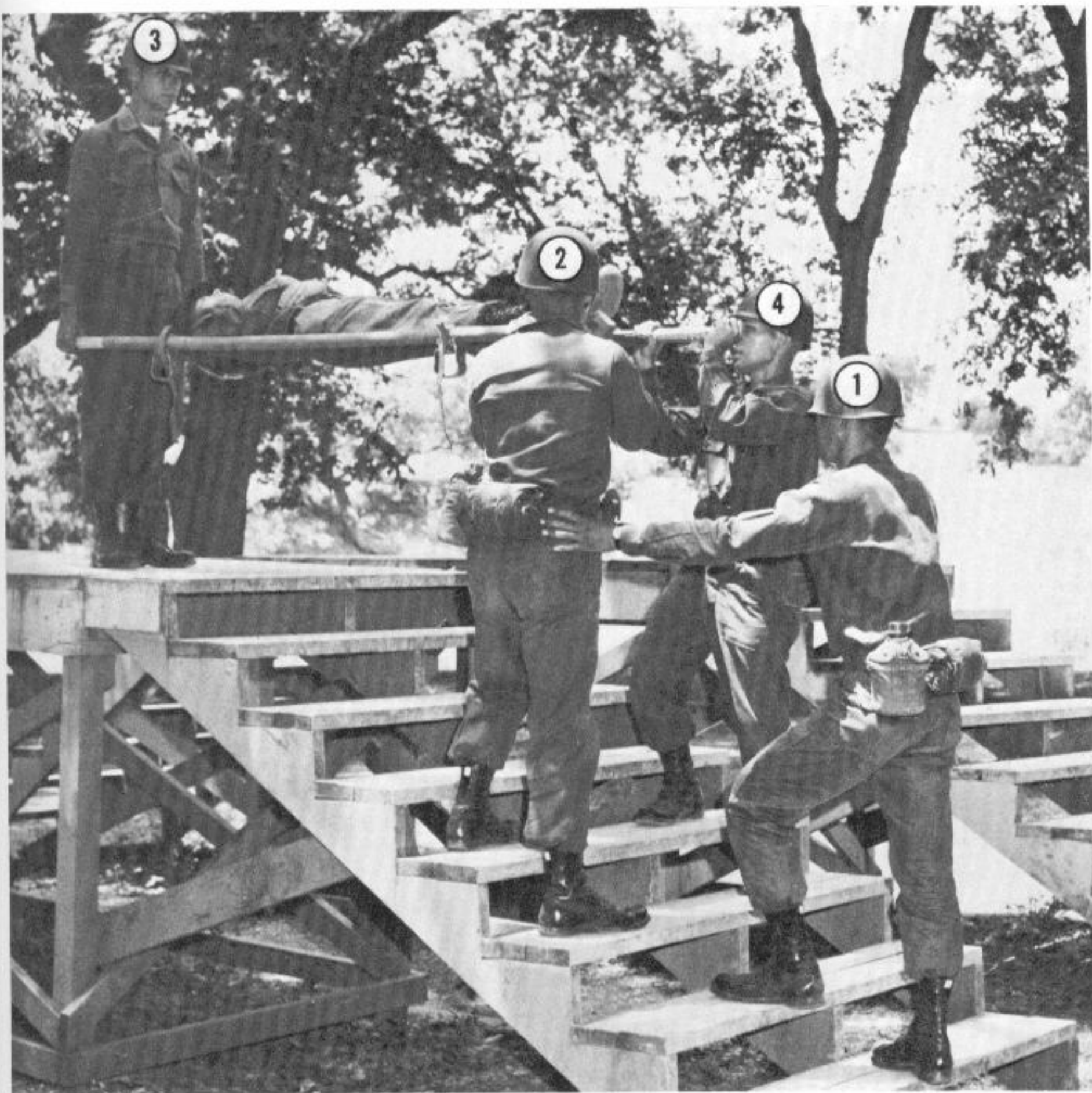
is limited to the control of hemorrhage, clearing the airway, the prevention and treatment of infection, and the splinting of fractures. This treatment is modified according to the weather, the type of clothing worn by the patient, and the discretion of the person giving the treatment.

b. It is particularly important to guard against shock by conserving body heat. Patients are therefore placed in specially constructed patient evacuation bags at the earliest possible moment. When they are not available, arctic sleeping bags or other articles are used for cover.

3-27. Aids to Litter Evacuation in Snow and Extreme Cold

Litter evacuation is difficult under conditions of extreme cold and deep snow and, as a result, litter bearers are subject to excessive fatigue. For this reason, litter aids, either hand-drawn by litter bearers, animal-drawn, or vehicle-towed, should be used whenever feasible.

a. *Litter Kit, Ski Sled.* The litter kit, ski sled, is used for converting a pair of skis and ski poles to a sled for transporting patients. It consists of one canvas platform, four brackets, two cross braces, two 7-foot and two 27-foot lengths of rope, and two patient securing straps.



- a. No. 3 steps in between the handles at the patient's head.
- b. No. 2 and No. 4 each maintain their respective positions at the patient's feet.
- c. No. 1 goes out in front, faces the team, and supports No. 2 and No. 4. He is also responsible to see that No. 2 and No. 4 keep the litter level during the descent.

Figure 3-42. Downstairs carry (step two).

b. *Ski adapter* (fig 3-67). The ski adapter consists of four adapters which hold a standard litter on skis. These adapters clamp on the litter stirrups and keep the litter above the surface of the snow. Patients can then be easily

pulled by attaching ropes to the converted litter.

c. *Ahkio* (fig 3-68—3-70). The ahkio is particularly useful where patients must be evacuated through deep snow.



At the preparatory command, team members turn and face each other, determining who is the taller of the two at each end of the litter.

Figure 3-43. Overhead carry (step one) (for deep trenches or fording streams).

d. *Evacuation bag, casualty* (fig 3-70). The casualty evacuation bag is issued in cold climates to keep the patient warm. It zips up

to protect all parts to the patient. Blankets may also be used inside the evacuation bag.

Section IX. LITTER EVACUATION IN MOUNTAIN OPERATIONS

3-28. General

Transportation of the sick and wounded in mountain operations is hampered by the difficulty of movement in mountainous terrain and climatic conditions. There are great

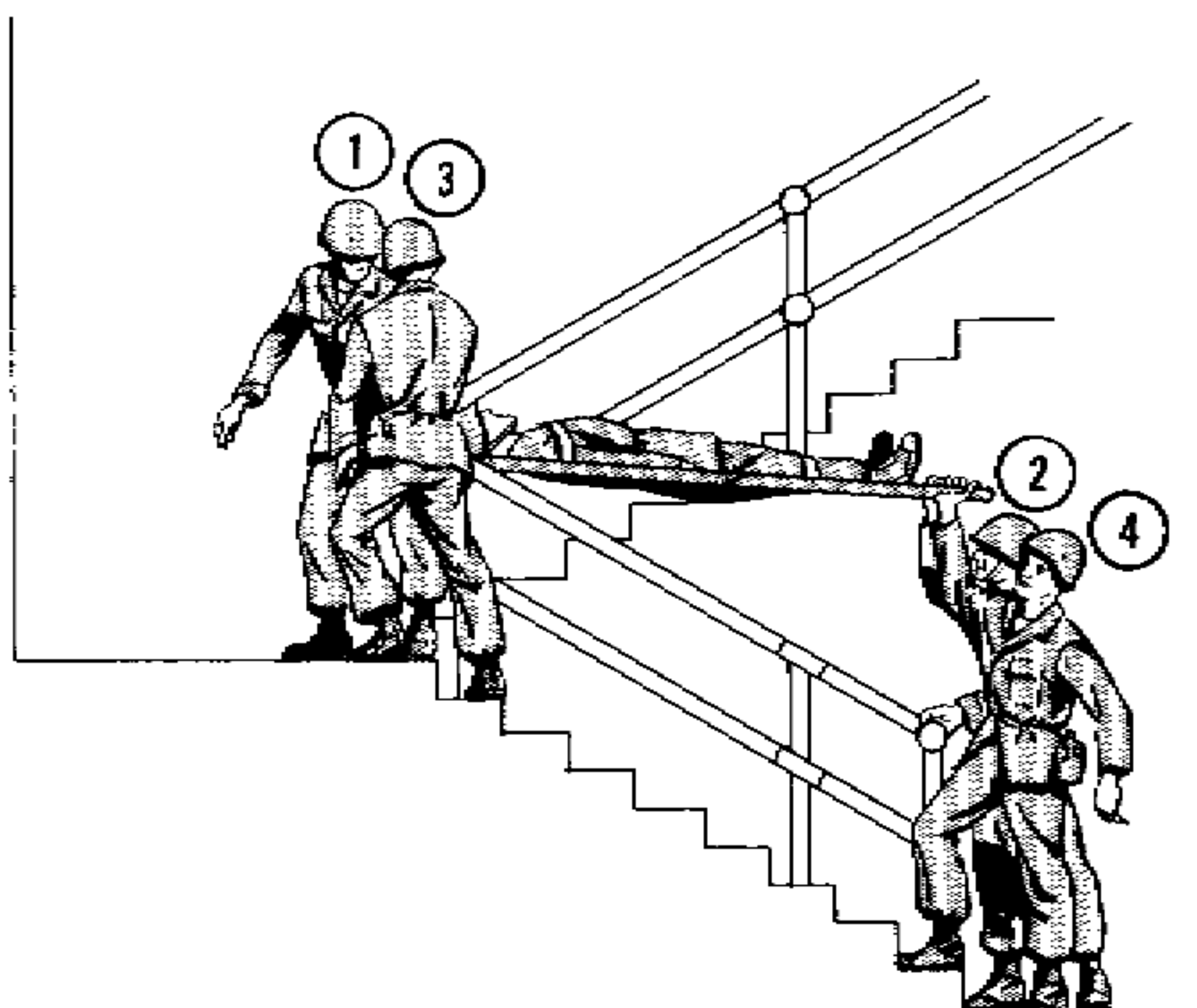
changes in elevation, extreme compartmentation, and poor roads. Temperatures are low, in some regions snow and ice cover the ground throughout the year, and there are abrupt local weather disturbances.

a. These conditions require modification in



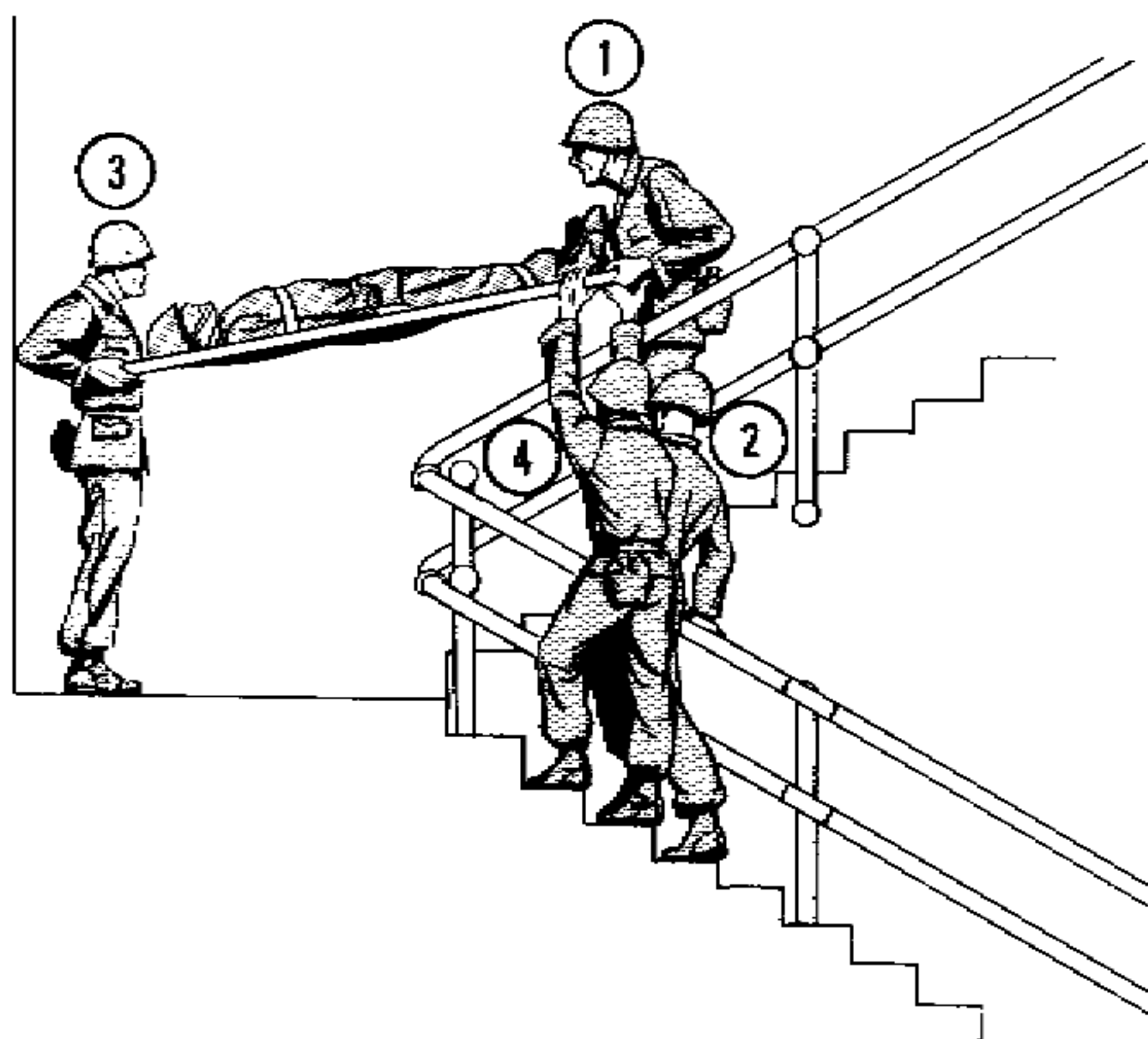
- a. At the command of execution, the team raises litter overhead, keeping it level. The taller member at each end of the litter goes between the handles and places hands on handles as close to litter canvas as possible. The shorter team member at each end then moves under litter, using stirrups for added height.
- b. If all members are of equal height, those going under litter will grasp the litter poles in front of the stirrups at patient's feet and in back of stirrups at patient's head.
- c. All team members face in the direction of travel. (At the preparatory command, members return to their respective handles, the shorter members moving first, then the taller, keeping litter level and overhead. At the command of execution, members bring litter down and face in the direction of travel.)

Figure 3-44. Overhead carry (step two) (for deep trenches or fording streams).



Squad proceeds up to first landing with No. 1 and No. 3 supporting head of litter, and No. 2 and No. 4 supporting the foot.

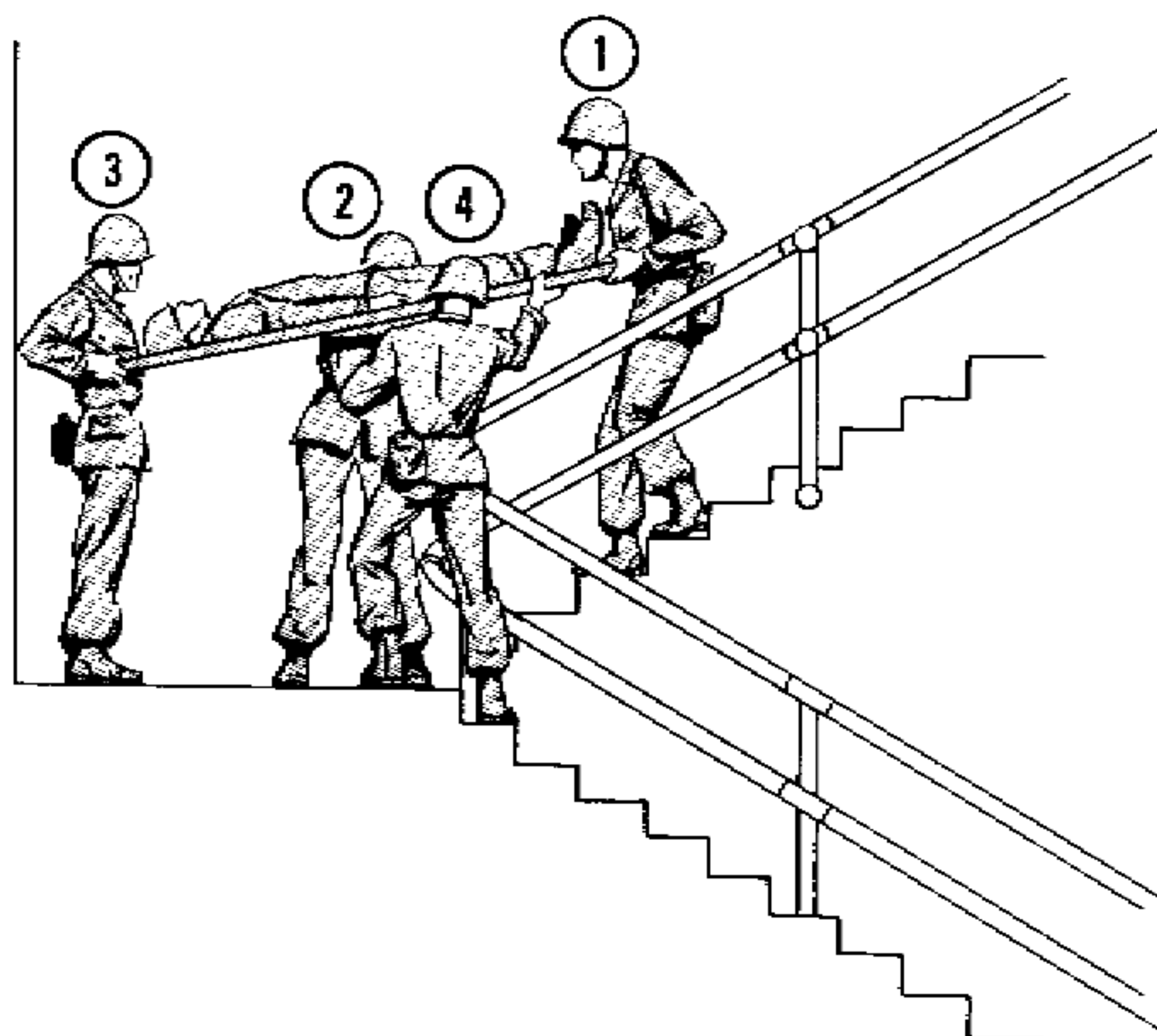
Figure 3-45. Carrying litter upstairs where landings are small (step one).



Upon arrival at first landing, No. 3 turns, facing head of litter and supporting it, while No. 1 proceeds several steps up the next flight of stairs. No. 2 and No. 4 raise foot of litter until No. 1 can grasp handles.

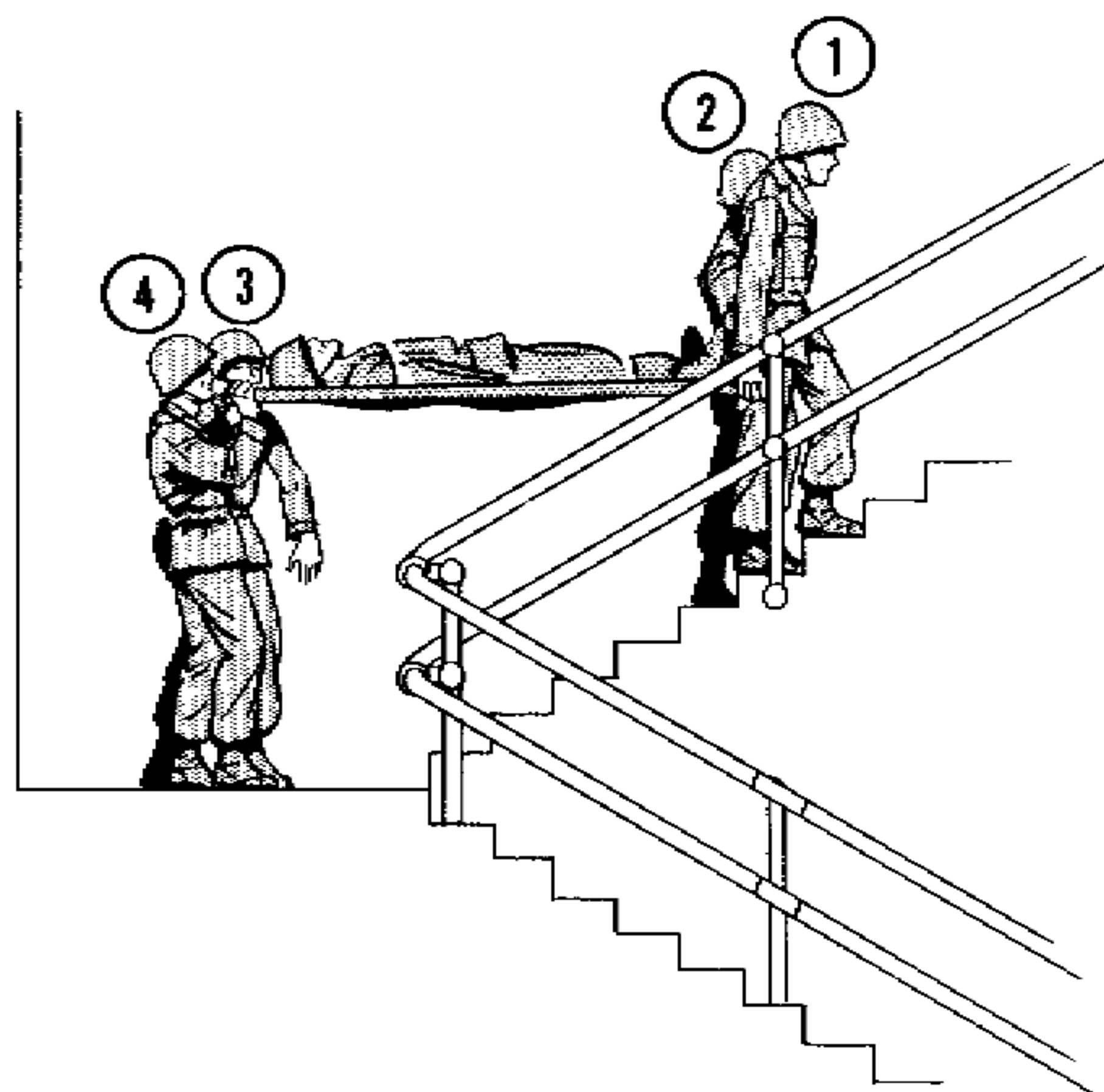
Figure 3-46. Carrying litter upstairs where landings are small (step two).

the normal handling of litter evacuation. It is customary for litter squads to be increased to six men each. On level terrain, a litter squad of four men can move a patient 1,000 yards and return in an hour. In mountainous country,



No. 1 and No. 3, with No. 2 and No. 4 assisting, then lift litter over banister to second flight of stairs.

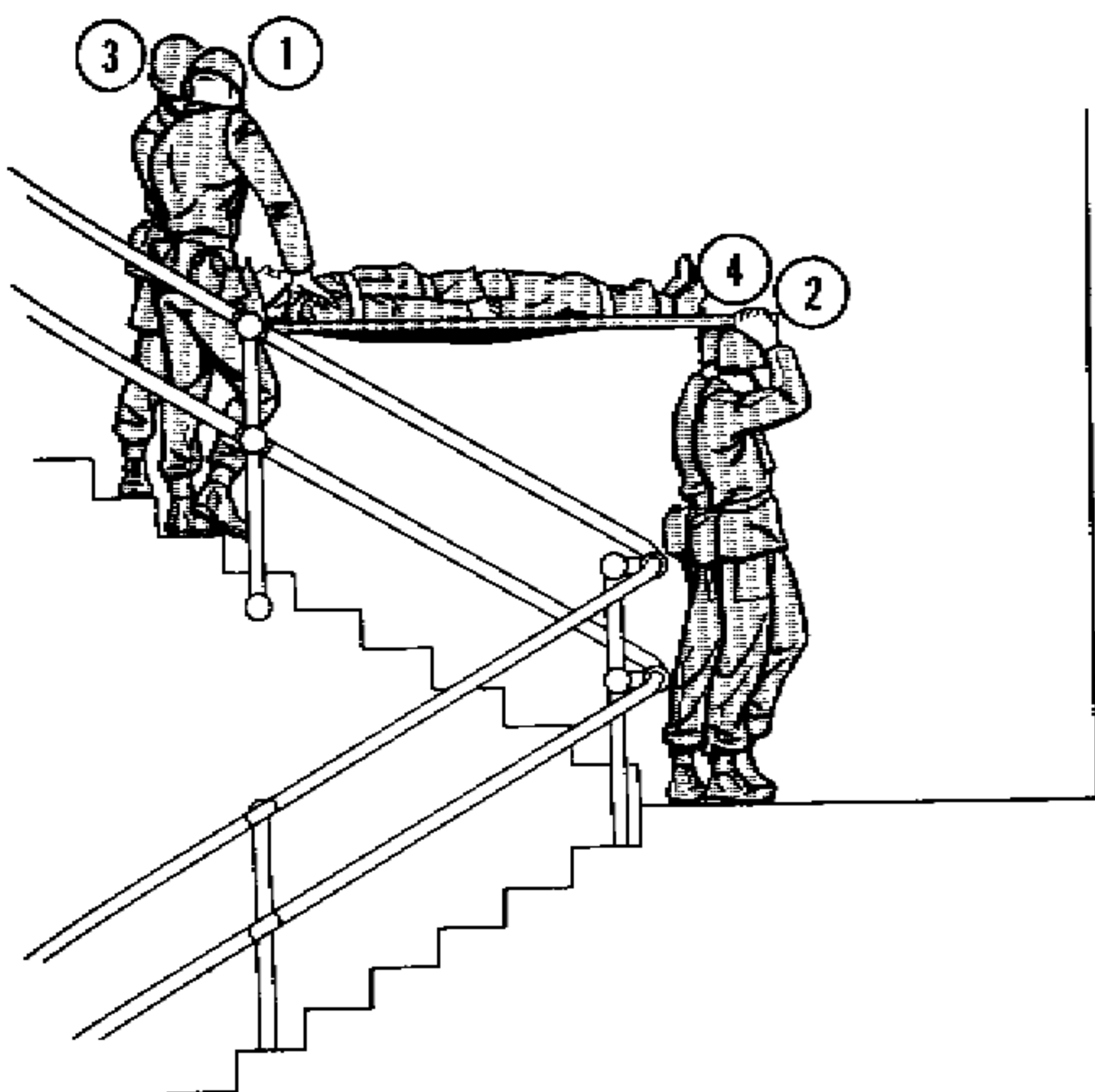
Figure 3-47. Carrying litter upstairs where landings are small (step three).



No. 4 assists No. 3 in carrying head of litter up second flight while No. 2 advances and assists No. 1 in carrying foot of litter.

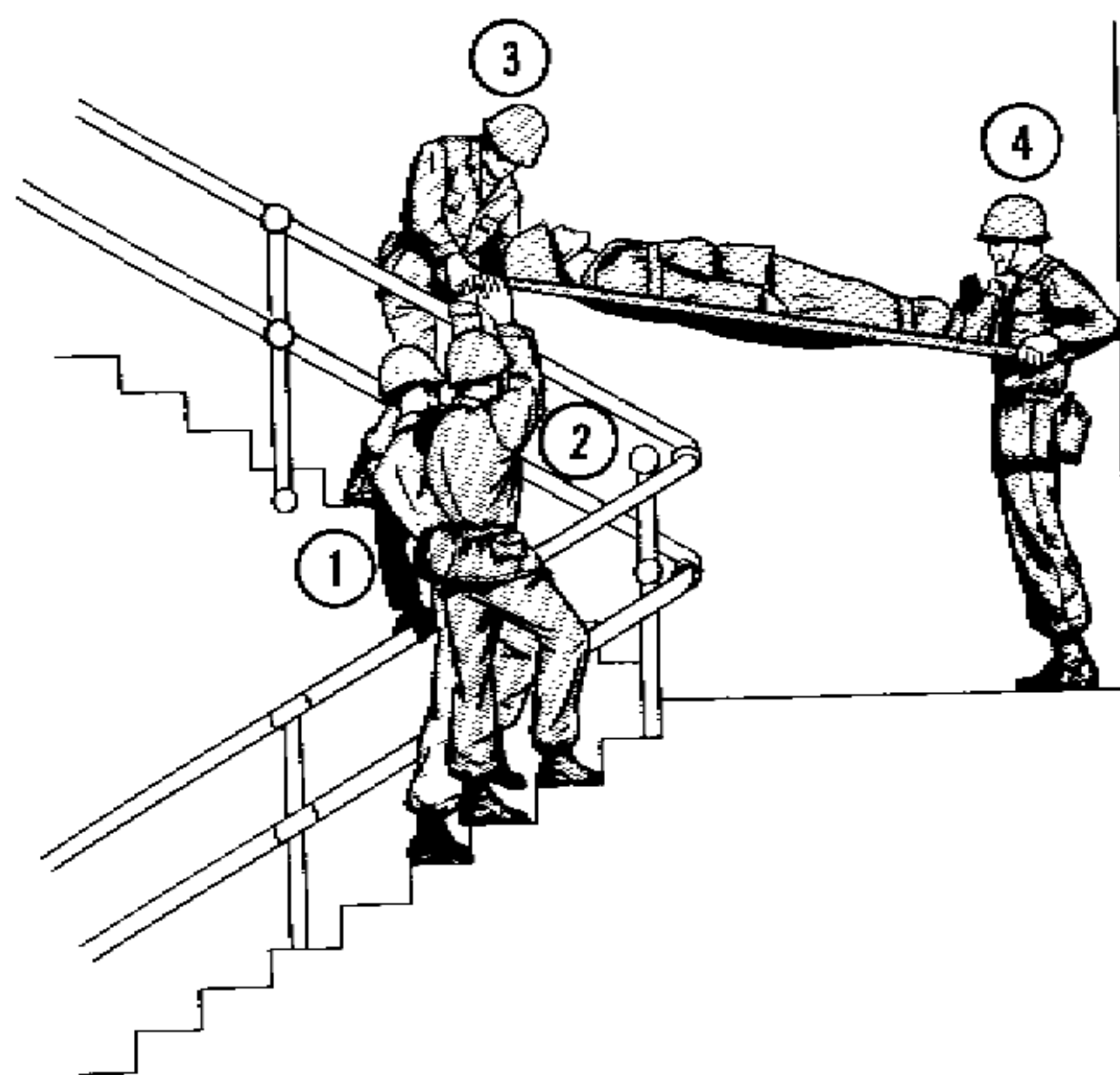
Figure 3-48. Carrying litter upstairs where landings are small (step four).

a squad of six men may cover only 400 yards and return in the same time.



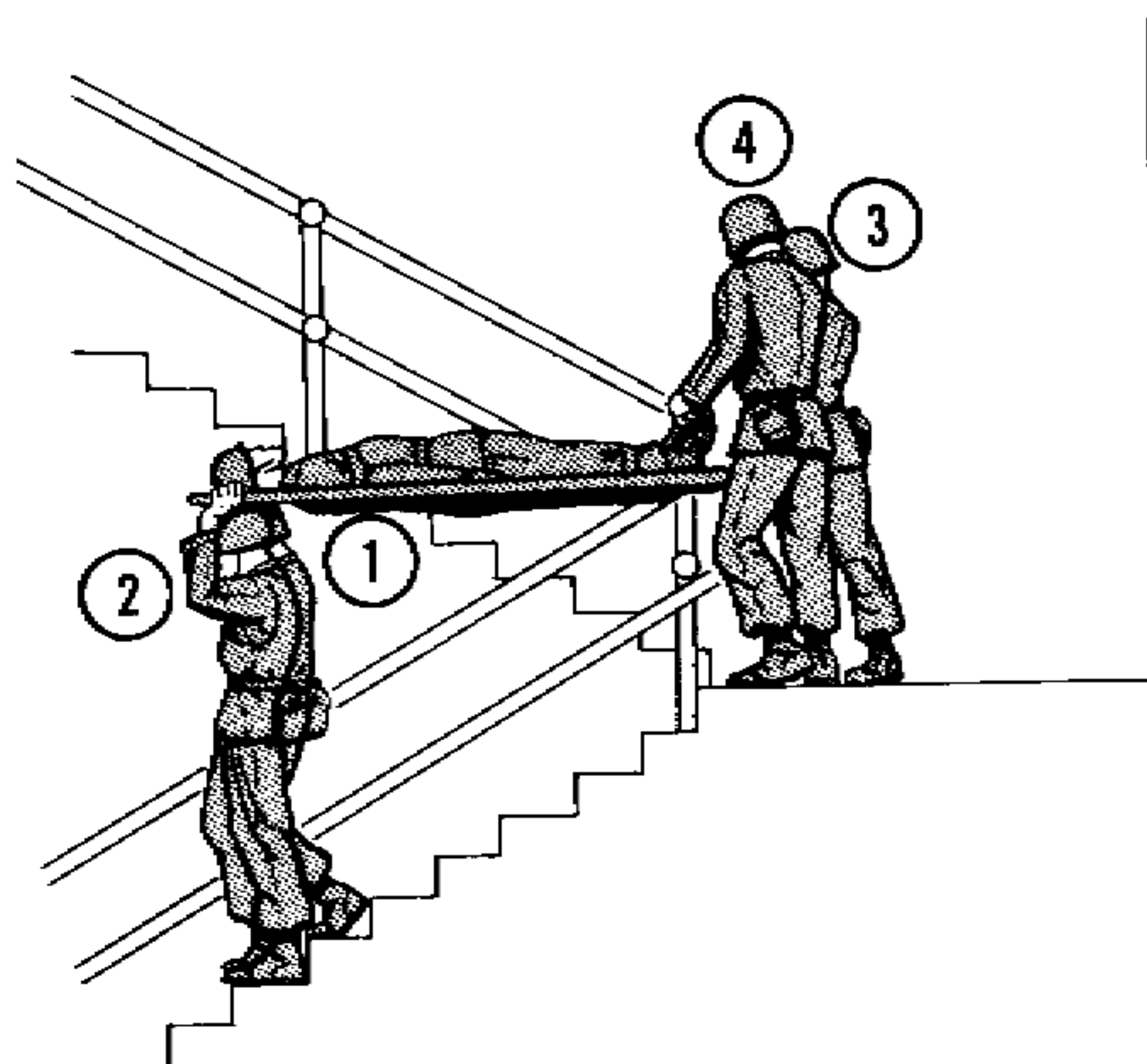
Squad proceeds down steps to first landing with No. 1 and No. 3 supporting head of litter, and No. 2 and No. 4 supporting the foot.

Figure 3-49. Carrying litter downstairs where landings are small (step one).



Upon arrival at first landing, No. 4 turns and faces litter and supports foot of it while No. 3 supports head. No. 1 and No. 2 descend a few steps of the second flight of stairs.

Figure 3-50. Carrying litter downstairs where landings are small (step two).



- a. No. 1 and No. 2 receive the head of the litter which is handed over the banister to them by No. 3.
- b. No. 3 then assists No. 4 to support foot of litter while No. 2 and No. 1 support the head, and all move down to the next landing.

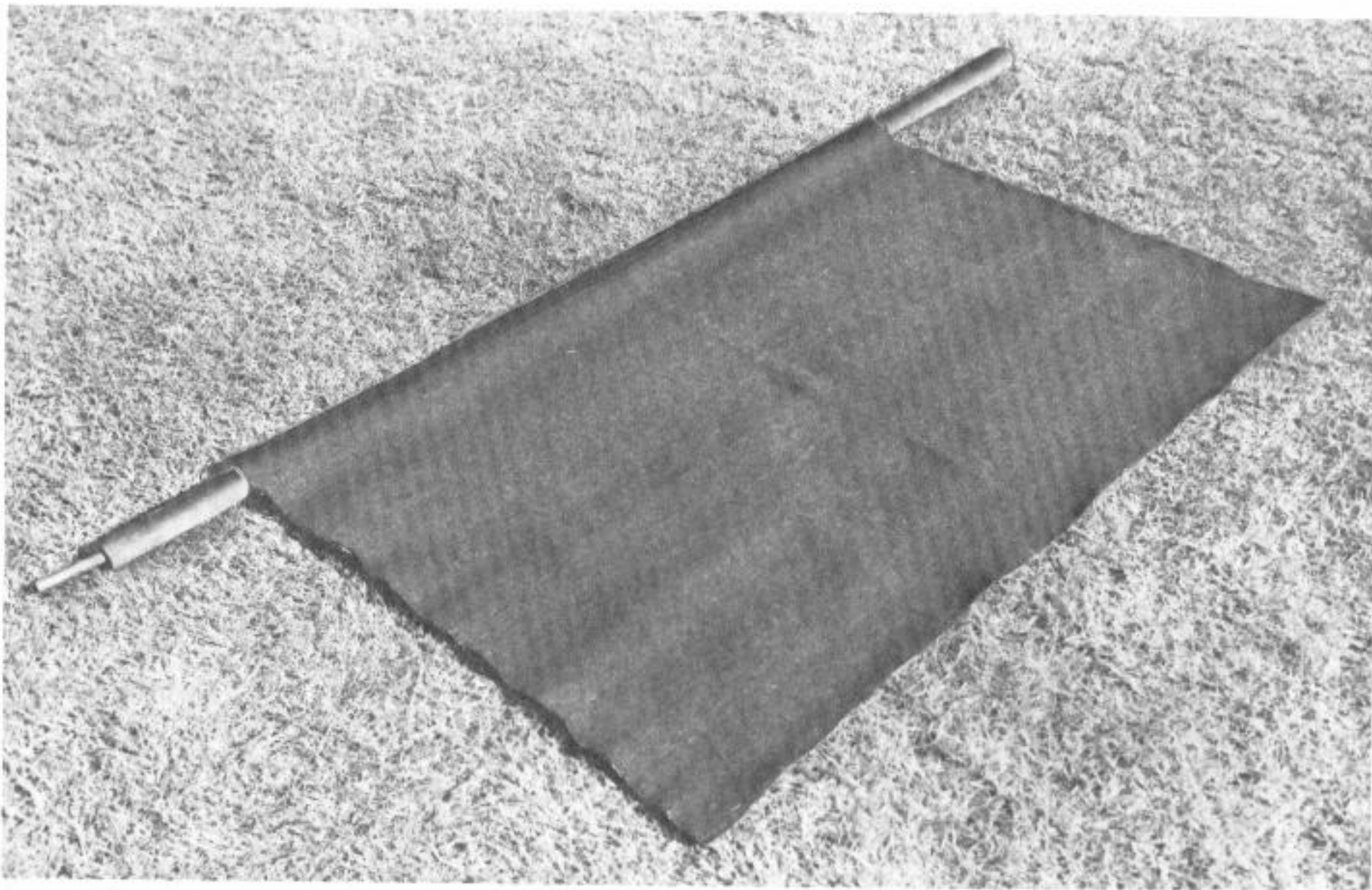
Figure 3-51. Carrying litter downstairs where landings are small (step three).

b. Whenever possible, litter relays should be employed. Using short hauls and frequent relays enables bearers to operate at maximum efficiency. It also enables them to learn their section of the trail thoroughly and thus to move patients more safely during darkness and periods of poor visibility.

c. Men assigned to litter squads for mountain service must be trained in rock climbing, in the use of rope, and in individual and unit movements at high altitudes. For additional information on movement and operations in mountainous regions, see FM 31-72.

d. The smoothest available route should be selected. When the route is long and arduous, a series of warming stations should be established and staffed with medical personnel to permit proper emergency treatment of shock, hemorrhage, or other emergency conditions. When a patient develops new or increased signs of shock while being evacuated, he should be left at one of these stations until his condition warrants further evacuation.

e. The patient should be kept as warm as possible during transportation and should not be handled more than is necessary. His helmet should be put over his head for protection from falling rock.



A blanket, shelter half, tarpaulin, or similar material may be used for the litter bed. The poles may be improvised from branches, boards, tent poles, skis, lengths of pipe, rifles, or any appropriate objects at hand.

- a. Spread blanket open on ground.
- b. Lay one pole lengthwise across center, and fold the blanket over it.

Figure 3-52. Pole and blanket litter (step one).

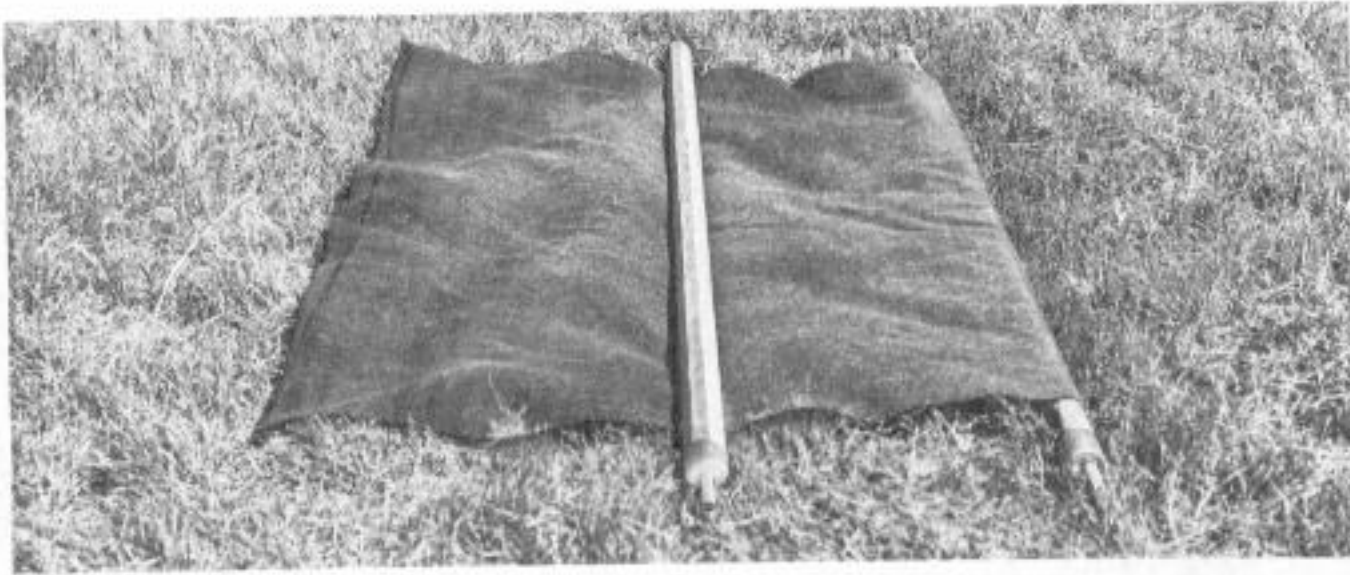
f. Since movement usually will be up or down slopes or along the side of a mountain, the patient must be securely lashed to the litter.

g. The mountain basket-type rigid litters or the semirigid poleless litters are preferred for evacuation in mountain operations; however, any standard litter may be used.

3-29. Methods

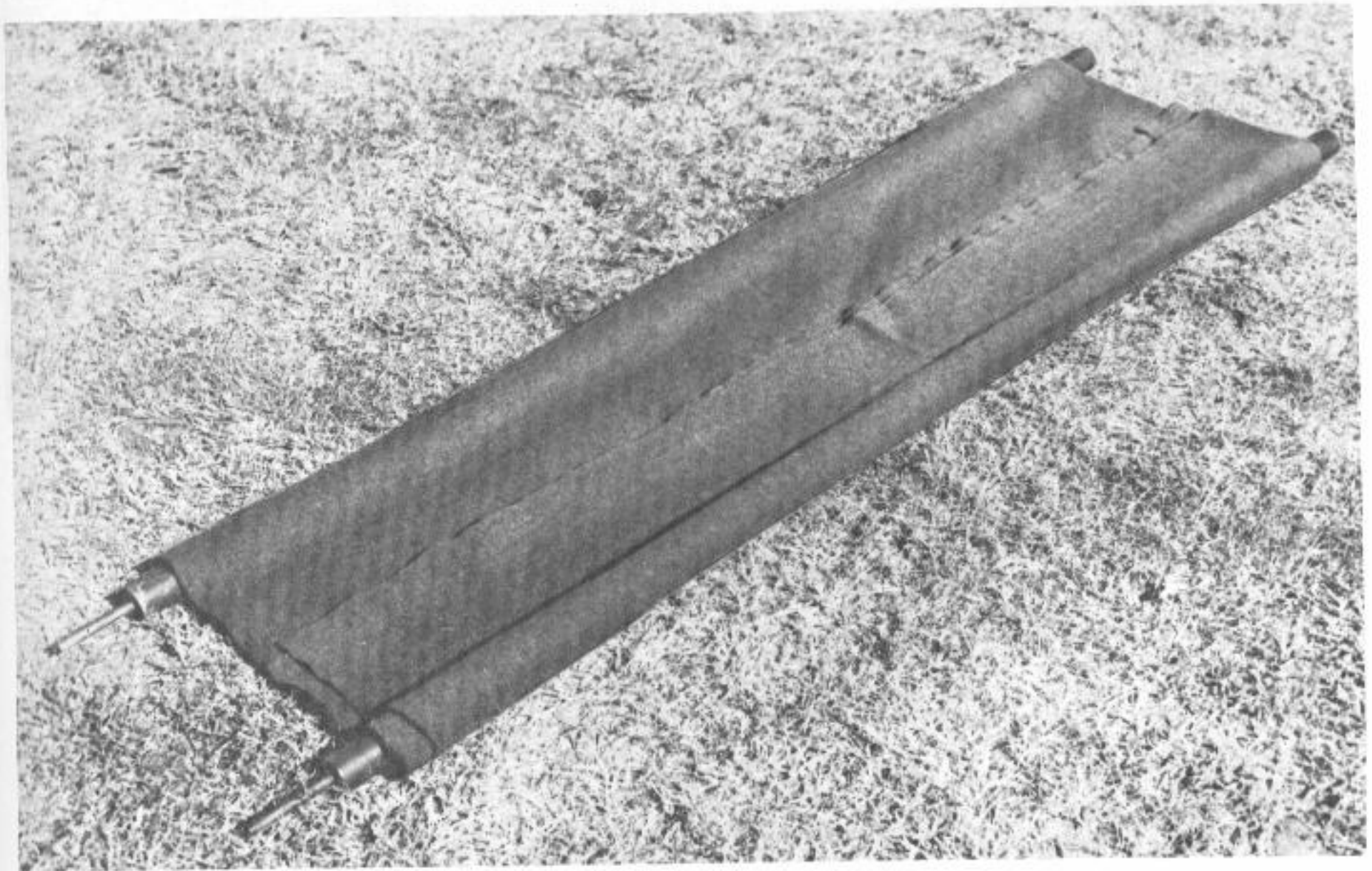
(fig 3-71—3-75)

Several methods of litter transportation which are adapted to mountain terrain and climatic conditions are described and illustrated below. They are subject to improvement and should be discarded as better methods are developed.



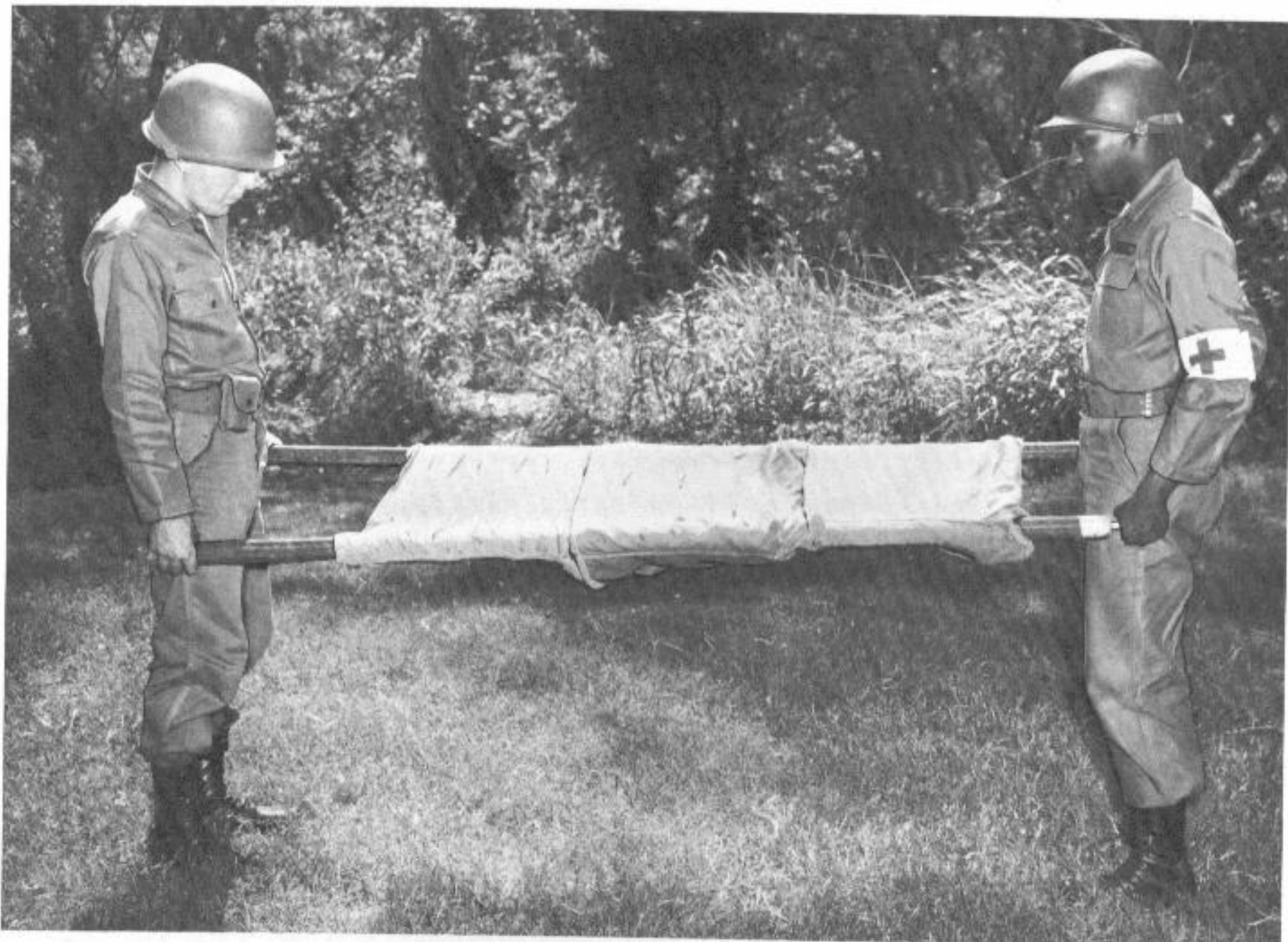
Place second pole across center of new fold.

Figure 3-53. Pole and blanket litter (step two).



Fold free edges of blanket over second pole.

Figure 3-54. Pole and blanket litter (step three).



Fold two or three blouses, shirts, or jackets, button them, turn them inside out so that the sleeves are on the inside, and pass a pole through each sleeve.

Figure 3-55. Litter improvised from poles and jackets.



(Use plane-surfaced objects of suitable size, such as cots, window shutters, doors, benches, ladders, boards, or poles tied together). Pad litter, if possible.

Figure 3-56. Door or board litter.



- a. Rip open bottoms or corners of sacks, bags, or bed ticks, or cut mattress covers.
- b. Pass two poles through them.

Figure 3-57. Litter improvised from poles and sacks.



(If no poles are available, use a blanket, shelter half, tarpaulin, or similar object rolled from both sides toward the center). Use rolls as grips when carrying patient.

Figure 3-58. Rolled blanket used as litter.



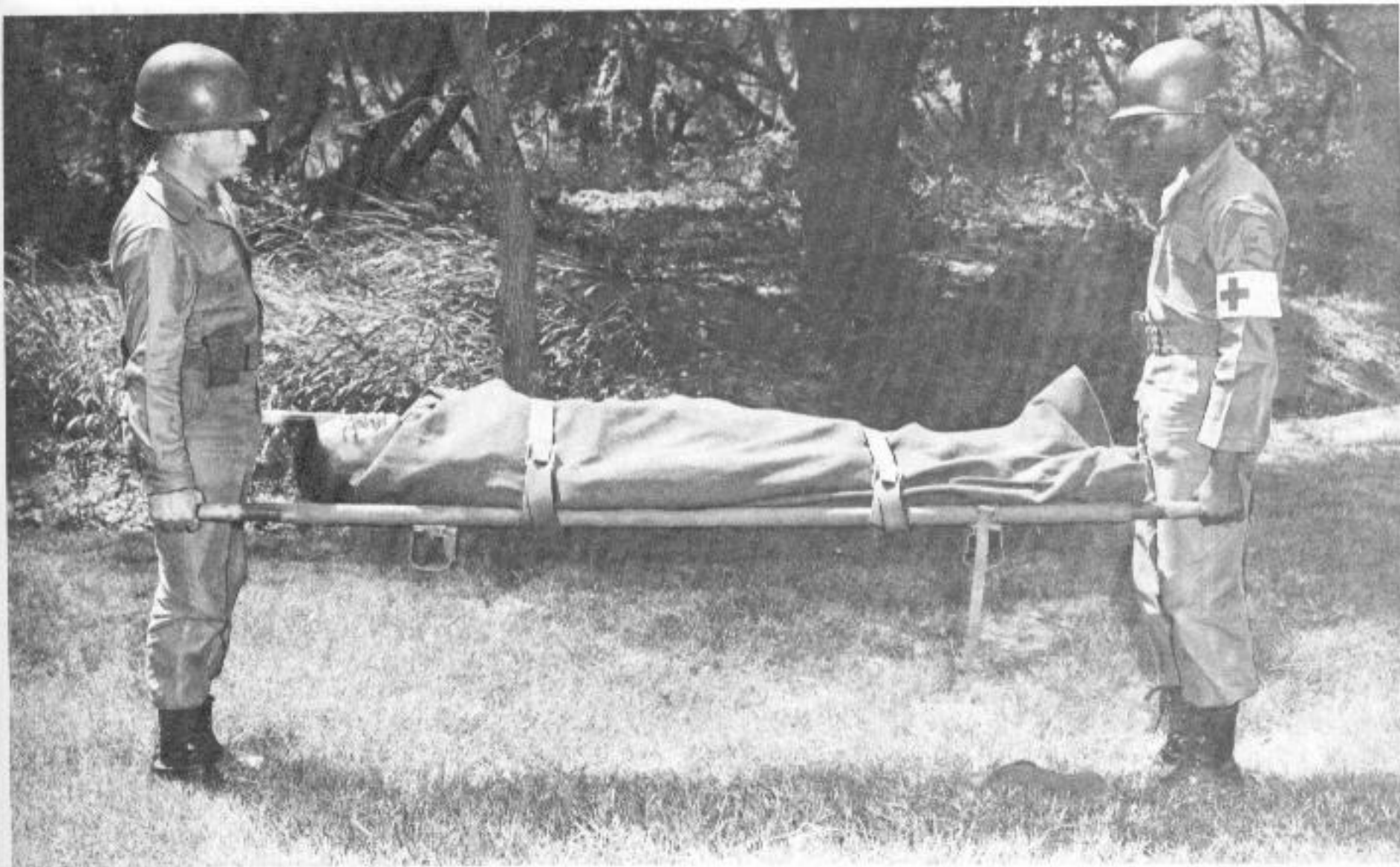
- a. The patient securing strap (available four per litter) consists of a length of 2-inch webbing with buckle which has a locking device and spring.
- b. The purpose of the patient securing strap is to hold the patient in position on the litter.
- c. The strap is designed to fit the straight aluminum litter and the folding aluminum litter.

Figure 3-59. Patient securing strap.



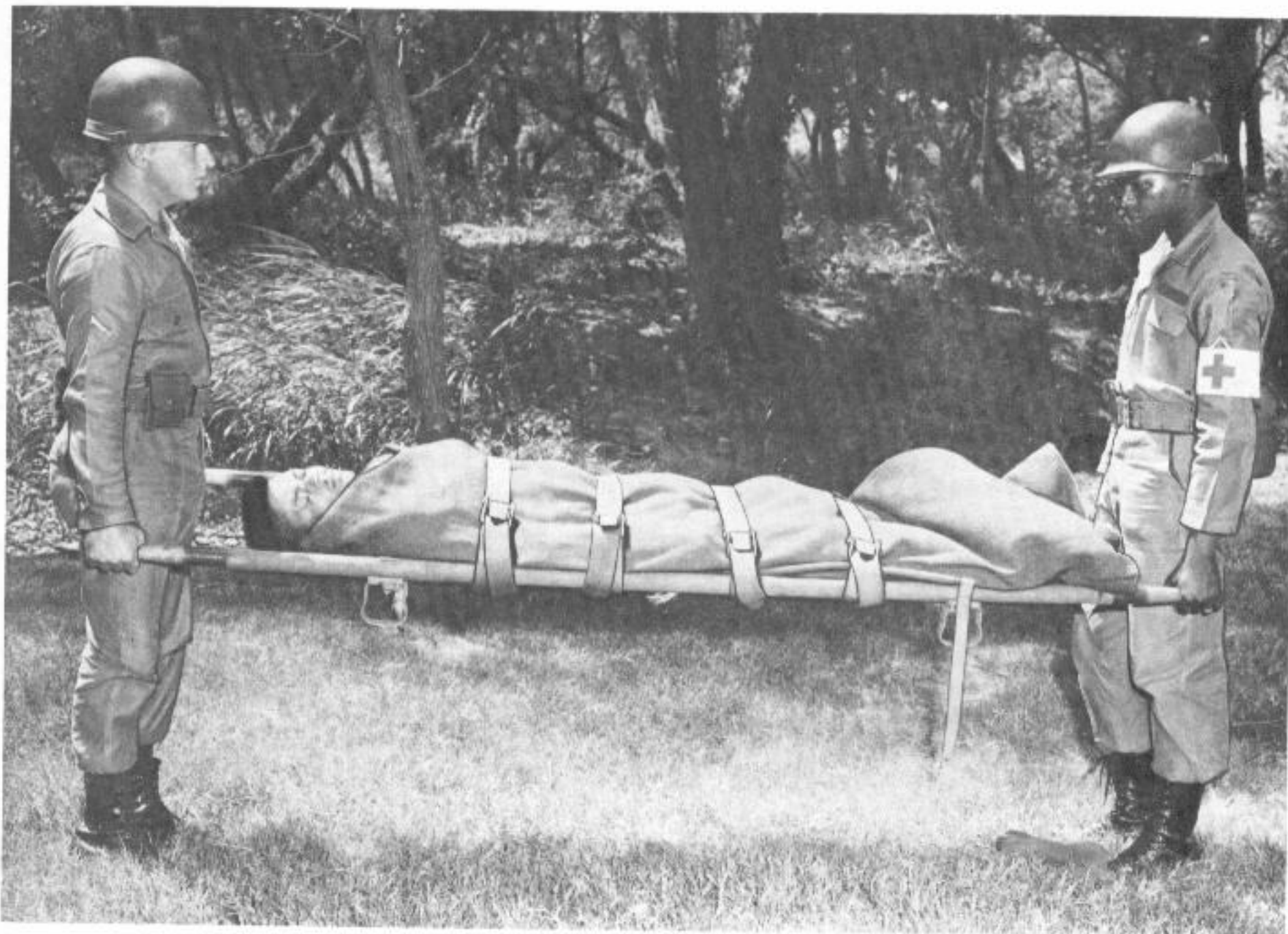
In securing the patient securing strap, carry the strap across the patient's body, extend it under the litter, and secure it in place.

Figure 3-60. Method of fixing patient securing strap in place.



(When considered necessary, use two patient securing straps.) Place one strap across the patient's chest and another across his legs below the knees.

Figure 3-61. Two patient securing straps (for normal terrain).



(When the litter is to be moved over rough terrain, or the movement is of such nature that there is danger of the patient falling from the litter, use four patient securing straps.)

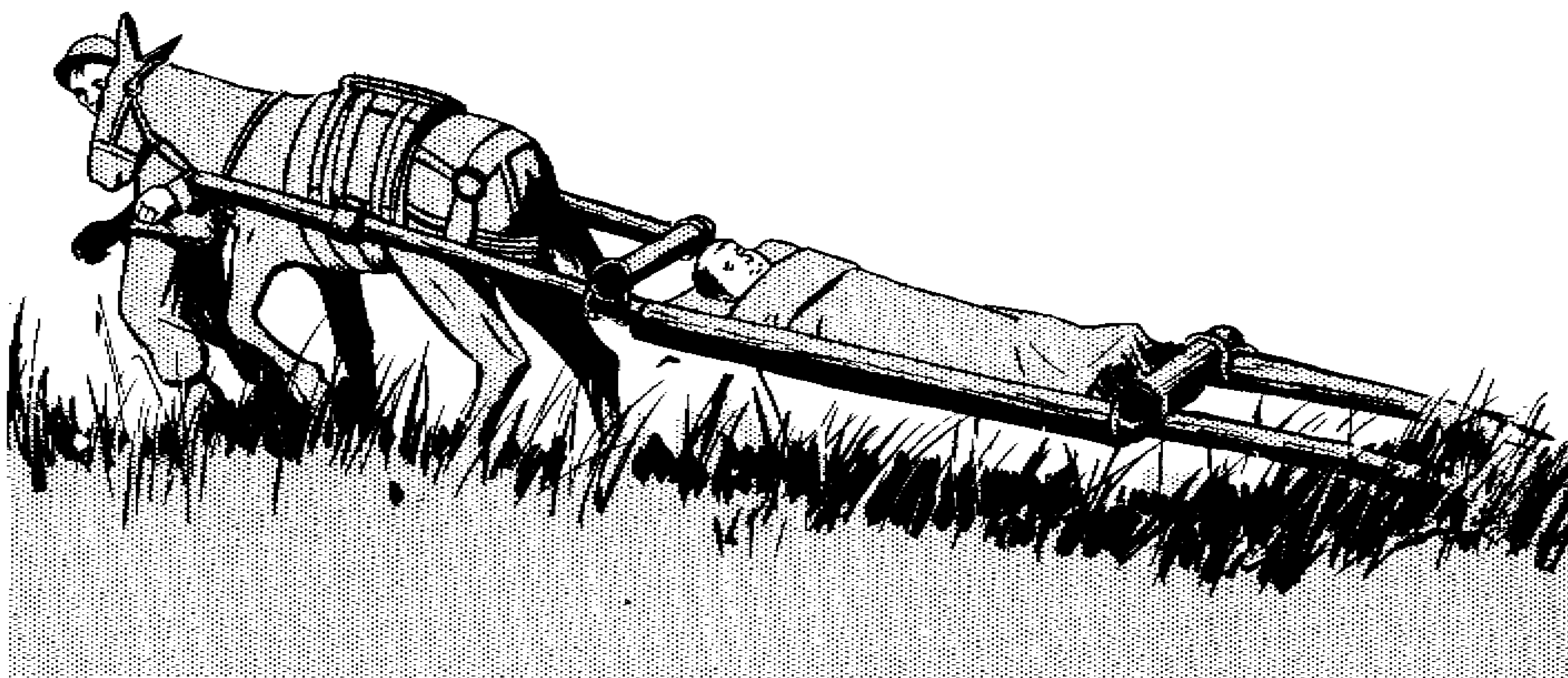
Place the four straps, one across the chest, one across the waist, one across the thighs, and one across the legs below the knees.

Figure 3-62. Four patient securing straps (for rough terrain).



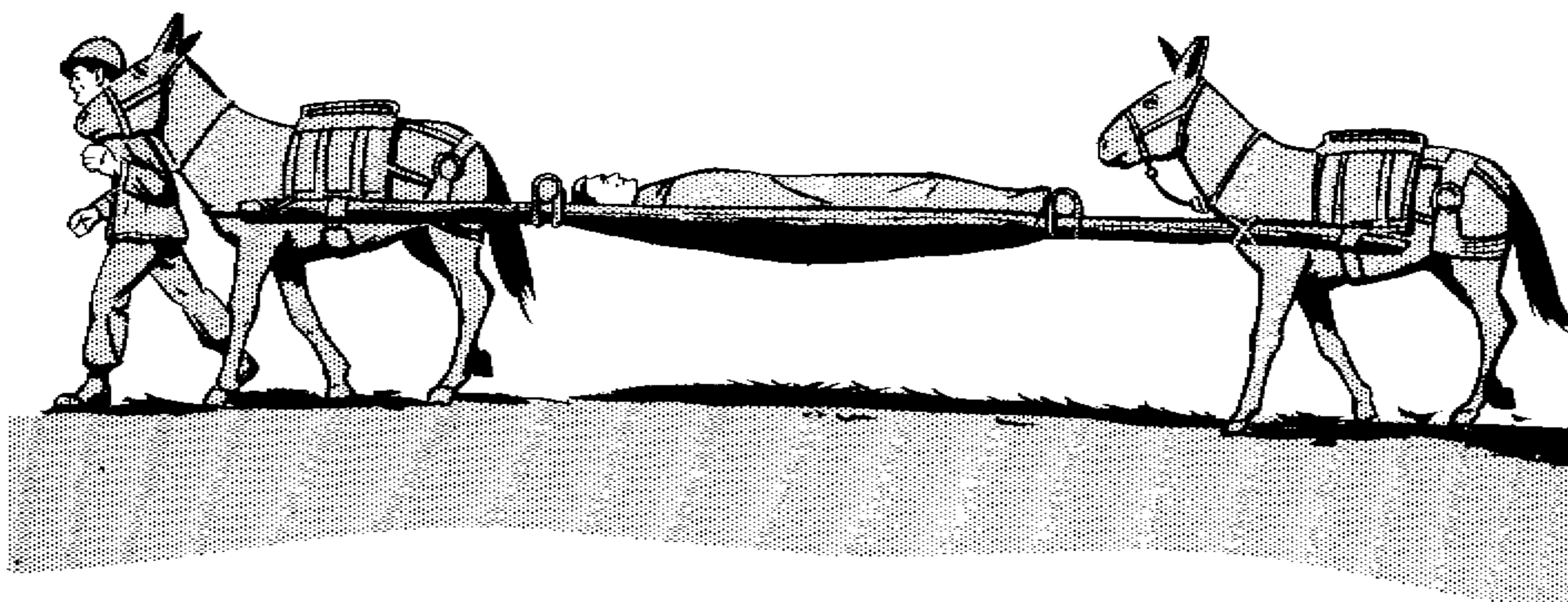
- a. Apply one strap across the chest.
- b. Apply the second strap across the legs.
- c. Carry strap over the thigh of one leg, and pass it between the legs and under the other leg to the far pole.
- d. Apply the fourth strap in the reverse manner; that is, carry it over the thigh of the far leg, under the near leg, and finally attach it to the near pole.

Figure 3-63. Four patient securing straps fixed for movement up or down steep slopes.



- a. Consists of two long poles lashed at one end to each side of a horse, or similar animal, the other end trailing the ground. Crossbars are lashed across these poles to receive the load.
- b. On the march, bearers should be ready to lift the rear end of the travois when passing obstacles, fording streams, or going uphill.
- c. To construct:
 - (1) Cut poles about 16 feet long and 2 inches in diameter at the small end.
 - (2) Lay poles parallel to each other, large ends to the front and 2 1/2 feet apart, the small ends 3 feet apart with one of the small ends projecting some 8 or 10 inches beyond the other to impart a rocking rather than a jolting motion to the load.
 - (3) Connect poles by a crossbar about 6 feet from the front end and another about 6 feet back of the first, each notched at the ends and securely lashed to corresponding notches in the long poles.
 - (4) Fill in litter bed (6 feet long) between crossbars with a blanket, canvas, or similar material, securely fastened to the poles and crossbars.
 - (5) In place of canvas or a blanket, a rope or strap may be stretched obliquely from pole to pole, in many turns, crossing each other to form a basis for a light mattress or improvised bed. A litter or cot may be fastened between poles for the same purpose.
 - (6) Fasten securely the front ends of the poles to the saddle of the animal.

Figure 3-64. Travois, one-horse.



If desired, the rear ends of the poles, instead of being allowed to drag, may be lashed to the saddle of a second horse which follows the first in tandem.

Figure 3-65. Travois, two-horse.



- a. A packsaddle fitted with a litter is usually carried by a mule, but can be adapted to other animals.
- b. It is particularly useful in mountain and jungle areas where long manual carries might otherwise be necessary.

Figure 3-66. Packsaddle litter (improvised).

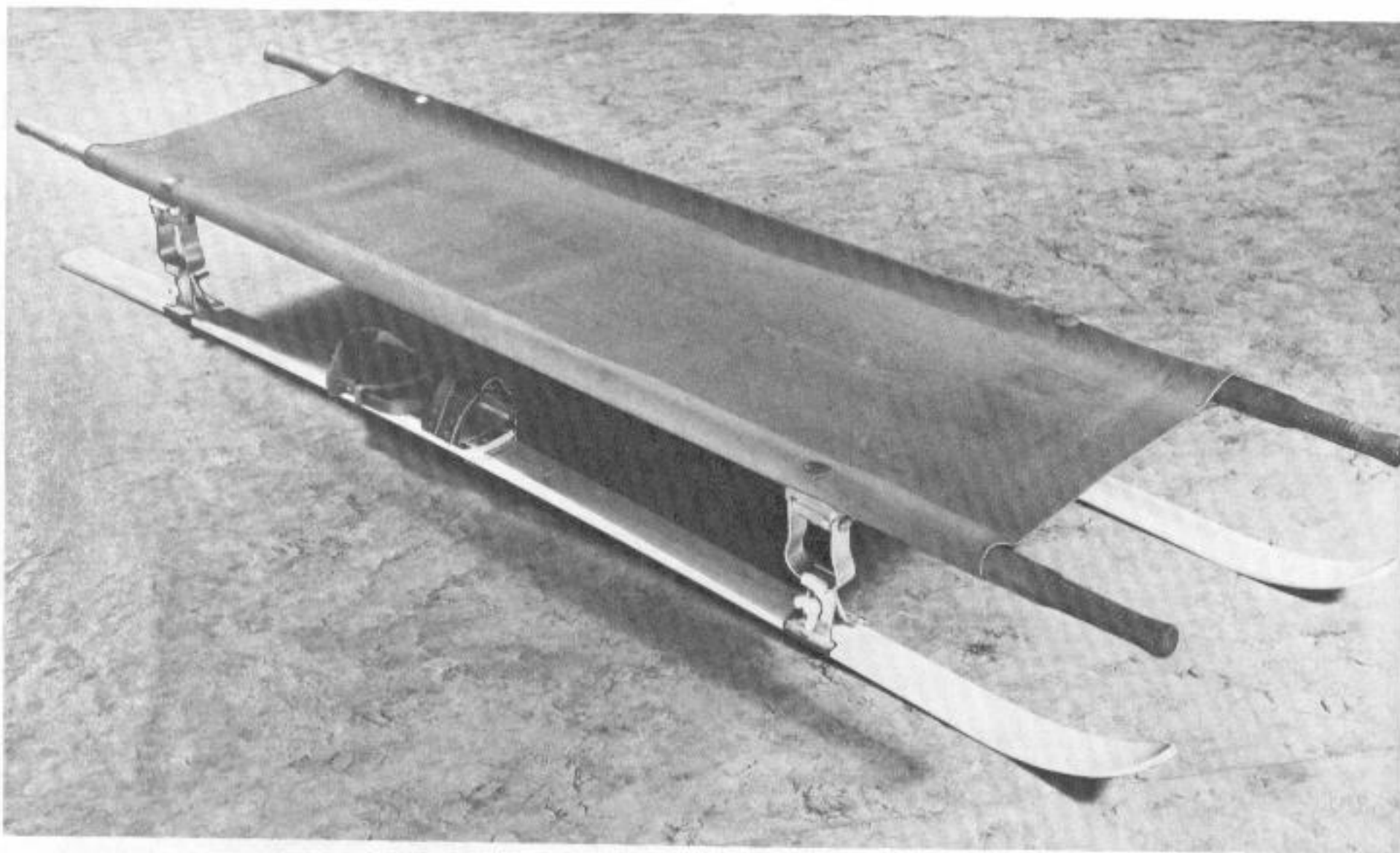


Figure 3-67. Ski adapter.



Figure 3-68. Patient being transported on ahkio.



Figure 3-69. Patient on ahkio being loaded into ambulance.

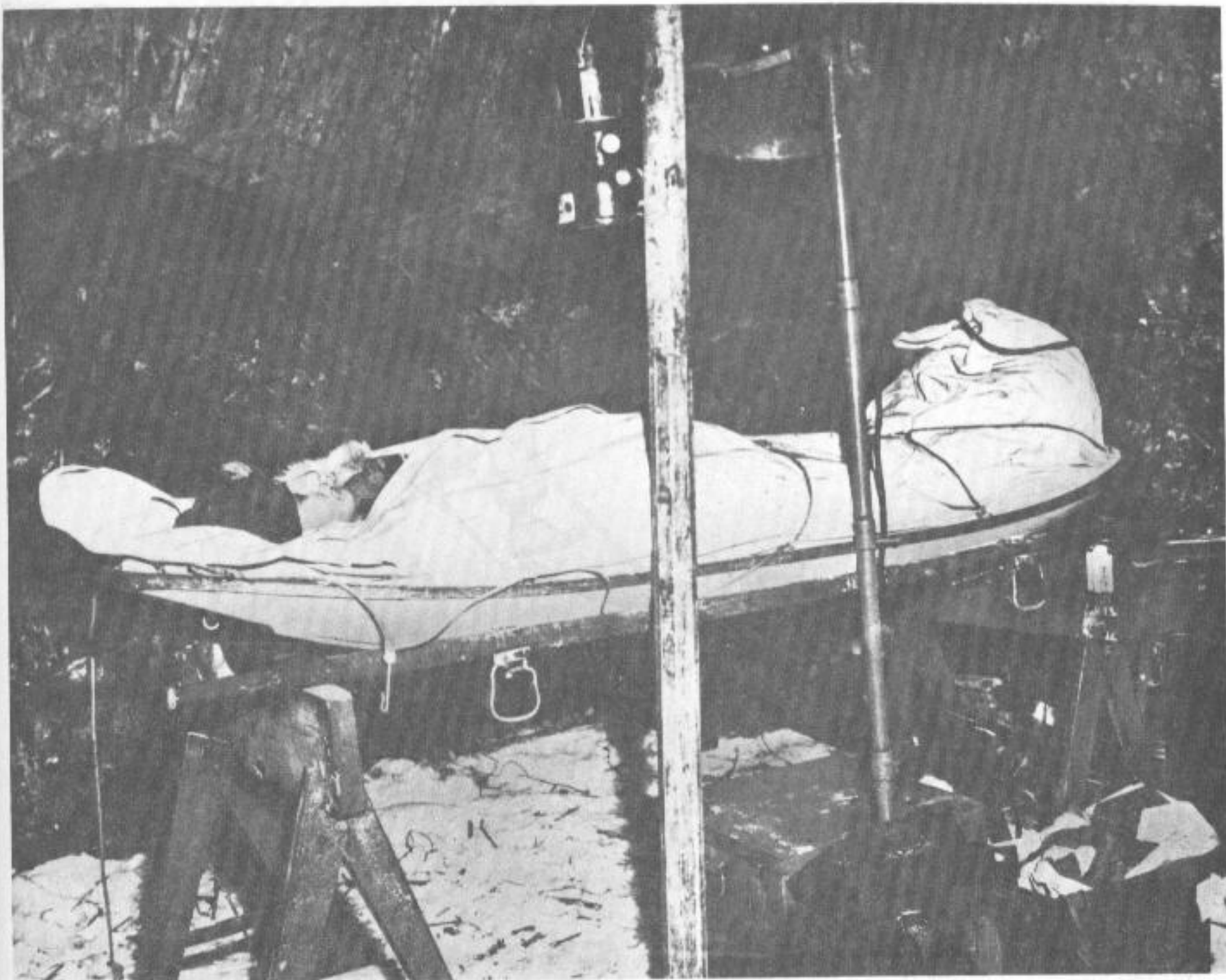


Figure 3-70. Patient on ahkio waiting for treatment at a medical treatment facility.



Can be used when descending a relatively smooth slope. Considerable speed can be made on slopes, and cliff faces, 4 to 6 feet high, can be passed without difficulty.

- a. Cut two poles about 18 feet long, the large end about 3 inches in diameter. Fasten poles to litter stirrups so that a length of from 5 to 10 feet of the poles extends beyond the litter. This length of pole acts as a runner.
- b. One bearer supports the foot of the litter by a rope sling and guides the litter downhill.
- c. Another bearer uses a rope to lower the patient and litter.
- d. A third bearer assists the man handling the rope and relieves him at frequent intervals.

Figure 3-71. Modified travois.



The litter is prepared as for descending.

a. Two men take their places at the head of the litter. (A thin sapling passed through the stirrups, extending 18 inches on each side of the lines, affords a more secure grip for these two bearers.)

b. A third, using an improvised rope sling, takes his place at the foot.

c. The fourth and fifth men take their positions along the extended rope which is in the hands of the sixth.

d. At the signal UP ROPE, the fourth, fifth, and sixth men pull, while the first, second, and third men lift the litter and slowly climb.

(The men carrying the litter should not try to do all the work but should allow themselves to be pulled up the slope while they hold the litter off the ground. The positions of the men should be rotated at each halt so that the work will be distributed equally.)

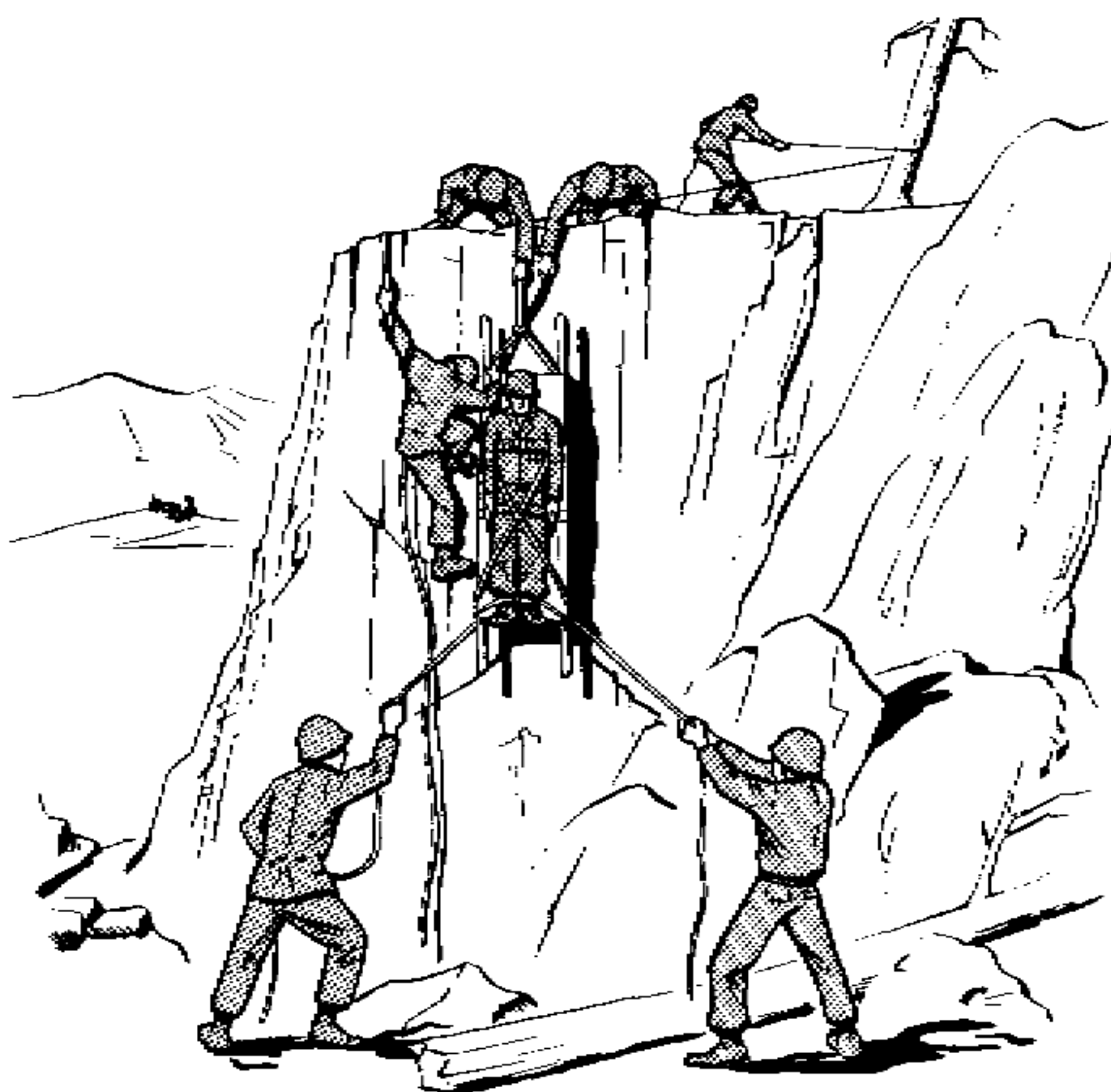
Figure 3-72. Steep slope evacuation (ascending).



In making the descent, the most direct, practicable passage should be taken.

- a. To prepare the litter, patient securing straps are used, if available. If rope is used, it is passed through head stirrups, lashed in place, and used as a support.
- b. Two men hold the rope to assist in lowering litter.
- c. The three litter bearers take their positions as for ascent.
- d. The sixth man may assist with the litter or precede the team, picking a trail, making the passage more negotiable by clearing away shrubs and vines, and making a reconnaissance so that the team need not retrace its steps if a cliff should be encountered.

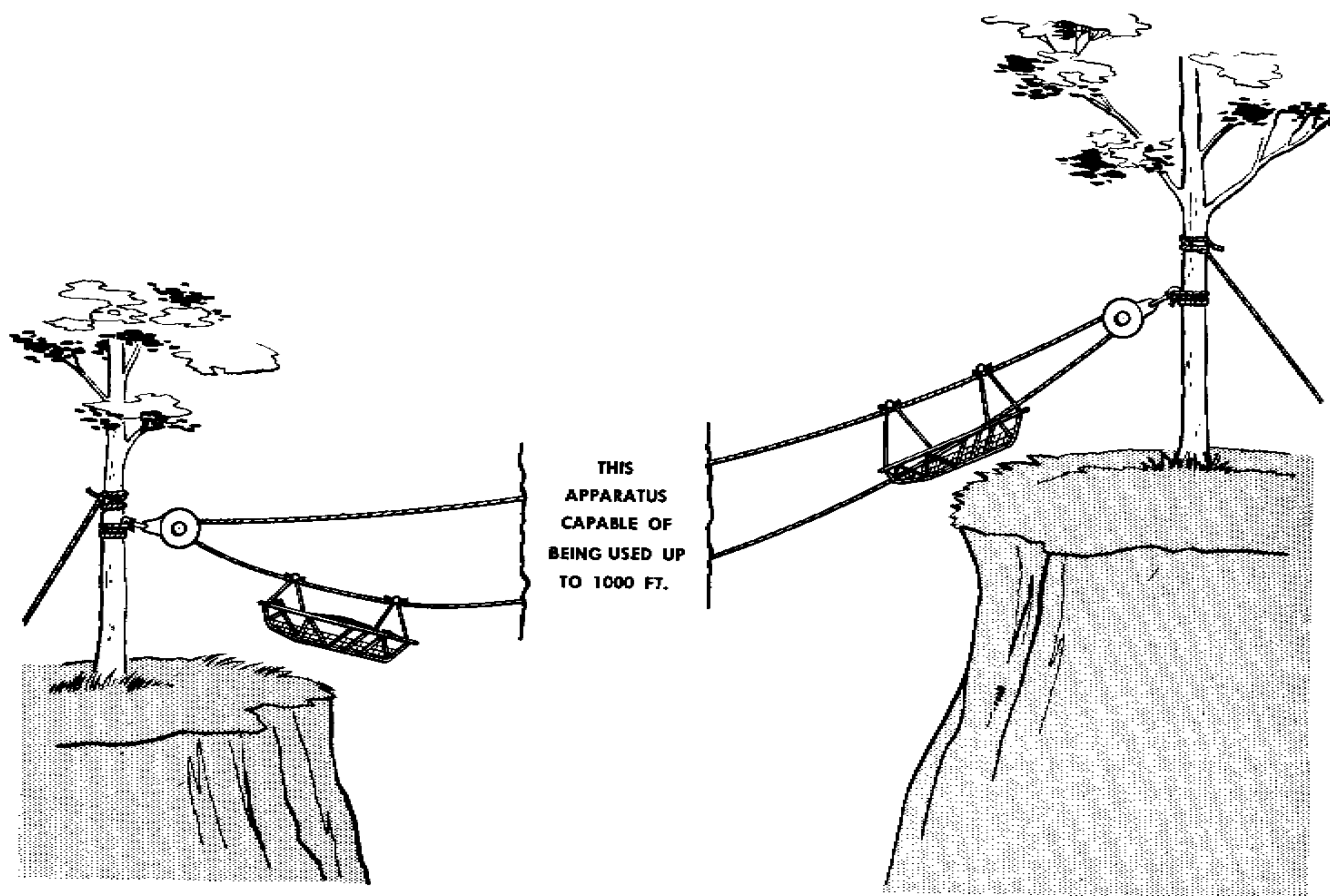
Figure 3-73. Steep slope evacuation (descending).



If a cliff is too extensive to bypass, select the smoothest face for descent.

- a. Secure patient as before.
- b. Attach two large poles, the length of the litter or longer, to the stirrups. Poles act as runners.
- c. Tie lashing ropes on poles in the notches cut in the poles, to prevent fraying from rubbing against stone cliff.
- d. Attach ropes to the stirrups at the foot of the litter to use as guy ropes to keep litter from revolving.
- e. Two men lower litter over cliff edge, while a third man secures the rope around a tree or large boulder.
- f. One man descends the cliff face on a rope, moving parallel to the litter, and assists the litter over any projections.
- g. The remaining bearers guide the litter from the foot of the cliff by holding the guy ropes.
- h. When the litter has almost reached the base of the cliff, they ease it to the ground.

Figure 3-74. Lowering patient down cliff.



Consists of a continuous wire rope cableway, secured by a system of snatch-blocks, spanning a maximum of 1,000 feet between terminals. (A slope of at least 10° is required for proper operation.) It is a standard item of issue. (For use and maintenance, see TM 5-270.)

- a. A Stokes litter with patient is suspended from the top of the cable at the upper terminal.
- b. An empty litter is suspended from the bottom of the cable at the lower terminal.
- c. The litter patient at the upper terminal is lowered by gravity to the lower terminal. (A belay line has been attached to the litter to prevent injury from a rapid and uncontrolled descent.) At the same time the empty litter at the lower terminal is raised to the upper terminal ready to receive another patient.
- d. One man stands at the upper terminal controlling the belay line, and another stands at the lower terminal ready to receive the patient.

Figure 3-75. Monocable patient evacuation apparatus.

CHAPTER 4

TRANSPORTATION BY GROUND VEHICLE

Section I. MOTOR AMBULANCE

4-1. General

Motor ambulances are vehicles specially designed for carrying patients. They are organic to the AMEDD units which are assigned the task of transporting the sick and wounded by ground ambulance. Motor ambulances are equipped with supplies, including litters, blankets, and splints, and are staffed with ambulance personnel qualified in basic emergency medical care and treatment procedures. An ambulance crew consists of a driver and an orderly.

4-2. Types of Motor Ambulances

These vehicles are of four major types—the field ambulance (para 4-6, 4-7, and 4-8), the bus ambulance (para 4-9), the metropolitan ambulance (para 4-10), and the truck ambu-

lance, light, 4 X 2 (para 4-11). Field ambulances, designed for use with field units, can cross rough ground, climb steep grades, and if required can operate across country. There are several types of field ambulances, including the truck, ambulance, 1¼-ton, 4 x 4, M725; the truck ambulance, ¼-ton 4 X 4, M718, frontline; and the truck ambulance ¼-ton, 4 X 4, M170, frontline. The ¼-ton frontline ambulance is specially designed to combine the maneuverability of the ordinary ¼-ton truck with some of the advantages of the closed ambulance. It is a lightweight vehicle with an open body and canvas cover. It is equipped with a spare wheel (inside at the right side of the front passenger seat in the M170 and outside on the right toward the rear in the M718), crash pads, an interior emergency light, and three litter racks, which can be easily disassembled to carry ambulatory

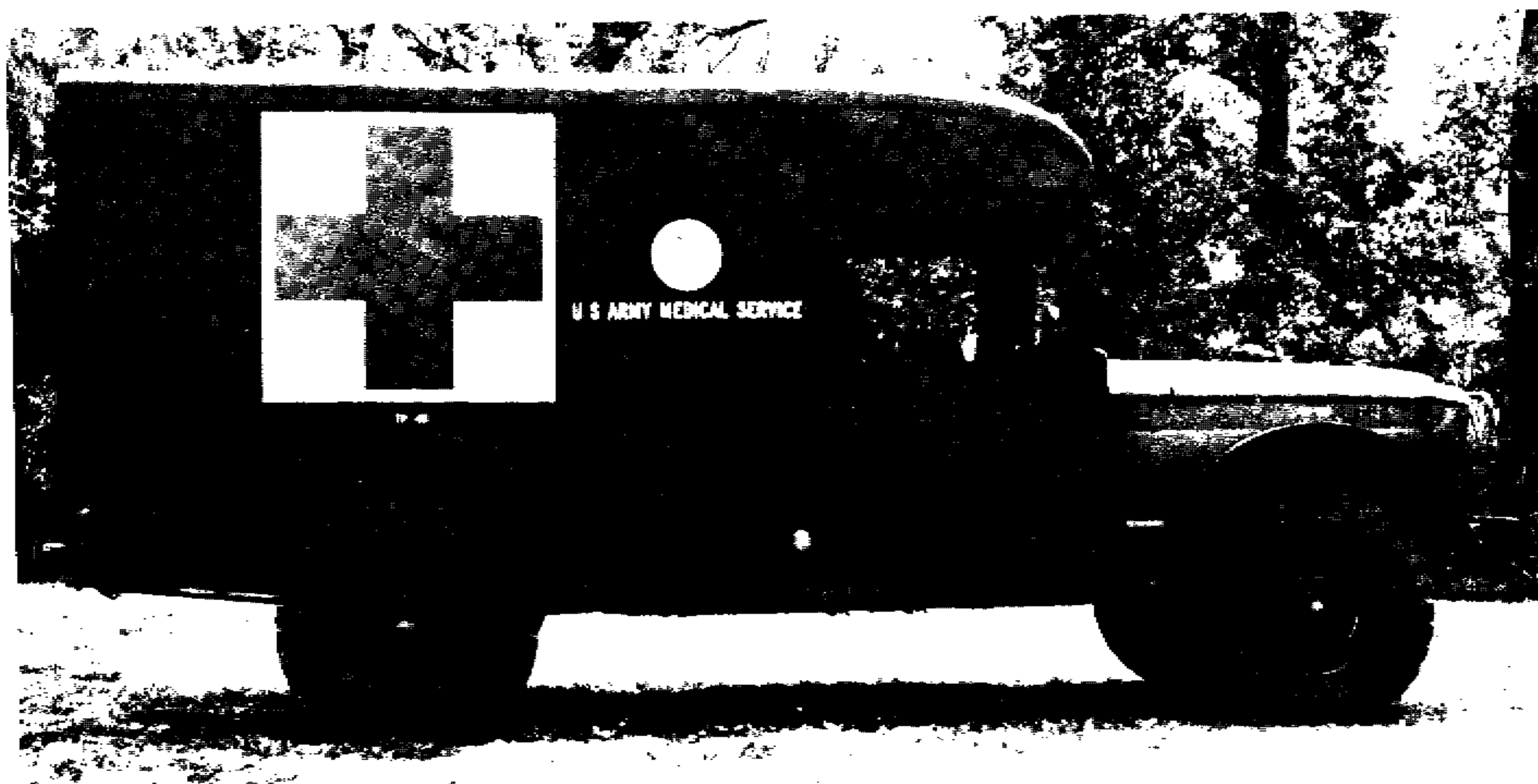


Figure 4-1. Truck, ambulance, 1¼-ton, 4 X 4, M725.



Figure 4-2. Five litter patients in ambulance, in emergency.

patients. The tailgate (M170) can be lowered to facilitate the loading and unloading of the litters. The vehicle is normally used to evacuate patients from the frontline units to aid stations.

4-3. Ambulance Driver

The ambulance driver is responsible for the ambulance at all times. He performs driver maintenance and is responsible for reporting major defects to his section chief or to the unit sergeant. When no ambulance orderly is assigned, he performs the duties of the orderly. The driver also has the following specific responsibilities:

- a. Providing maximum possible safety and welfare of patients entrusted to his care.
- b. Maintaining the proper number of litters, blankets, and splints within his ambulance.

- c. Preparing the ambulance for loading and unloading.

- d. Assisting the litter bearers in the loading and unloading of patients.

- e. Carrying out property exchange when patients are loaded and unloaded.

- f. Delivering messages and medical supplies upon request of authorized personnel.

- g. Accomplishing the necessary operative maintenance on vehicles, as prescribed in applicatory publications.

4-4. Ambulance Orderly

The ambulance orderly acts as assistant driver when required and performs the following duties:

- a. Becomes familiar with the condition of each patient being transported.



Figure 4-3. Two litter patients in ambulance.

b. Checks with the person in charge of evacuation for any special instruction in the care and treatment of patients while en route.

c. Renders emergency medical treatment as required by the patients while in transit.

d. Makes periodic checks of patients.

e. Supervises and assists in the loading of patients, taking care that patients with wounds of the chest or abdomen and those wearing cumbersome splints are loaded in lower berths.

4-5. Ambulance Loading and Unloading

a. In loading and unloading all patient-carrying vehicles, litter patients are moved as carefully as possible to provide the maximum possible safety and comfort for them. Details of the loading and unloading procedures will vary slightly depending upon the number of bearers, the presence or absence of an orderly, and the type of vehicle used. Unless contraindicated by the nature of the patient's injuries, patients

are loaded head first. Patients with wounds of the chest or abdomen and those wearing cumbersome splints are loaded in lower berths.

b. In the instruction for loading and unloading, men are numbered and formal commands are given so that each man can learn what his particular job is and all can learn to work as a team. Demonstration of the steps in ambulance loading and unloading, followed by application, is the recommended method of instruction. Before loading, patients are grounded three paces to the rear of the ambulance and with the patient's head toward the ambulance.

4-6. Truck, Ambulance 1 1/4-Ton 4 X 4, M725

(fig 4-1)

This field ambulance can carry four litter patients, ten ambulatory patients, or a mixed load of two litter and five ambulatory patients. It is primarily designed to carry no more than four litter patients, so that the attendant can



Figure 4-4. Two litter patients and five ambulatory patients in ambulance.

have space to care for the patients. In an emergency, however, one additional litter patient can be carried on the floor (fig 4-2). When only two litter patients are to be carried, the lower berths are used (fig 4-3). When both litter and ambulatory patients are to be carried, they are loaded with both litters on one side and the ambulatory patients on the other side (fig 4-4). When only two litters are loaded, litter handles must be secured to the berth to prevent the litters from falling. The four longitudinal spaces formed within the body of the ambulances are known as berths and are designated as right (left) and upper (lower). A three-man squad is needed to load and unload the ambulance.

a. Loading the Ambulance. The sequence for loading the berths is *right upper, right lower, left upper, left lower*. The most serious patients are loaded last, so they will be the first to be taken out of the ambulance.

(1) The *first* command is Ambulance, POSTS, (fig 4-5).

(2) The *second* command is Prepare Ambulance for, LOADING (fig 4-6—4-9).

(3) The *third* command is Right Upper Berth, Prepare to Load, LOAD (fig 4-10—4-12).

(4) The *fourth* command is Right Lower Berth, Prepare to Load, LOAD (fig 4-13).

(5) When loading is completed, No. 1 raises the rear step (which forms a seat) and closes the rear doors. The squad then resumes position (Ambulance, POSTS) without command.

b. Unloading the Ambulance. The sequence for unloading, which is the reverse of loading, is *left lower, left upper, right lower, and right upper*.

(1) The *first* command is Prepare Ambulance for, UNLOADING. The procedure following this command is similar to that for loading as illustrated in figures 4-6 and 4-7. (Squad assumes position of ambulance, POSTS (fig 4-14).

(2) The *second* command is Left Lower Berth, Prepare to Unload, UNLOAD (fig 4-15 and 4-16).



Figure 4-5. Squad at ambulance, POSTS.

(3) The *third* command is Left Upper Berth, Prepare to Unload, UNLOAD (fig 4-17 and 4-18).

4-7. Truck, Ambulance, ¼-Ton, 4 X 4, M718, Frontline

The frontline ¼-ton ambulance (fig 4-19) can accommodate three litter patients, one litter patient and three ambulatory patients, or six ambulatory patients. A three-man squad is required for loading and unloading.

a. *Loading the Ambulance.* The sequence for loading the berths is *right upper, left upper, and center.*

(1) The *first* command is Ambulance, POSTS (fig 4-20).

(2) The *second* command is Prepare Ambulance for, LOADING (fig 4-21).

(3) The *third* command is Right Upper Berth, Prepare to Load, LOAD (fig 4-22—4-24).

(4) The *fourth* command is Left Upper

Berth, Prepare to Load, LOAD. At the command of execution, the litter is loaded into the left upper berth (fig 4-25—4-28).

(5) The *fifth* command is Center Berth, Prepare to Load, LOAD. At this command, the center berth is loaded (fig 4-29 and 4-30). This berth consists of two grooved tracks attached to the floor of the ambulance at an angle.

b. *Unloading the Ambulance.* In unloading the ambulance the sequence is *center, left upper, and right upper.*

(1) The *first* command is Ambulance, POSTS. At this command the squad falls in (fig 4-20).

(2) The *second* command is Prepare Ambulance for, UNLOADING. At this command the litter bearers take position and furl the curtains.

(3) The *third* command is Center Berth, Prepare to Unload, UNLOAD (fig 4-31).



No. 1 opens rear doors.

Figure 4-6. Prepare ambulance for, *LOADING* (step one).

(4) The *fourth* command is Left Upper Berth, Prepare to Unload, UNLOAD.

(5) The *fifth* command is Right Upper Berth, Prepare to Unload, UNLOAD. At these commands the right side is unloaded in the same manner as is the left side.

4-8. Truck Ambulance, ¼-Ton, 4 X 4, M170, Frontline

(fig 4-32)

The frontline ¼-ton ambulance can accommodate three litter patients, or two litter patients and three ambulatory patients, or five ambulatory patients. A three-man squad is required for loading and unloading.

a. *Loading the Ambulance.* The sequence for loading the berths is *right upper, right lower, and left.*

(1) The *first* command is Ambulance, POSTS (fig 4-33).

(2) The *second* command is Prepare Ambulance for, *LOADING* (fig 4-34—4-36). (At this command, No. 1 takes position at the left side of ambulance, No. 3 at the right side, and No. 2 at the rear. All furl curtains at assigned positions.)

(3) The *third* command is Right Upper Berth, Prepare to Load, *LOAD* (fig 4-37—4-39).

(4) The *fourth* command is Right Lower Berth, Prepare to Load, *LOAD*. At this com-



No. 1 lowers rear step.

Figure 4-7. Prepare ambulance for, *LOADING* (step two).

mand the right lower berth is loaded. This berth consists of two grooved tracks bolted to the floor of the ambulance (fig 4-40).

(5) The *fifth* command is Left Berth, Prepare to Load, *LOAD*. At the preparatory command, the procedure described in figure 4-37 is followed. At the command of execution, a third litter is loaded on the left side just above the seat for ambulatory patients (fig 4-41 and 4-42).

b. Unloading the Ambulance. In unloading the berths, the sequence is *left, right lower, and right upper*.

(1) The *first* command is Ambulance, *POSTS*. At this command, the squad falls in (fig 4-33).

(2) The *second* command is Prepare Ambulance for, *UNLOADING* (fig 4-43). At this command bearers take positions and furl curtains.

(3) The *third* command is Left Berth, Prepare to Unload, *UNLOAD* (fig 4-44 and 4-45).

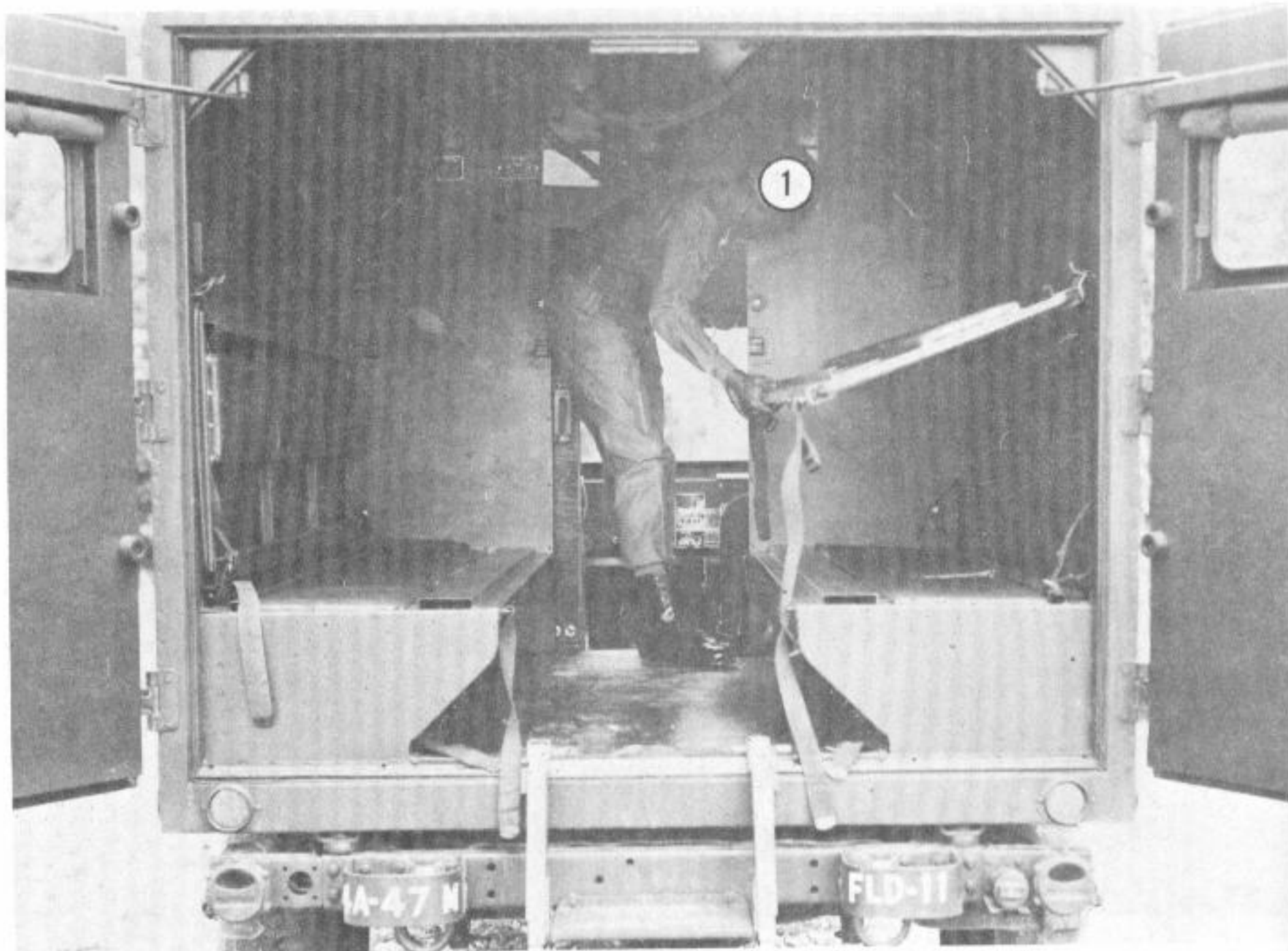
(4) The *fourth* command is Right Lower Berth, Prepare to Unload, *UNLOAD* (fig 4-46).

(5) The *fifth* command is Right Upper Berth, Prepare to Unload, *UNLOAD* (fig 4-47).

4-9. Bus, 44-Passenger, 4 x 2, Integral Type (Bus Ambulance)

This bus is designed for rapid conversion into a bus ambulance. It is available to overseas general hospitals and other Army units. It can be used in support of the Army in the field as far forward as the road network and tactical situation will permit. It is most useful in situations where a large number of patients are to be transported for relatively short distances over improved roads, such as in transferring patients from holding companies and hospitals to airheads, railheads, and ports of embarkation.

a. General (fig 4-48—4-50). Without modification, this bus has a capacity for 44 ambulatory patients. With modification, it can accommodate



No. 1 enters ambulance and raises front of right upper berth into position.

Figure 4-8. Prepare ambulance for, LOADING (step three).

18 litter patients and 4 attendants or ambulatory patients. A kit containing the necessary accessories for conversion is located in the compartment of the right side of the bus body (outside) approximately at the center of the bus.

b. Conversion (fig 4-51 and 4-52). For conversion, all seats are removed, except the seats immediately behind the driver. These seats are left in place to accommodate four medical attendants or ambulatory patients. Litter support hooks are inserted in the brackets located at the top and bottom of the interior of the body side. The litter support hangers are then suspended from the hooks in the ceiling rails. To revert to passenger operation, this procedure is reversed. Detailed instructions for conversion include the following steps:

(1) Pull out seat pin (E) on the aisle side of the seat and turn about $\frac{1}{2}$ inch clockwise, then release.

(2) Pull out seat pin lock (E) on window side of seat and push seat backrest (A) forward.

(3) Loosen wingnut (D) located on front leg of seat on aisle side. Push wingnut (D) up and retighten, thus preventing latch from falling down.

(4) Lift up aisle side of seat until legs are free of the legrest, then fold seats under by pushing toward window side and upwards.

(5) Holding seat level, raise seat latch (G) on window side while at the same time pulling the seat slightly to the rear. Then lift seat out.

(6) After removing seats, install lower litter support hook (H) in brackets (M), tapping if necessary to insure proper seating. Install upper litter support hook (I) by inserting the bent end of the hook into the slots (L) located above the windows.

(7) Beveled edges of upper and lower litter support hooks (H and I) should meet in such



No. 2 lowers rear of berth from the wall and pulls out the berth support rod.

Figure 4-9. Prepare ambulance for, *LOADING* (step four).

a manner that the sleeve (J) of the upper litter support hook (I) can slide freely over the two edges, locking them in place. When so locked the litter support assembly cannot be moved up or down.

(8) Install the sectional litter support hangers (K) by suspending from the ceiling hooks (N). Add two more support hangers (K) by hooking through open end of the top hanger (K).

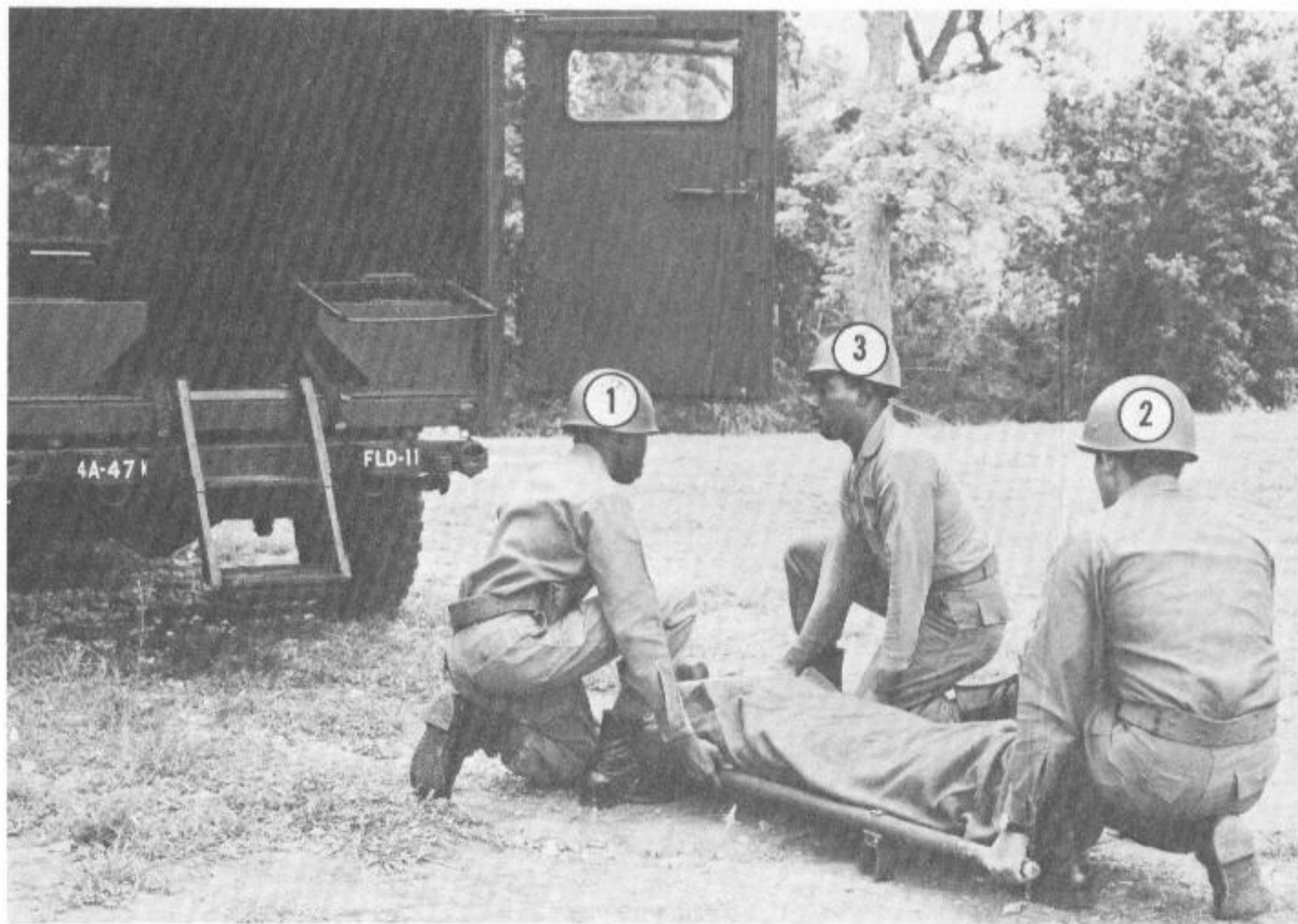
(9) When bus is set up for litters, 9 seats may be stored under the lower litters, 4 on the left side and 5 on the right side, secured with litter straps; 6 immediately behind the driver's seat and secured with litter straps; and 7 on the right side immediately behind the passenger door.

c. *Loading.* Normally, two three-man litter squads are required to load and unload the bus ambulance. The bus is loaded from the front to the rear and from top to bottom. Unless contraindicated by the nature of the patient's injuries or the local conditions, all patients are loaded into the bus with the patient's head to the front.

(1) When loading from *loading ramps or platforms*, one litter team enters the rear of the bus with a litter patient, loads the patient on the appropriate berth, and exits through the front as the second team enters the rear with a litter patient. The second team loads its patient and exits through the front as the first team is entering the rear with its second patient. Only one of the teams is in the bus at a time, thereby avoiding interference with each other.

(2) When patients are to be loaded from ground level without the aid of loading ramps or platforms, the procedure is as described in figure 4-53.

d. *Unloading.* Patients are unloaded (contrary to the loading procedure) from the rear to the front and from the bottom to the top. When the bus is to be unloaded from loading ramps or platforms, the two litter teams alternate in unloading. If patients are to be unloaded without ramps, one litter team removes the litter patients from the berths in the bus and places them on the floor at the rear of the



At the preparatory command, positions and procedures are as follows:

- a. No. 2 at the foot of the litter and facing the patient, stoops and grasps the handles.
- b. No. 1 and No. 3, one on each side of the litter and facing the patient's shoulders, grasp the left and right poles, respectively.

Figure 4-10. Loading right upper berth (step one).

bus where they are picked up and unloaded by the second litter team.

4-10. Automobile, Ambulance, Metropolitan Type, 4 x 2

(fig 4-54).

The large metropolitan ambulance is designed for use on good roads only. It is supplied to named Army hospitals and to certain other large hospitals. The stretcher, ambulance, two-level, is ordinarily used with this ambulance. The capacity of this ambulance is one two-level stretcher and three field litters, or four

field litters. There is an attendant's seat in the patient's compartment.

4-11. Truck, Ambulance, Light, 4 x 2 (fig 4-55)

This ambulance is designed for use on good roads only. It is supplied to Army hospitals and to dispensaries. The capacity of this ambulance is two stretchers, ambulance, two-level, and two field litters; one stretcher, ambulance, two-level, and three field litters; or one stretcher, ambulance, two-level, and one field litter on one side, and on the other side four ambulatory patients, or eight ambulatory patients.

Section II. CONVERSION OF MILITARY VEHICLES TO PATIENT CARRIERS

4-12. General

Often in combat areas, ambulances will be unavailable or too few in number, or they may

be incapable of evacuating patients in certain types of terrain. In these instances, many vehicles which are available to most units can be used with little or no change in structure. Some



- a. At the command of execution, the litter is lifted and carried to the ambulance.
- b. The front stirrups are placed in the grooves of the inclined upper berth.
(No. 2 slides litter into right upper berth.)

Figure 4-11. Loading right upper berth (step two).

amphibious cargo and personnel carriers can be used for this purpose, their patient carrying capacity varying with the type of vehicle used. Methods of using several types of military vehicles as patient carriers will be described in this section.

a. Most of these vehicles are not inclosed. When using an open vehicle, litters must be lashed securely to the side of the vehicles, so that they will not bounce off while in transit.

Lengths of rope, litter securing straps, or any convenient materials may be used to lash the litters to the vehicle.

b. When litters are loaded lengthwise to the vehicle, the patients' heads normally are placed toward the front of the vehicle. When the litters are loaded crosswise, the patients' heads may be placed alternately to the right and to the left, in order to minimize the discomfort resulting from cases of nausea and vomiting.



- a. No. 2 lifts berth into place and retains pressure on the berth support rod.
 - b. No. 1 goes inside ambulance and secures left rear safety rod and the roof upper berth safety straps. He also secures litter handles with the strap that is attached to the berth for that purpose.
 - c. No. 3 secures the right rear safety latch.
 - d. No. 2 slides support rod into place. (The squad then reassembles without command.)
- (In loading the left upper berth, No. 1 and No. 3 exchange duties.)

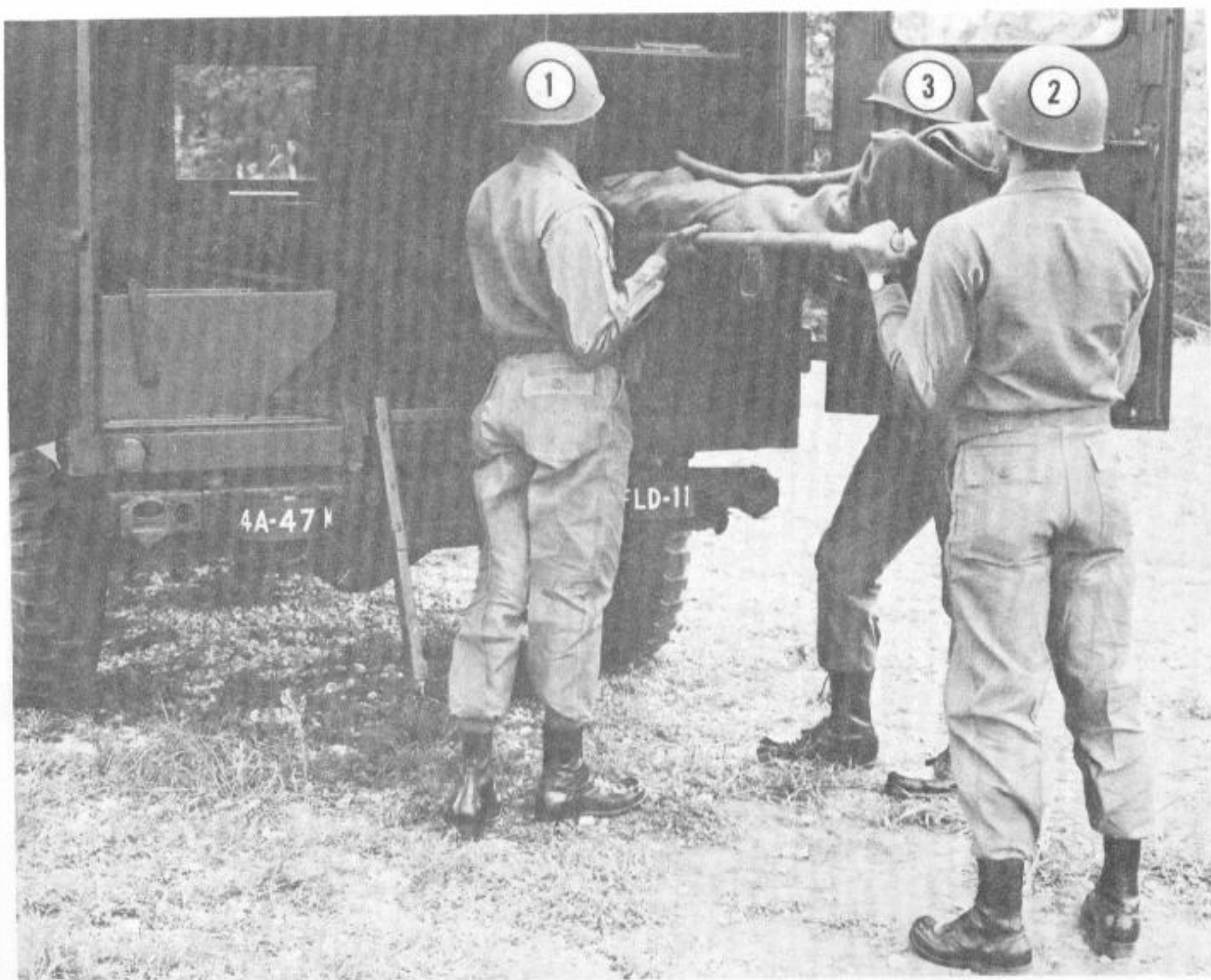
Figure 4-12. Loading right upper berth (step three).

4-13. Carrier, Light Weapons, Infantry, 1/2-Ton, 4x4, M274, W/E

(fig 4-56—4-58)

This vehicle is designed to carry light cargo

over rough terrain at slow speed with the advantage in combat of a very low silhouette. It consists of a platform on which the driver's seat is mounted. The small size and cross-country mobility of this vehicle make it an expedient



The litter is slid into place and the handles secured by straps of the upper berth.
(The left side of the ambulance is then loaded in a similar manner. No. 1 and No. 3 exchange duties when loading left upper berth.)

Figure 4-13. Loading right lower berth.

patient carrier for forward units. It is easily loaded with litter patients; however, the patients must be lashed securely to the litters in all types of terrain. It can transport as many as three litter patients. The most satisfactory method of using this vehicle as a patient carrier is to place two litter patients lengthwise on the vehicle. A two-man team is used for loading.

4-14. Truck, utility, 1/4-ton, 4 x 4, M38A or M151

The 1/4-ton truck is a forward area vehicle designed for maneuverability and close-in support. It is a vehicle with a four-passenger capacity, open-type body, normally used as a general purpose personnel or cargo carrier. The 1/4-

ton truck and the 1/4-ton trailer, M110, are standard equipment of the medical company as well as many other units of the Army. Generally they are available and can be easily converted to patient carriers.

a. Two litter patients can be carried on the 1/4-ton truck without altering the vehicle or using additional equipment (fig 4-59).

b. A pole or sapling frame can be improvised to permit carrying two litter patients lengthwise on the rear of the truck (fig 4-60).

c. The trailer, 1/4-ton, 2-wheel, M115, designed as a trailer to the 1/4-ton truck, may be readily converted into a patient carrier (fig 4-61). When attached to the 1/4-ton truck, two patients may be transported on each. The trail-

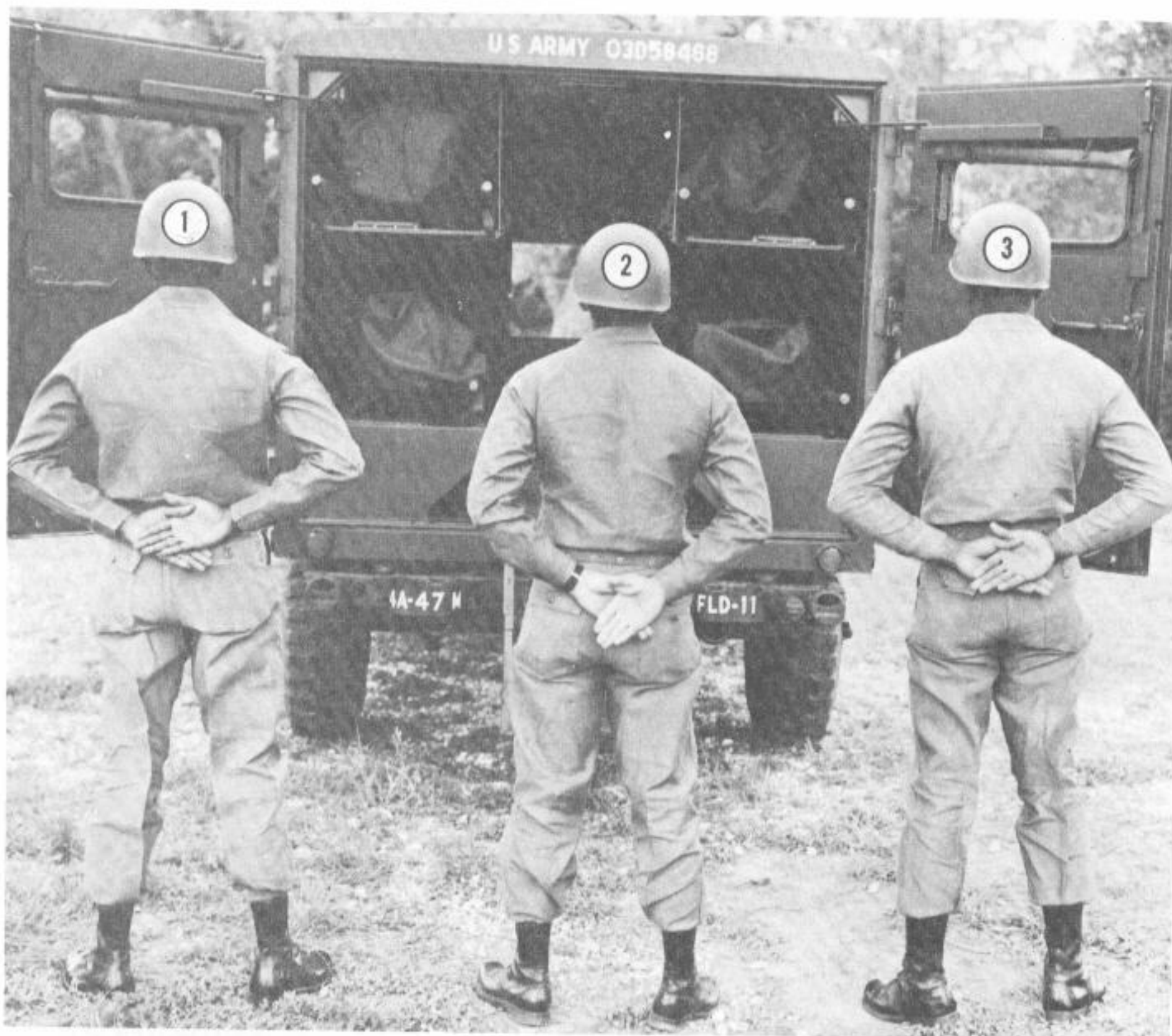


Figure 4-14. Squad at ambulance, POSTS, ready to unload ambulance.

er cannot be attached if an improvised sapling frame is used on the truck.

4-15. Truck, cargo, 3/4-ton, 4 x 4, M37 and M57B1

(fig 4-62)

The 3/4-ton cargo truck is a lightweight, open-top, cab-type vehicle used to transport personnel or light general cargo. It is a common vehicle for almost all units and can be easily adapted for use as a carrier with a capacity for five litter patients.

4-16. Truck, Cargo, 2 1/2-Ton, 6 x 6, Wide Bed

(fig 4-63)

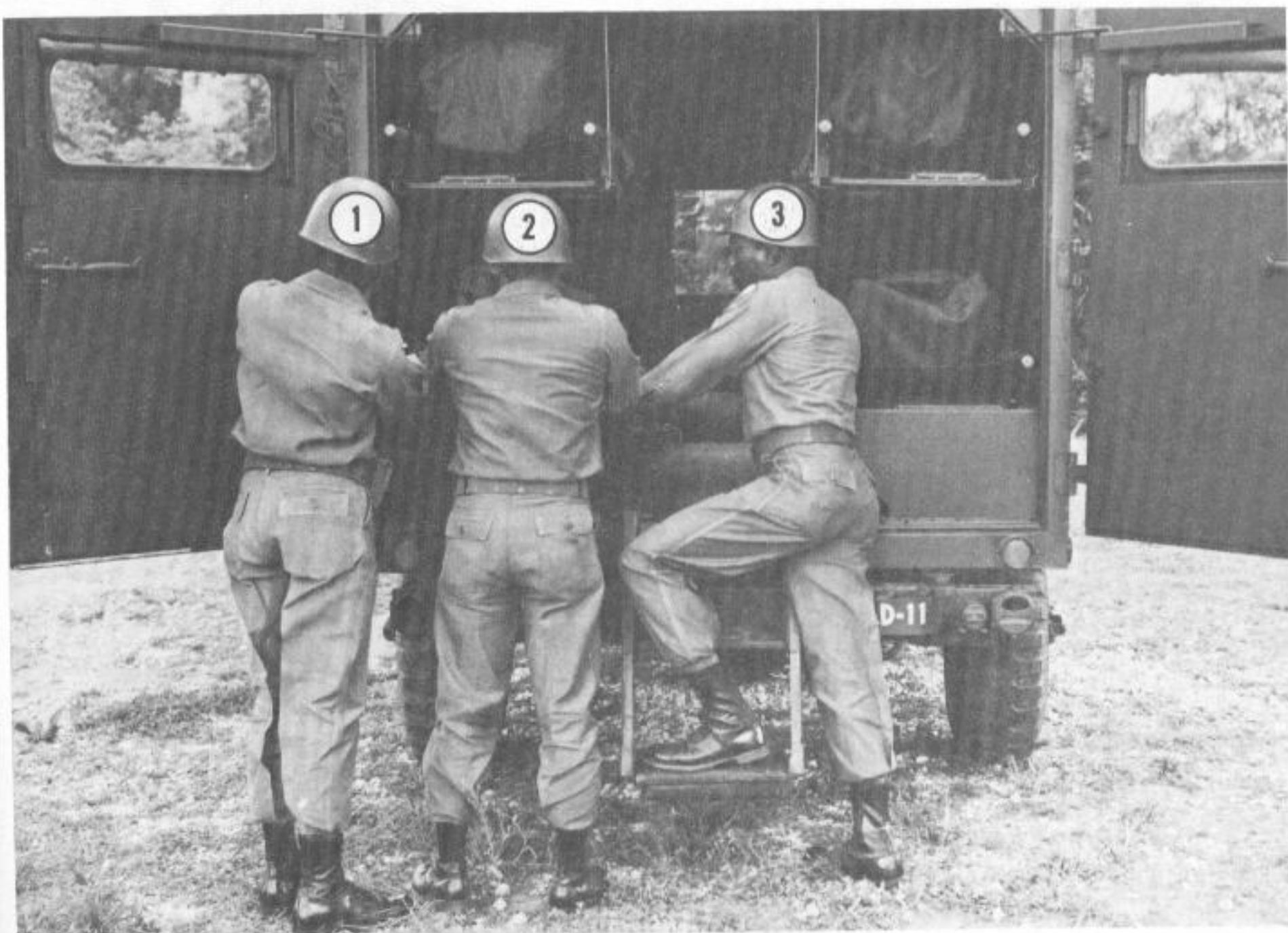
The 2 1/2-ton truck, 6 x 6, normally is used

to transport general cargo and personnel. It has a canvas-covered cab, is the open-top type, and has removable tarpaulin braces and body side boards. This vehicle has a maximum capacity of 12 litter patients. It can then be loaded in two layers from front to rear, in any conventional order. Loading must be done carefully so as not to obstruct the placing of one litter by the premature loading of another.

4-17. Carrier, cargo, amphibious, tracked, M116

(fig 4-64)

This type of tracked vehicle can be converted to a patient carrier for operations over marshes, snow, and ice. It is small but valuable in Arctic



a. No. 1 unfastens the litter safety straps.

b. No. 2 grasps the rear handles of the litter in the left lower berth while No. 1 and No. 3 take their places on each side.

Figure 4-15. Preparing ambulance for unloading left lower berth.

operations. In low temperatures, a special top is necessary. With the top installed, the carrier has a litter capacity of four; two litter patients can be loaded on the floor of the vehicle and two more in the additional inclosure provided by the top. A conversion kit is provided for the installation of the special top. Without the

top installed, four litters can be placed lengthwise on the vehicle.

4-18. Carrier, Personnel, Full-Track: Armored, M113, T113E2, W/E.

The M113 armored personnel carrier (fig 4-65) is a standard item available to several units.



At the command of execution, No. 2 pulls the litter from the berth while No. 1 and No. 3 grasp the litter poles toward the head as the litter slides out.

Figure 4-16. Unloading left lower berth.

It is a lightweight vehicle capable of amphibious operation on inland lakes and streams, of extended cross-country travel over rough terrain, and of high-speed operations on improved roads and highways. Movement of the tracks propels and steers the vehicle on both land and water. This vehicle has a conversion kit which can be easily and quickly installed and gives the vehicle a normal capacity of four litter patients. The four longitudinal spaces formed by the chain conversion kit are known as berths and are designated upper and lower (right and left). A squad of four men is needed to load and unload the vehicle.

a. *Loading the M113.* The sequence for loading is *right upper, right lower, left upper, and left lower.*

(1) The *first* command is Ambulance, POSTS. At the command of execution, the mem-

bers of the squad fall in, alining themselves in numerical sequence from left to right, one pace to the rear of and facing the vehicle.

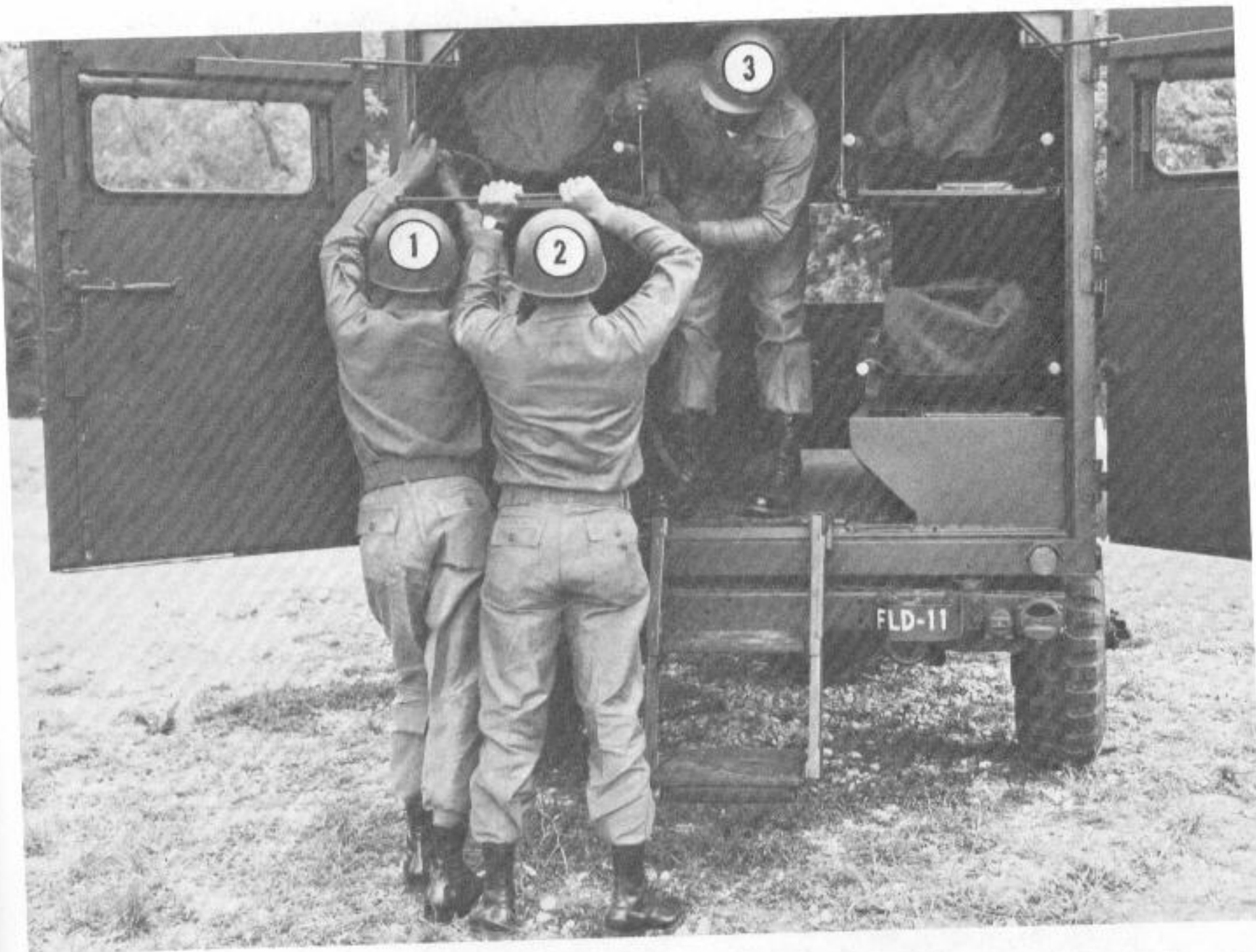
(2) The *second* command is Prepare Vehicles for, LOADING (fig 4-66).

(3) The *third* command is Right Upper Berth, Prepare to Load, LOAD (fig 4-67 and 4-68).

(4) The *fourth* command is Right Lower Berth, Prepare to Load, LOAD. At this command, the litter is loaded as described in figures 4-69 and 4-70.

(5) Remaining berths are loaded in the same manner.

b. *Unloading the M113.* The sequence for unloading is *left lower, left upper, right lower, and right upper.* The procedures are the same as for loading, except in reverse.



- a. At the preparatory command, No. 2 steps forward and pulls out the upper berth supporting rod, maintaining upward pressure on it to prevent the berth from accidentally dropping.
- b. No. 1 unfastens the roof safety straps, the litter handle safety straps, and the left rear safety rod.
- c. No. 3 unfastens the right rear safety latch.
- d. No. 2 lowers the rear of the litter berth.
- e. No. 2 grasps the rear handles of the litter while No. 1 and No. 3 take their positions on the left and right sides of the litter.

Figure 4-17. Preparing ambulance for unloading left upper berth.

Section III. RAIL TRANSPORTATION

4-19. Use of Ambulance Trains

An ambulance train is a special train consisting of one or more ambulance train sections designed and equipped to provide transportation and emergency treatment to patients. Ambulance trains, operated over commercial or Army-controlled railroads, are another means of overland transportation of the sick and wounded. In general, they are used when movement of patients by aircraft is not feasible or available. In a theater of operations, ambu-

lance trains evacuate patients to transfer points and to embarkation points within the combat and communications zones. In the zone of interior they are used to move patients from various debarkation points to Armed Forces hospitals and to transfer patients between medical treatment facilities.

4-20. Responsibilities for Rail Transportation

The Army Medical Department is responsible for the determination of rail evacuation



At the command of execution, No. 2 pulls the litter out while No. 1 and No. 3 grasp it as before. (Care must be taken to lift the litter off the berth before the front stirrups reach the rear to prevent injury to the patient caused by the litter stirrups dropping off the rear of the berth.) (Squad removes the litter at least three paces from the ambulance and places it on the ground. Squad reassembles at rear of ambulance without command.)

Figure 4-18. Unloading left upper berth.

requirements and for staffing and equipping ambulance trains with medical personnel and equipment. It is also responsible for the administration, training, and discipline of medical personnel assigned to ambulance train duties, the welfare and safety of patients being transported, and the maintenance of equipment used in patient care. The United States Army Material Command is charged with the procurement of necessary rail rolling stock to meet rail evacuation requirements, the maintenance of this equipment, and all rail operations relative to

the movements of ambulance trains. For further information, see AR 40-4.

4-21. Types of Ambulance Trains

a. An ambulance train section is a suitable combination of:

- (1) Specially designed pullman-type ambulance railway cars.
- (2) Pullman or passenger cars designated as ambulance cars on a temporary basis.
- (3) Kitchen cars.
- (4) Dining cars.

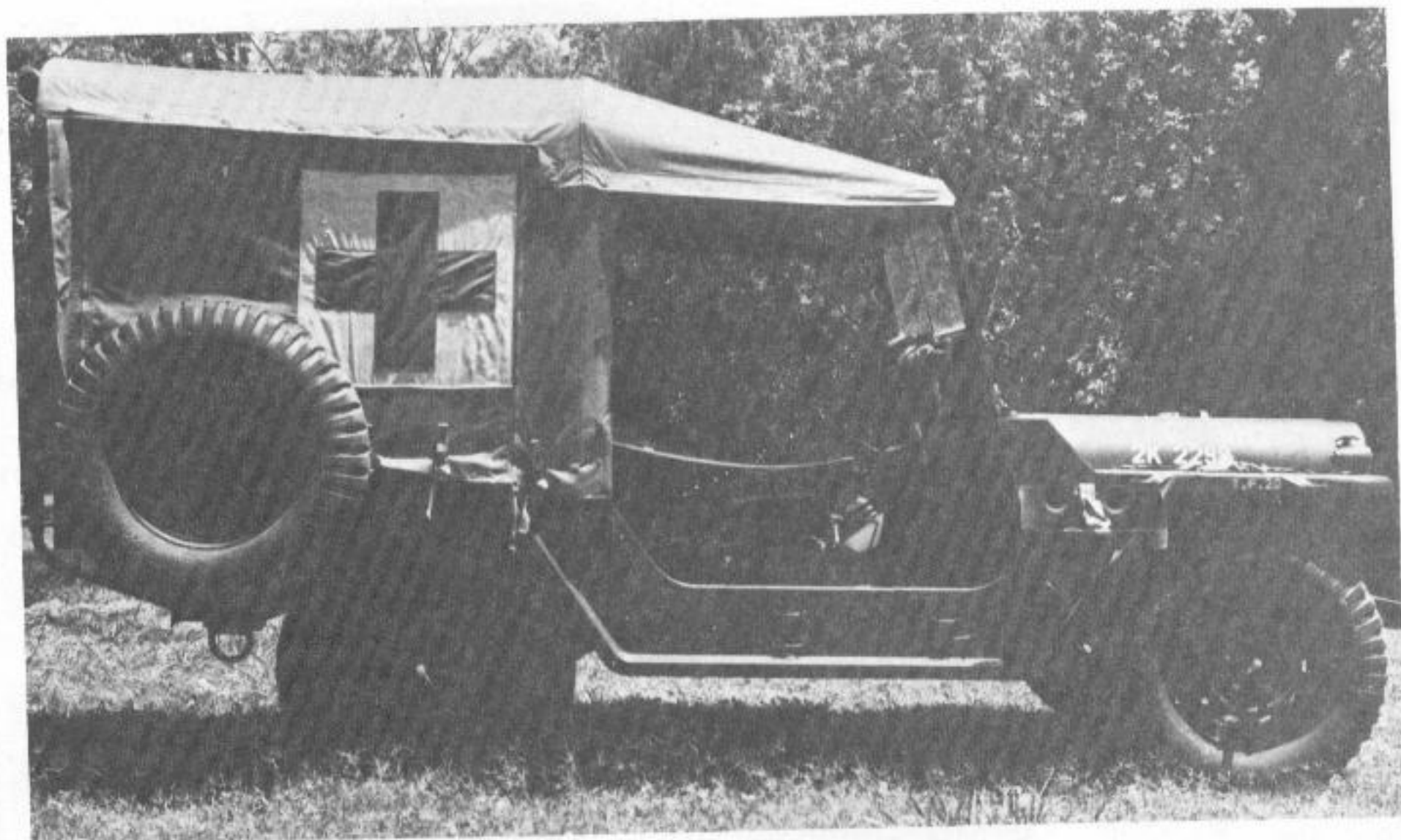


Figure 4-19. Truck, ambulance, 1/4-ton 4 x 4, M718, frontline.

(5) Baggage cars.

(6) Pullman sleeping accommodations for attendant personnel.

(7) An ambulance train section normally will consist of 6 ambulance cars, 1 kitchen car, 1 dining car, 2 pullman sleepers, and baggage cars as required. An ambulance train section may be attached as a portion of a commercial train, but when so attached will be capable of operating as a self-contained entity.

b. Most ambulance trains are standard trains operating under the prescribed TOE or TD. The three principal types of standard ambulance trains are the wide-gage and the narrow-gage rail ambulance cars, both of which operate in the theater of operations, and the ambulance unit car, which operates in the zone of interior. The number of cars in a standard ambulance train varies, depending upon available locomotive power, the number and types of patients being transported, and the number of medical personnel required to care for patients en route.

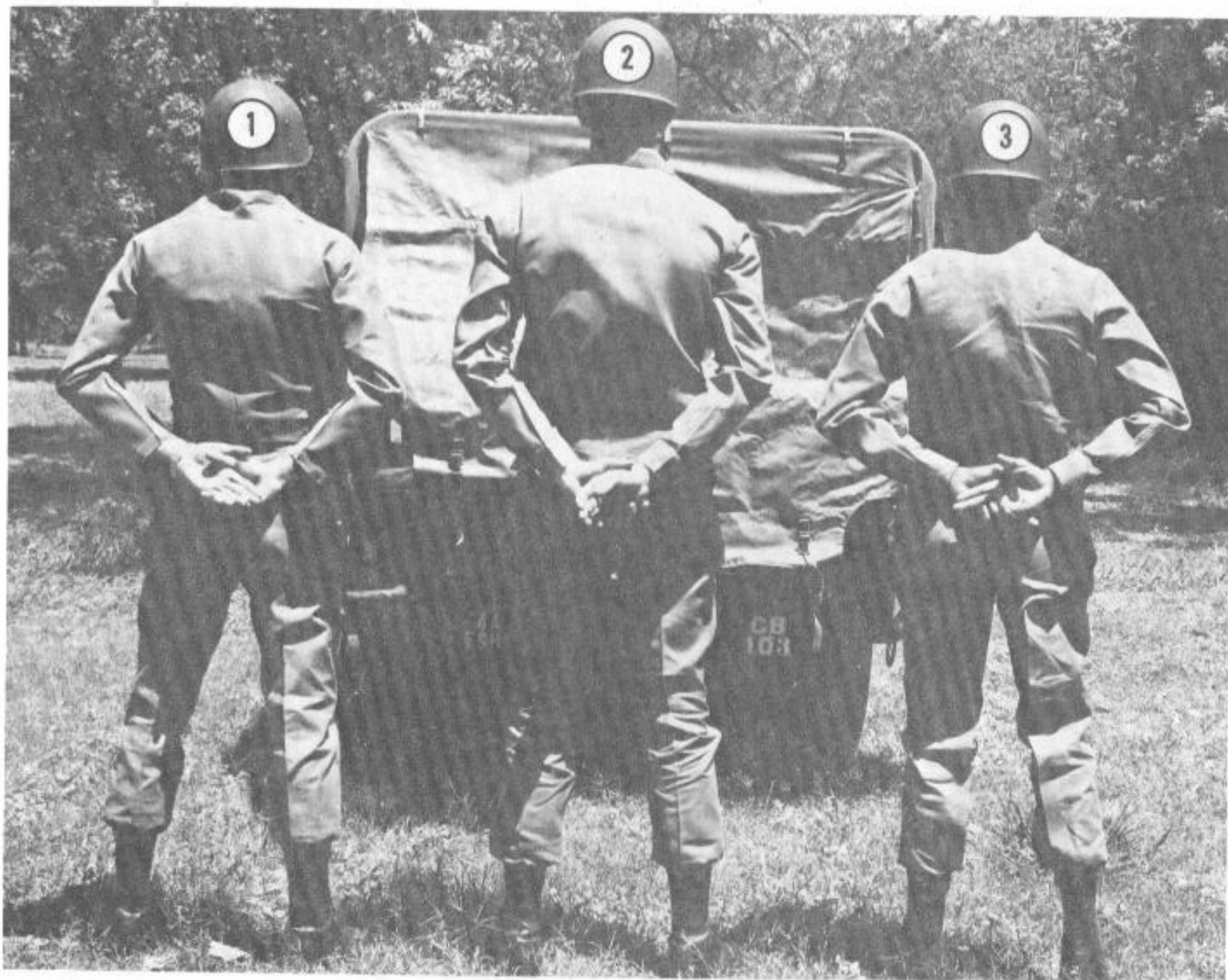
c. In an emergency, practically any type of standard sleeper, chair car, or baggage car may be used to transport the sick and wounded. Passenger-type cars are preferred, and in all

instances every effort is made to provide the maximum possible comfort of the patients. Standard baggage cars may be used on an improvised ambulance train for transporting baggage and equipment of patients, duty personnel, medical equipment, and other supplies. A baggage car may also be converted into a kitchen car.

4-22. Theater of Operations Ambulance Train (Wide-Gage Rail)

This train (56 1/2-, 60-, 63-, and 66-inch gage rail) consists of six air-conditioned ambulance cars, two ambulance personnel cars, and one ambulance kitchen, dining, and storage car.

a. *Ambulance Car.* The ambulance car is a specially-designed pull-man type railway car equipped to provide transportation and emergency treatment to patients. Each ambulance car has six double-tiered berths and six three-tiered berths which can accommodate 30 nonambulatory patients. The six three-tiered spaces can be converted to seat 24 ambulatory patients. The car has a combination receiving room and nurse's station, toilet rooms, bedpan washer and sterilizer, and sink.



At the first command, members of the squad fall in, alining themselves in numerical sequence from left to right, one pace to the rear of and facing the ambulance.

Figure 4-20. Squad at ambulance, POSTS.

b. Ambulance Personnel Car. This car is divided into two compartments with double-tiered berths with accommodations for four male officers; one compartment with a double-tiered berth for two female ANC officers; and five compartments with three-tiered berths to accommodate 15 enlisted men. It has separate toilet facilities for male and female personnel and common shower facilities for all personnel.

c. Ambulance Kitchen, Dining, and Storage Car. This car provides kitchen and food storage facilities for the preparation of meals for approximately 175 patients and ambulance train personnel. The car has tables which can seat 24 and storage space for medical and unit supplies and equipment.

4-23. Theater of Operations Ambulance Train (Narrow-Gage Rail)

This train (36-, 39 3/8-, and 42-inch gage rail) has the same number and type of cars as does the wide-gage rail ambulance train.

a. Ambulance Car. Each ambulance car has 10 double-tiered berths, which accommodate 20 nonambulatory patients. Four of the double-tiered berths can be converted to seat 16 ambulatory patients. The car has a combination receiving room and nurse's station, toilet rooms, bedpan washer and sterilizer, and sink.

b. Ambulance Personnel Car. This car is divided into two compartments, one with a double-tiered berth for two male officers, and one with a double-tiered berth for two female ANC



At the second command, No. 1 takes position at left side of ambulance, No. 3 at right side, and No. 2 at rear. All furl curtains at assigned positions. (Team installs right litter rack.)

Figure 4-21. Prepare ambulance for, LOADING.

officers. An open section, the enlisted men's section, has seven double-tiered berths to accommodate 14 enlisted men. Four of the double-tiered berths can be converted to provide seats for 16 individuals. The car has common showers for all personnel and separate toilet facilities for male and female personnel.

c. Ambulance Kitchen, Dining, and Storage Car. This car is the same as that of the wide-gage rail train, except that tables are available to seat only 14 individuals.

4-24. Zone of Interior Ambulance Unit Car (Standard 56 1/2-inch Gage Rail)

(Fig. 4-7 and 4-72).

In the zone of the interior ambulance unit

cars (standard 56 1/2-inch gage rail) are used and operated on commercial railroads. Depending upon the number of patients to be transported and the economical use of rolling stock, unit cars may be grouped to form an ambulance train or integrated independently into trains within the commercial rail system operating on regular schedules.

a. An ambulance unit car has nine three-tiered berths accommodating 27 nonambulatory patients; two three-tiered berths for six medical enlisted personnel assigned to train duty; and a separate compartment for a male officer and another for the ANC officer. All patient-berth spaces may be converted to seat 36 ambulatory patients, and berth space for medical personnel



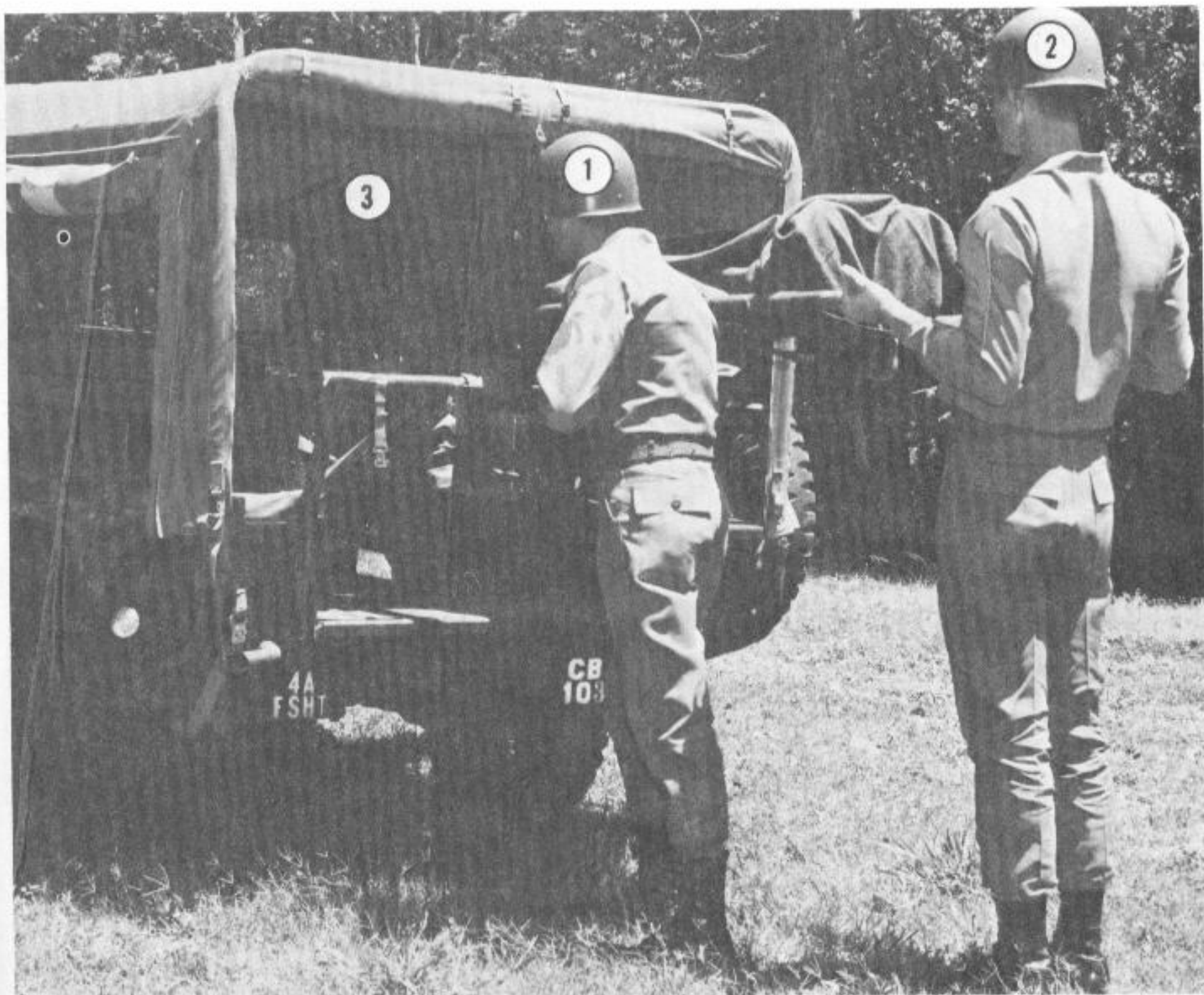
At the third command, the litter is carried to the ambulance and the front stirrups placed in the grooves of the berth, with No. 1 and No. 3 at the sides and No. 2 at rear.

Figure 4-22. Loading right upper berth (step one).

may be converted to seat eight individuals. One three-tiered section in the patient area is screened in such a manner as to permit the transportation of mental patients.

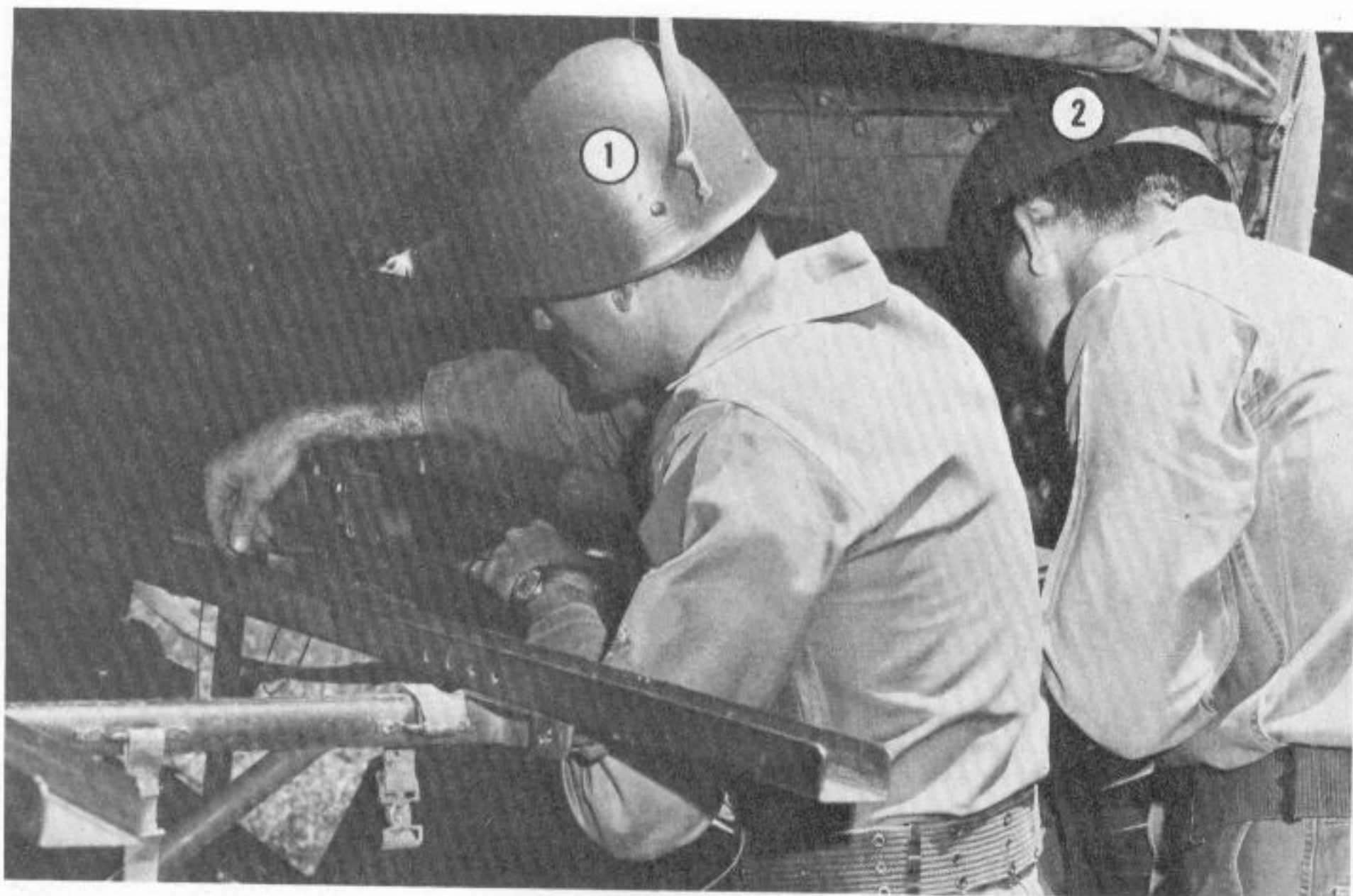
b. This car is air-conditioned and has a combination receiving room and nurse's station, partitioned toilets and lavatory, bedpan washer

and sterilizer, and cabinet space for storage of linens and baggage. It has a kitchen equipped to prepare food and serve approximately 75 persons. It also has a common dressing room and shower and separate toilet facilities for patients and for male and female officer personnel.



No. 3 moves to the right side of vehicle, assists the other team members who are sliding the litter forward, and goes into vehicle.

Figure 4-23. Loading right upper berth (step two).



No. 3 secures the litter to the berth at the head while No. 1 and No. 2 secure the litter to the berth at the feet.

Figure 4-24. Loading right upper berth (step three).



At the command of execution, the litter is carried to the ambulance and the front stirrups are placed in the grooves of the berth with No. 1 and No. 3 at the sides and No. 2 at the rear.

Figure 4-25. Loading left upper berth (step one).



Team begins to slide litter into berth.

Figure 4-26. Loading left upper berth (step two).



No. 1 moves to the left side and gets into the driver's seat, on his knees facing the rear, and assists the other team members who are sliding the litter forward.

Figure 4-27. Loading left upper berth (step three).



No. 1 secures the litter at the head while No. 2 and No. 3 secure the litter to the berth at the feet.

Figure 4-28. Loading left upper berth (step four).



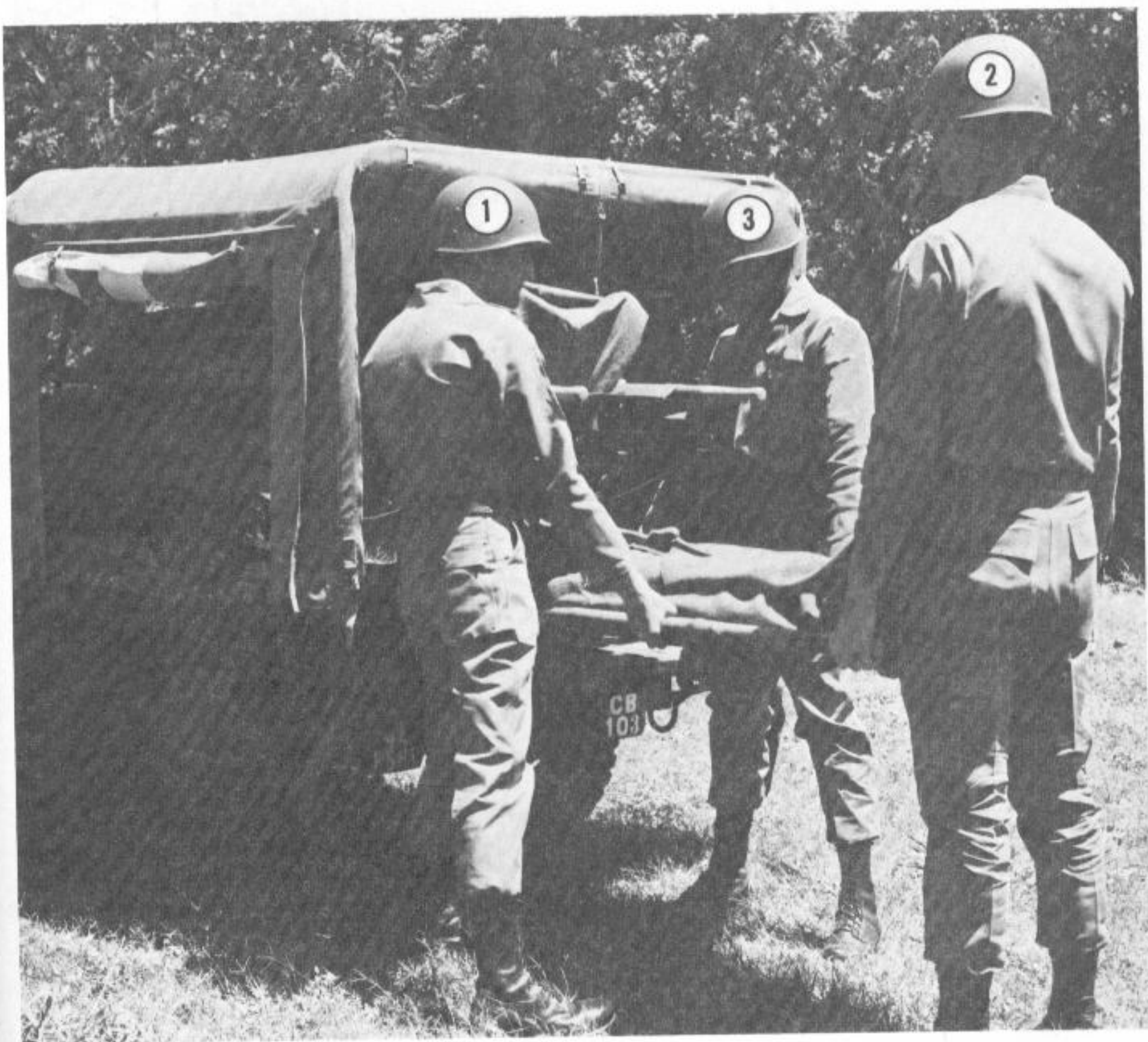
At the command of execution, the litter is carried to the ambulance and the front stirrups are placed in the grooves of the berth, with No. 1 and No. 3 at the sides and No. 2 at the rear.

Figure 4-29. Loading center berth (step one).



- a. No. 3 goes to the right side of vehicle and the other team members slide the litter forward with his assistance.
- b. No. 3 makes sure the litter handles slide through the ring at the head while No. 1 and No. 2 secure the litter to the berth at the feet.

Figure 4-30. Loading center berth (step two).

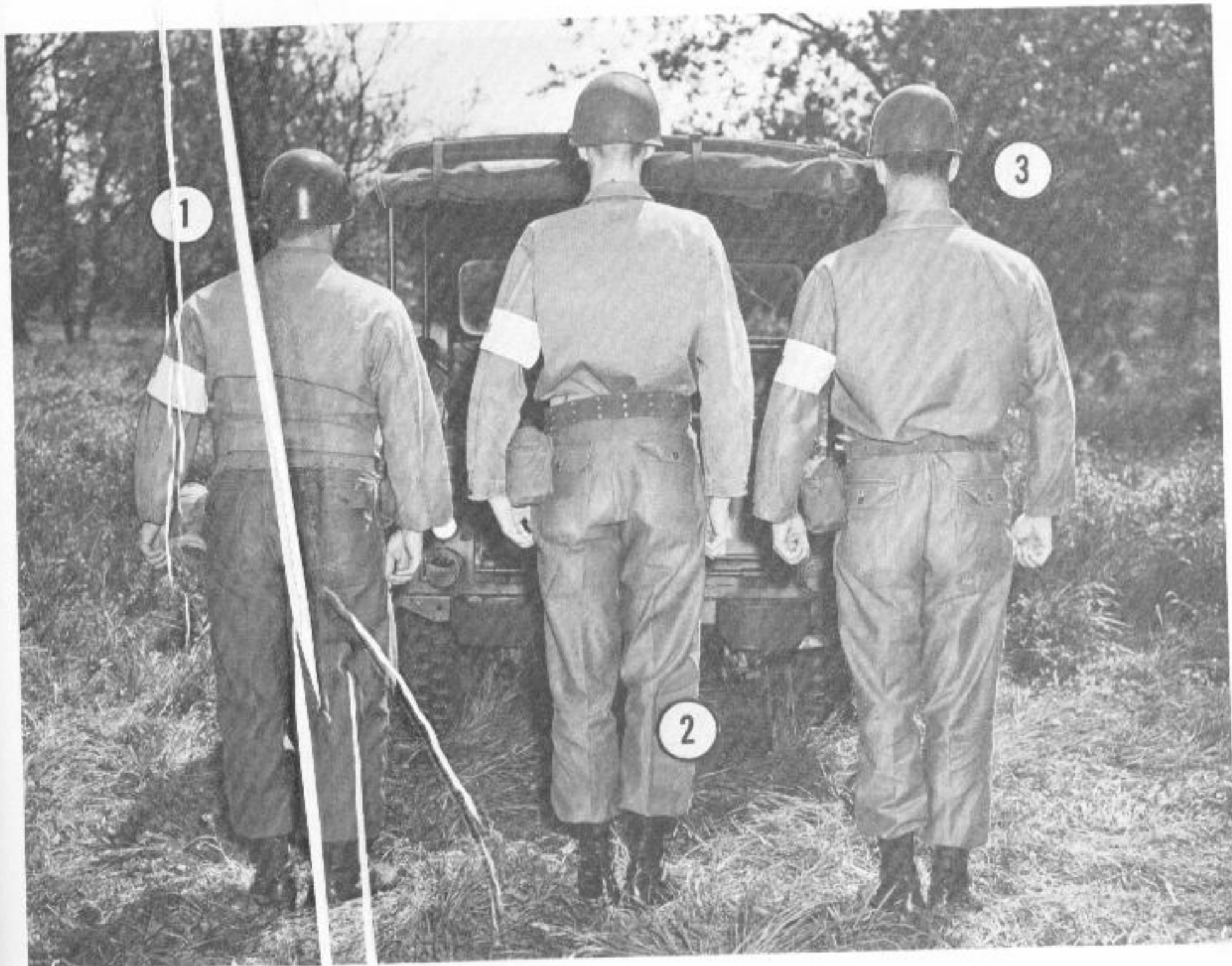


- a. At the preparatory command, No. 1 and No. 3 face each other on opposite sides of the litter and No. 2 moves between the litter handles.
- b. At the command of execution, No. 2 pulls the litter from the ambulance stopping 4 to 6 inches from the end.
- c. No. 1 and No. 3 lift the litter out. (Then the team carries the patient away from the ambulance.)

Figure 4-31. Unloading the ambulance.



Figure 4-32. Truck, ambulance, 1/4-ton, 4 x 4, M170, frontline.



At the command of execution, members of the squad fall in, alining themselves in numerical sequence from left to right, one pace to the rear of and facing the ambulance.

Figure 4-33. Squad at ambulance, POSTS.



No. 1 lowers the tailgate.

*Figure 4-34. Prepare ambulance for, **LOADING** (step one).*



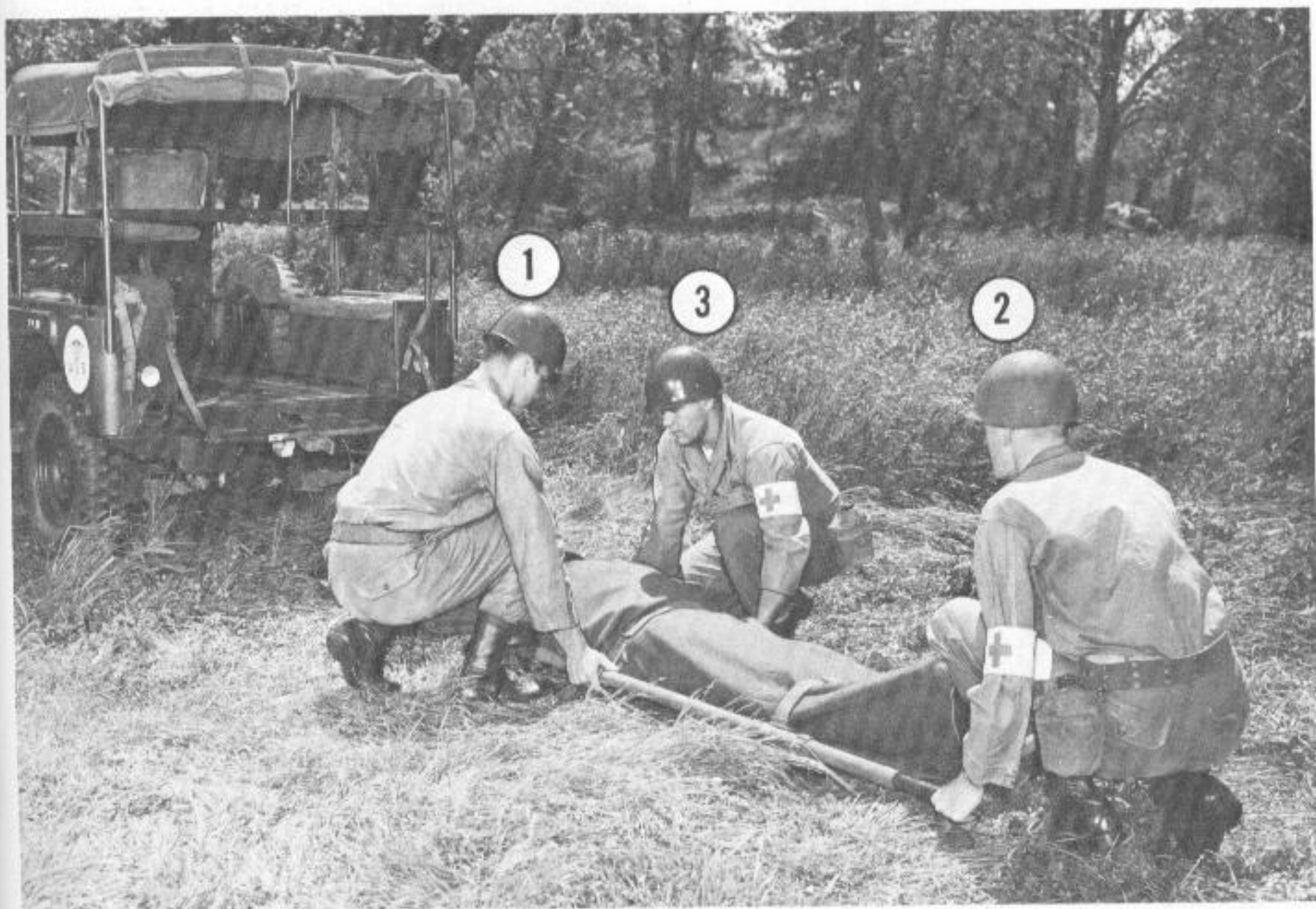
- a. No. 1 enters the ambulance and arranges the front passenger seat in crash pad position for upper and lower litter patients.
- b. No. 2 unties litter rack storage strap, located on the right outside bow.

Figure 4-35. Prepare ambulance for, LOADING (step two).



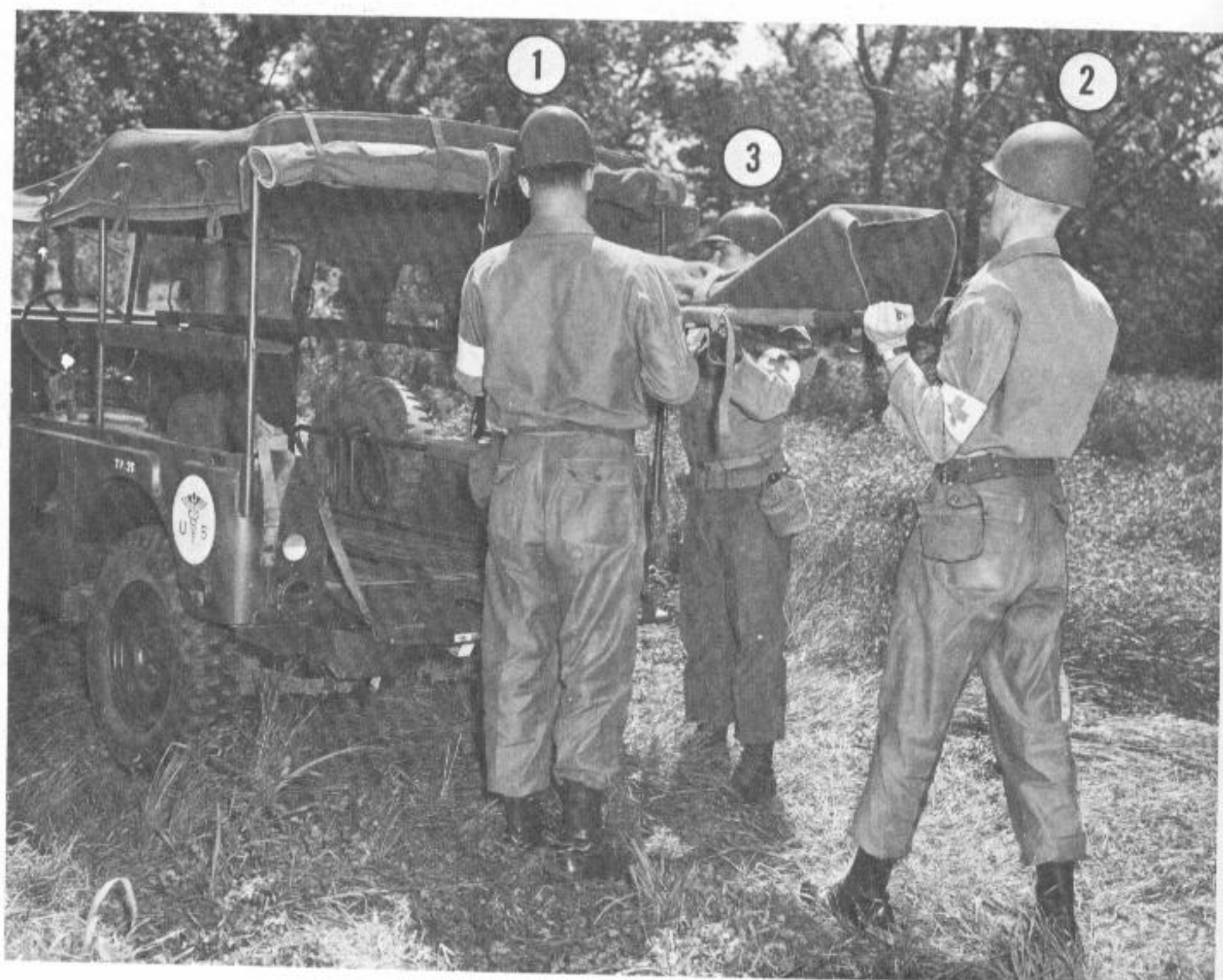
No. 3, assisted by No. 1, sets up the upper litter rack. (All reassemble at the rear of the ambulance without command.)

Figure 4-36. Prepare ambulance for, LOADING (step three).



- a. At the preparatory command, No. 2 takes position at the foot of the litter facing the patient, stoops, and grasps handles.
- b. No. 1 and No. 3, one on each side of the litter facing the patient's shoulders, grasp the left and right poles, respectively.

Figure 4-37. Loading right upper berth (step one).



(At the command of execution, the litter is lifted and carried to the ambulance.) The front stirrups are placed in the grooves of the upper berth. No. 2 slides litter into the berth. (No. 1 enters ambulance. No. 3 goes to the right front entry of the ambulance and secures litter to the berth at the head.)

Figure 4-38. Loading right upper berth (step two).



No. 2 secures litter to the berth at the foot, with the litter securing devices attached to the litter rack. (The squad reassembles without command.)

Figure 4-39. Loading right upper berth (step three).



- a. At the command of execution, the litter is carried to the ambulance and the front stirrups are placed in the grooves of the berth.
- b. No. 2 slides the litter forward.
- c. After the litter is in place, No. 1 and No. 3 raise and lock the tailgate, thus securing the litter.

Figure 4-40. Loading right lower berth.



(At the command of execution, the litter is carried to the ambulance, raised above the tailgate, and lifted into ambulance.)
 (No. 1 and No. 3 rest the head of the litter on the rear litter supports of the left berth.)
 No. 2 supports the foot of the litter.

Figure 4-41. Loading left berth (step one).



(No. 1 enters ambulance from the front, comes to the rear of ambulance, and grasps both handles at the head of the litter.)

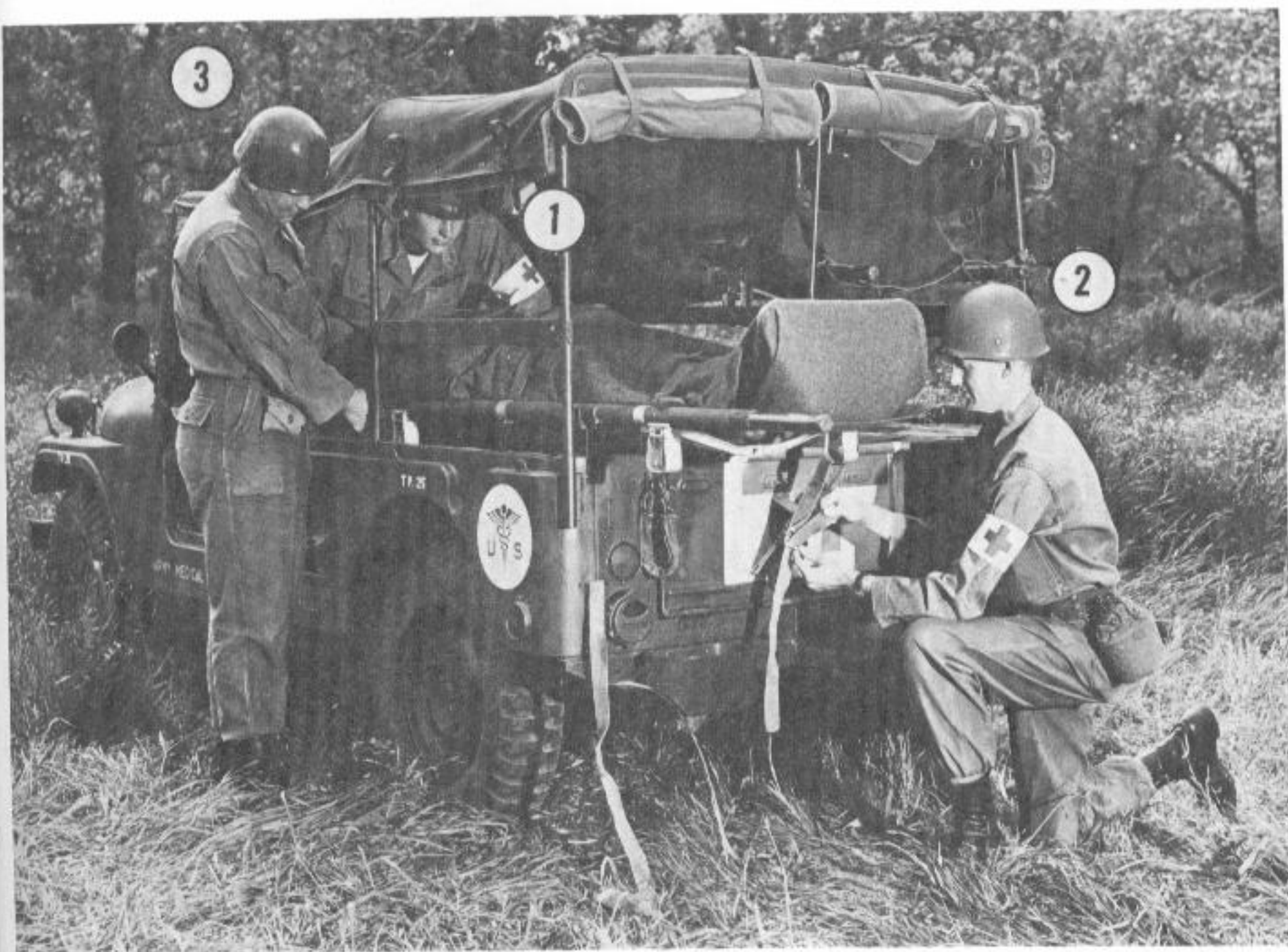
(With No. 2 at the foot and No. 1 at the head, they carry the litter to the front of the ambulance.)

(No. 3 proceeds to the front of the ambulance on the left side and assists No. 1 in placing the litter handles into the litter support rings, mounted on each side of the driver's seat.)

No. 2 places the rear handles of the litter in the rear litter support braces and secures the rear stirrups to the back of the ambulance with the straps that are attached for that purpose.

(Bearers unfurl and secure curtains.)

Figure 4-42. Loading left berth (step two).



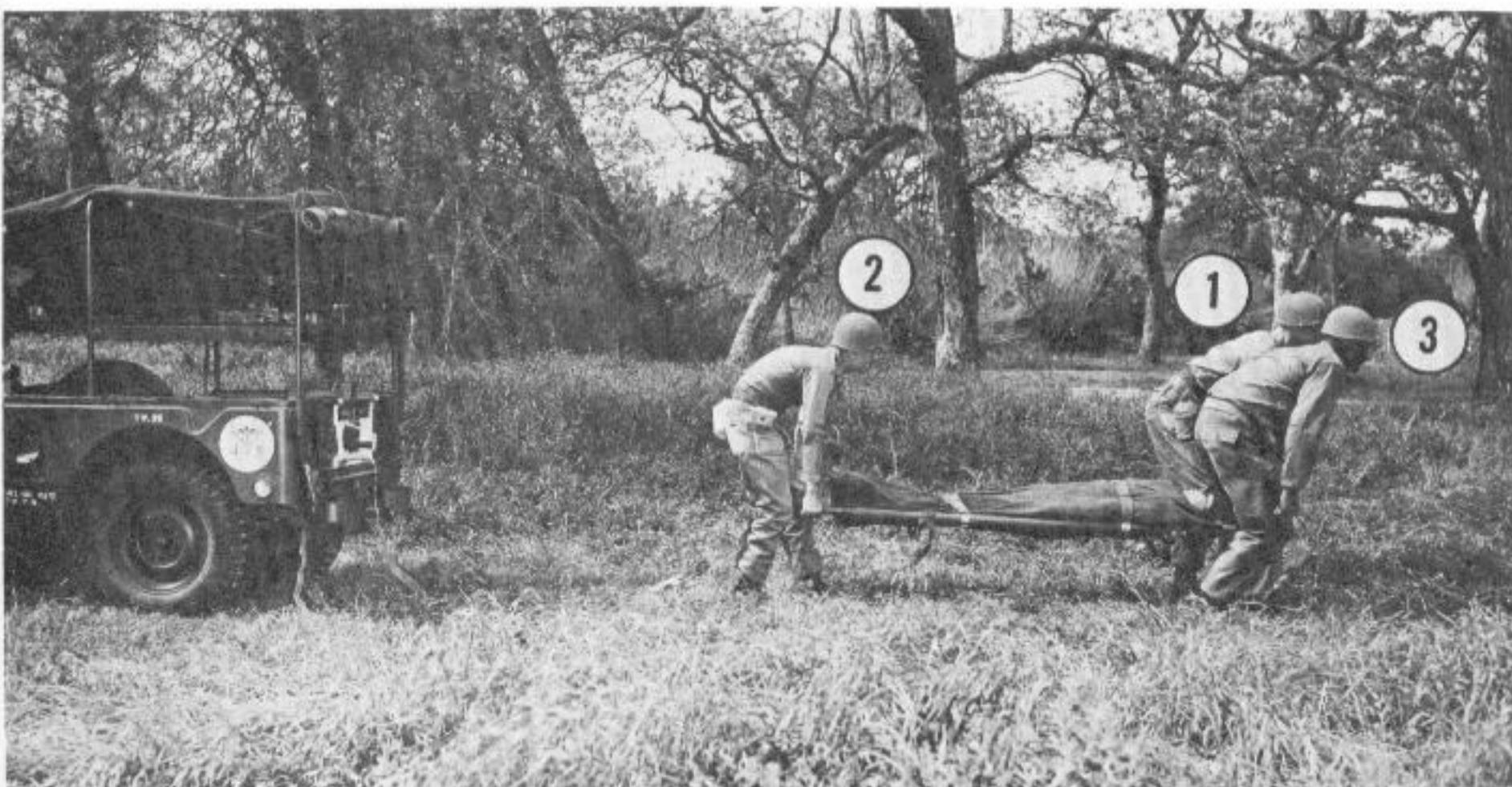
- a. No. 2 unfastens the straps securing the foot of the litter to the ambulance.
- b. No. 1 and No. 3 go to the left side and No. 1 enters the ambulance.

Figure 4-43. Prepare ambulance for, UNLOADING.



- a. No. 1 (at head) and No. 2 (at foot) carry litter to rear of ambulance.
- b. No. 1 rests front litter handles on the rear supports, and No. 2 retains hold of handles at the foot of litter. (No. 1 comes out of ambulance.)

Figure 4-44. Left berth, prepare to unload, UNLOAD (step one).



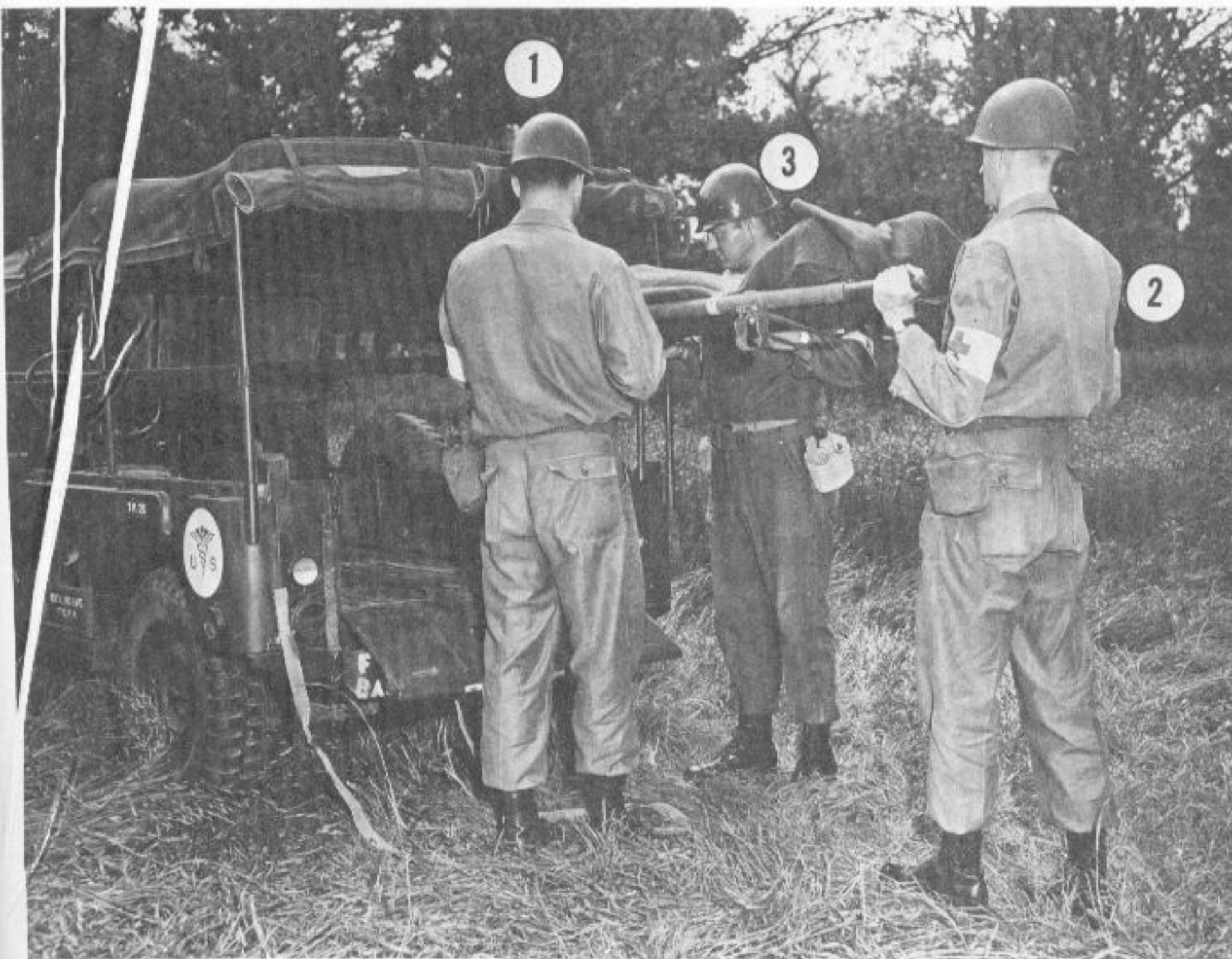
- a. At the preparatory command, No. 1 and No. 3 grasp litter handles at patient's head.
- b. At the command of execution, the three bearers lift litter from ambulance and carry it at least three paces to rear of ambulance and place it on the ground.
(The squad then reassembles without command.)

Figure 4-45. Left berth, prepare to unload, UNLOAD (step two).



- a. At the preparatory command, No. 1 and No. 3 grasp gate and take their positions, one on each side of the litter.
 - b. No. 2 grasps the litter handles at the patient's feet.
 - c. At the command of execution, No. 2 pulls the litter from the berth while No. 1 and No. 3 grasp the litter poles at the patient's shoulders as litter slides out of the berth.
 - d. Before stirrups at head of litter reach the end of the grooved tracks, No. 1 halts the squad in place to prevent the patient's head from striking the floor of the ambulance.
 - e. The three bearers lift litter from berth, carry it at least three paces to the rear of the ambulance, and place it on the ground.
- (Squad reassembles at the rear of the ambulance without command.)

Figure 4-46. Right lower berth, prepare to unload, UNLOAD.



(At the preparatory command, No. 1 enters the ambulance from the rear and releases the litter securing rings from the litter handles at the patient's head.) (No. 2 unfastens the straps securing the litter to the berth at the feet.)

a. No. 1 and No. 3 take their positions, one on each side of the litter, at the rear of the ambulance.

b. No. 2 grasps the rear handles of the litter.

c. At the command of execution, No. 2 pulls the litter from the berth.

d. No. 1 and No. 3 grasp the litter poles toward the head as the litter slides out, keeping it level at all times.

(The litter is lowered to the litter carry position, and all three bearers carry it at least three paces from the ambulance and place it on the ground.)

(When unloading is completed, No. 1 raises and locks the tailgate. Bearers unfurl and secure curtains. Squad then reassembles without command.)

Figure 4-47. Right upper berth, prepare to unload, UNLOAD.

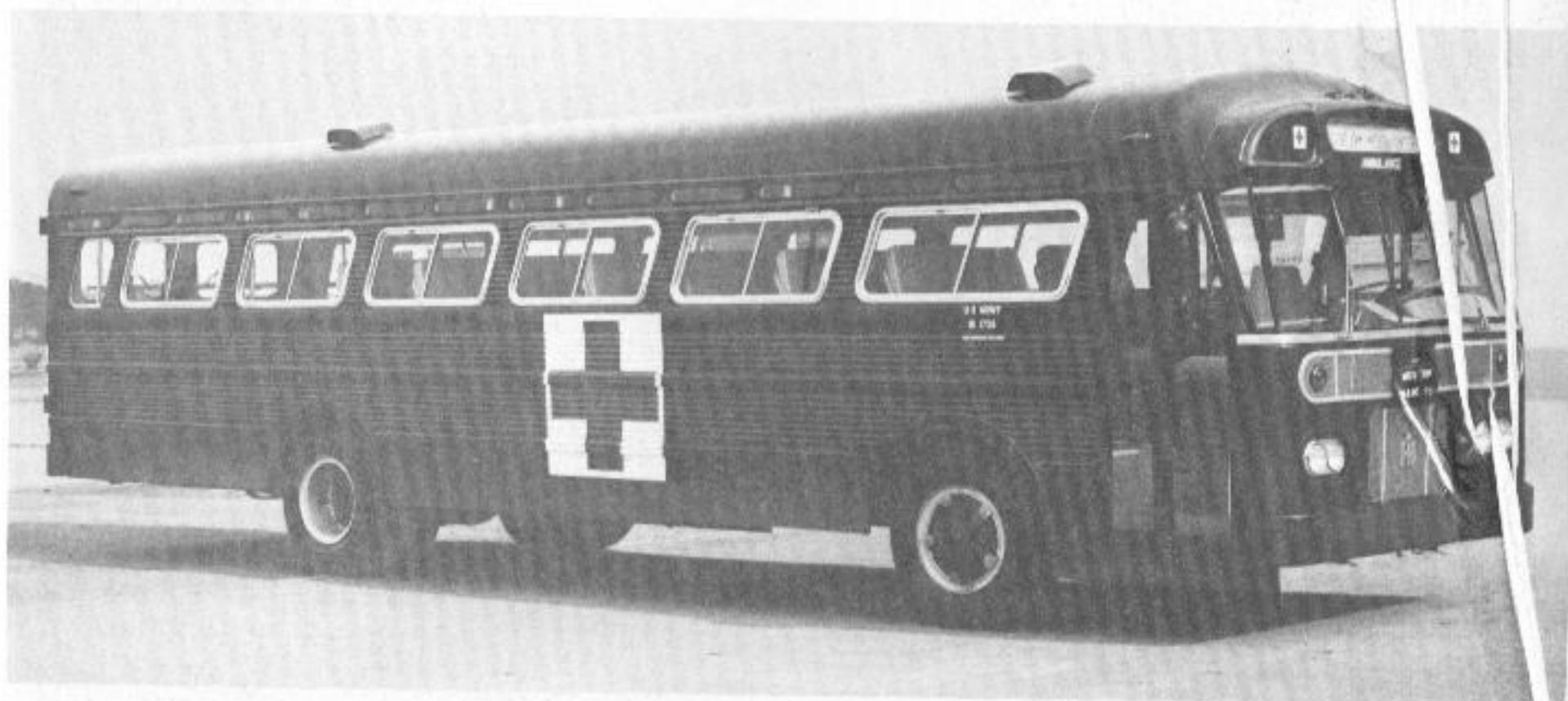


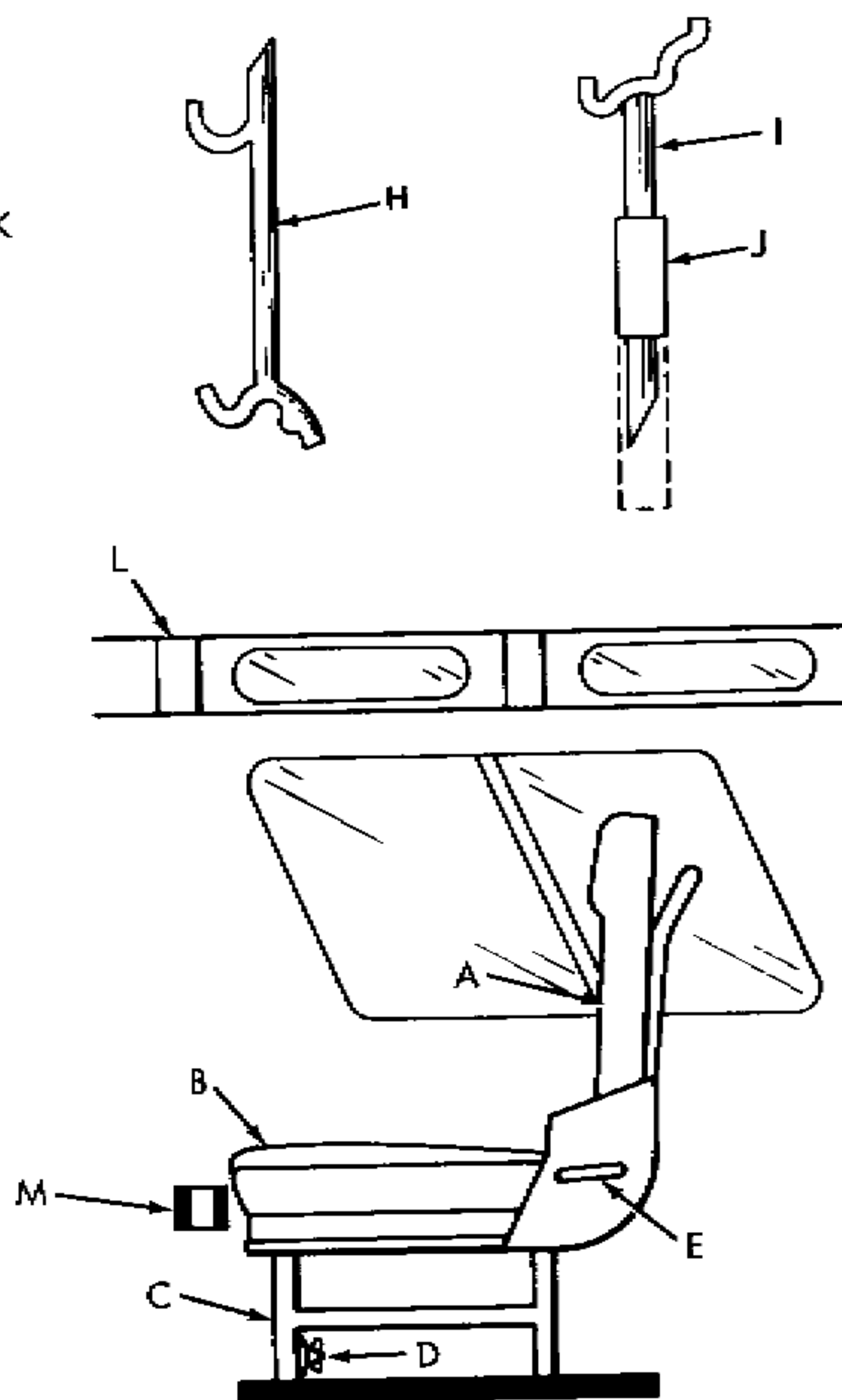
Figure 4-48. Bus, 44-passenger, 4 x 2, integral type (bus ambulance), exterior view.



Figure 4-49. Bus, 44-passenger, 4 x 2, integral type (bus ambulance), interior view.

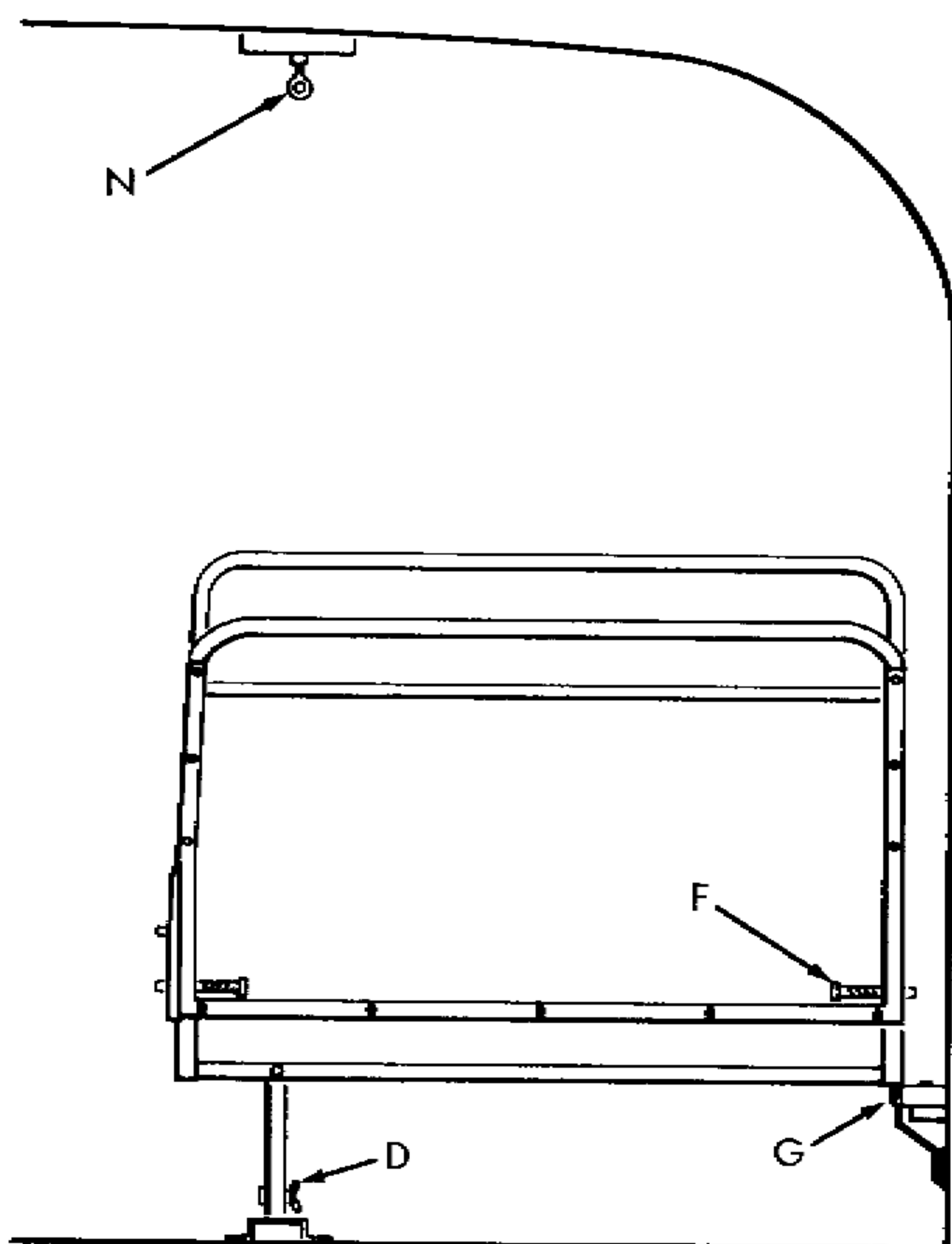


Figure 4-50. Bus, 44-passenger, 4 x 2, integral type (bus ambulance), interior view, seats removed and litters installed.



- A. Seat Backrest
- B. Seat Cushion
- C. Seat Legs
- D. Leg Wingnut
- E. Seat Pin Lock, Center
- H. Litter Support Hook, Bottom or Lower
- I. Litter Support Hook, Top or Upper
- J. Sleeve
- K. Litter Support Hanger
- L. Hook Bracket, Top or Upper
- M. Hook Bracket, Bottom or Lower

Figure 4-51. Conversion accessories, bus, 44-passenger, 4 x 2, integral type (bus ambulance), side view.



- D. Leg Wingnut
- F. Seat Pin Lock, Body Size
- G. Seat Latch
- N. Ceiling Hook, on Ceiling Rail

Figure 4-52. Conversion accessories, bus, 44-passenger, 4 x 2, integral type (bus ambulance), rear view.



- a. One litter team remains in the bus.
- b. A second litter team loads patients onto the floor of the rear of the bus where they are picked up by the team in the bus and loaded onto appropriate berths.

Figure 4-53. Loading patients on bus ambulance where loading ramps or platforms are not available.



Figure 4-54. Automobile, ambulance, metropolitan type, 4 x 2.



Figure 4-55. Truck, ambulance, light, 4 x 2.



Figure 4-56. Carrier, light weapons, infantry, 1/2-ton, 4 x 4, M274, W/E, transporting one patient.

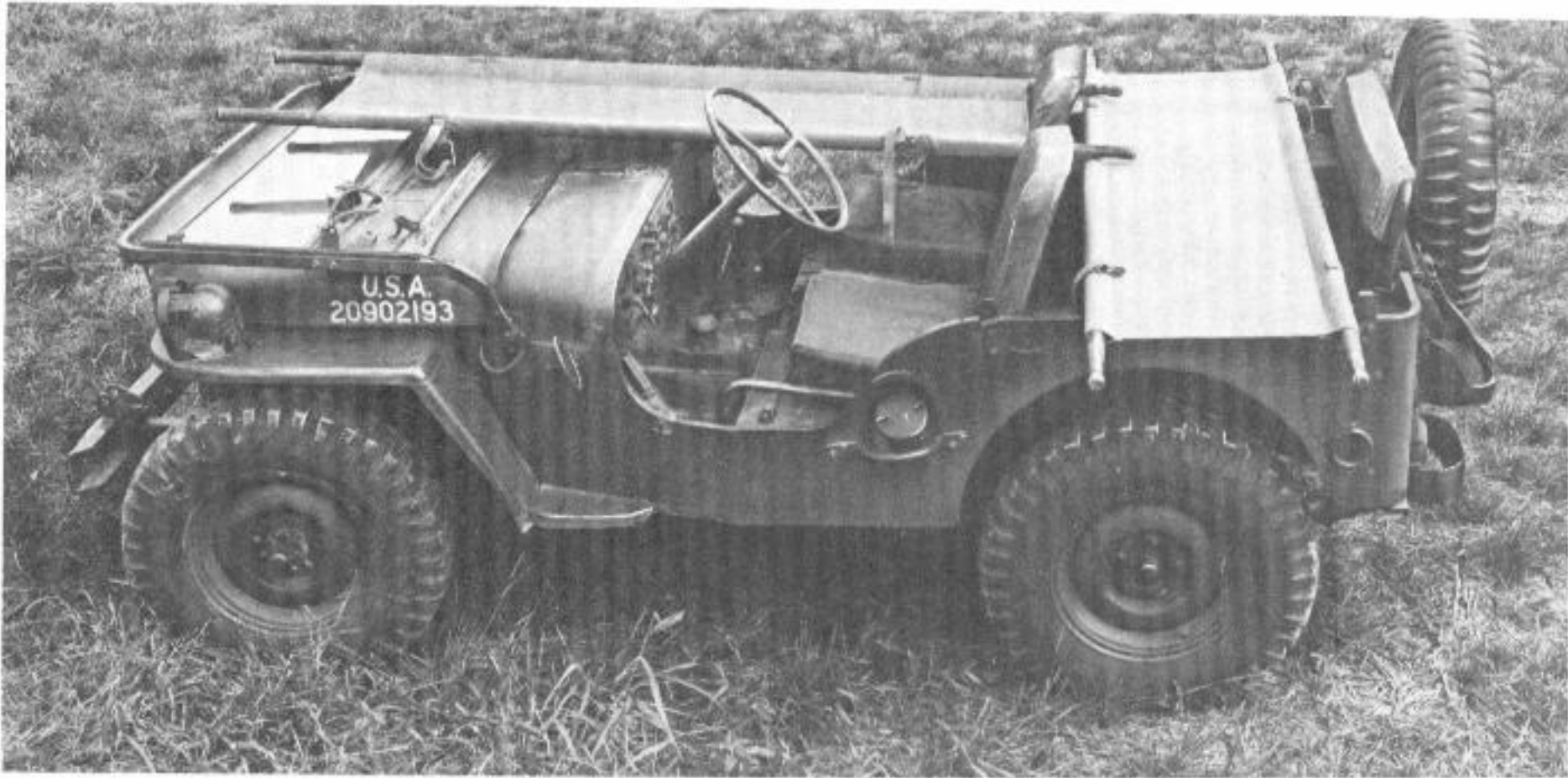


Figure 4-57. Carrier, light weapons, infantry, 1/2-ton, 4 x 4, M274, W/E, transporting two patients.



When transporting three patients, they must be placed across the body of the vehicle.

Figure 4-58. Carrier, light weapons, infantry, 1/2-ton, 4 x 4, M274, W/E, transporting three patients.



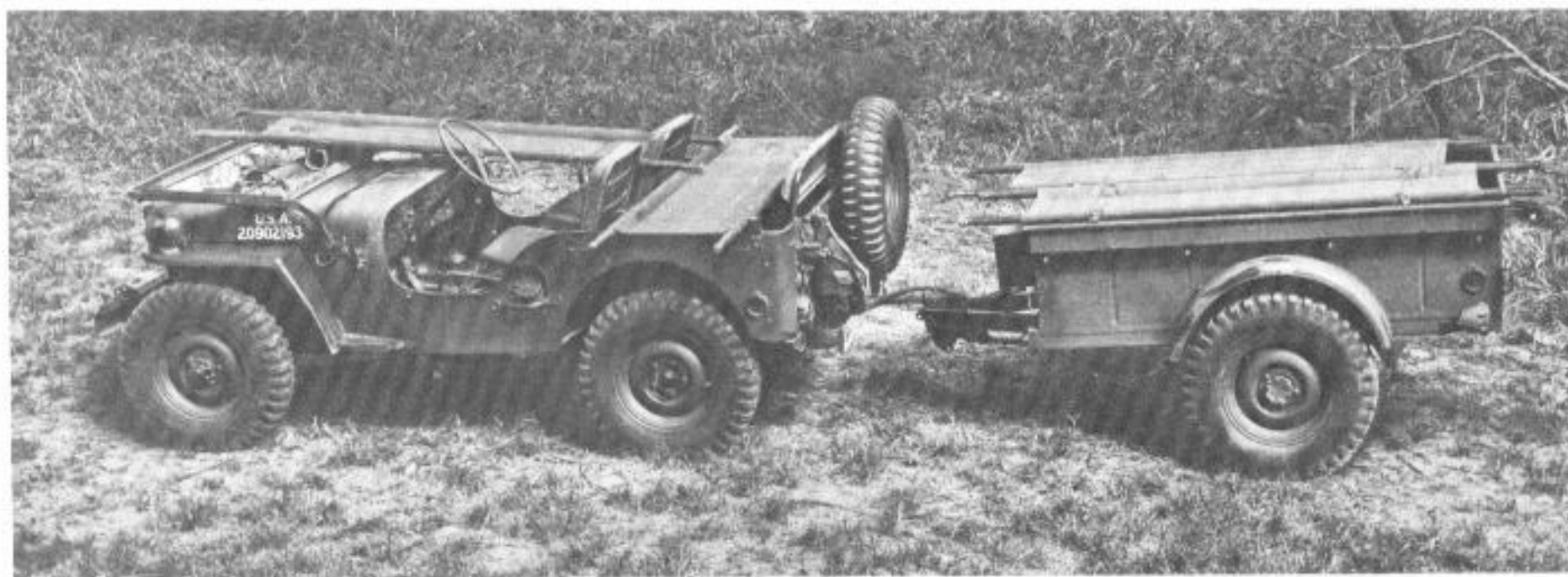
- a. Place one litter across the back of the truck with the litter handles resting on the truck sides. (When route of evacuation is along narrow roads or trails, take care that handles of litter do not catch on trees or bushes.)
 - b. Place second litter lengthwise on right side of truck with the rear handles resting on the side of the first litter and the front stirrups fitting into the groove below the windshield.
- (The second litter can also be placed with the front handles resting on the windshield frame and the rear handles straddling the spare tire, with the litter riding above the first litter.)

Figure 4-59. Truck, utility, 1/4-ton, 4 x 4, M38A or M151, with two litters.



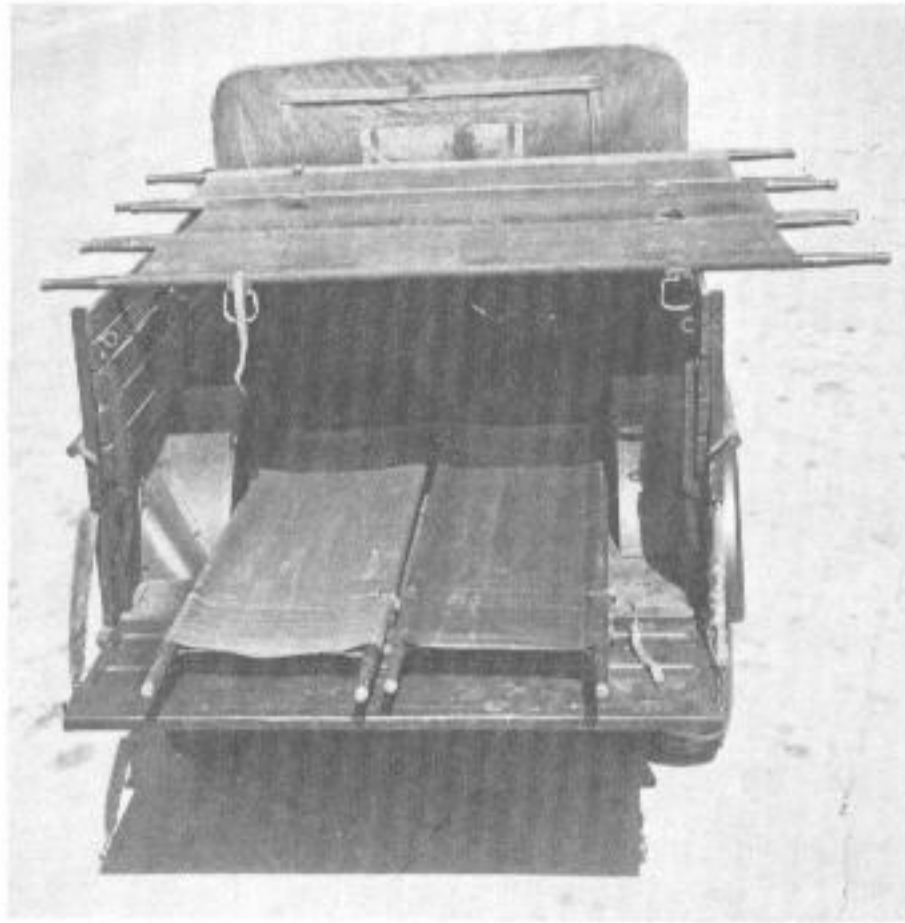
- a. Bind together four poles, saplings, or boards to resemble a two-rung ladder.
- b. Lash this frame to the truck with ropes or straps.
- c. Load litters with patients' heads placed toward the front.

Figure 4-60. Truck, utility, 1/4-ton, 4 x 4, M38A or M151, with two litters loaded on improvised sapling frame.



- a. Load 1/4-ton truck with two litters as described in figure 4-59.
- b. Place two litters lengthwise on trailer side by side.
- c. Bind handles of litter to the small hooks on sides of the trailer body.
(To unload, remove litters from their respective sides.)

Figure 4-61. Truck, utility, 1/4-ton, 4 x 4, M38A or M151, with trailer, 1/4-ton, 2-wheel, M115 (two litters each).



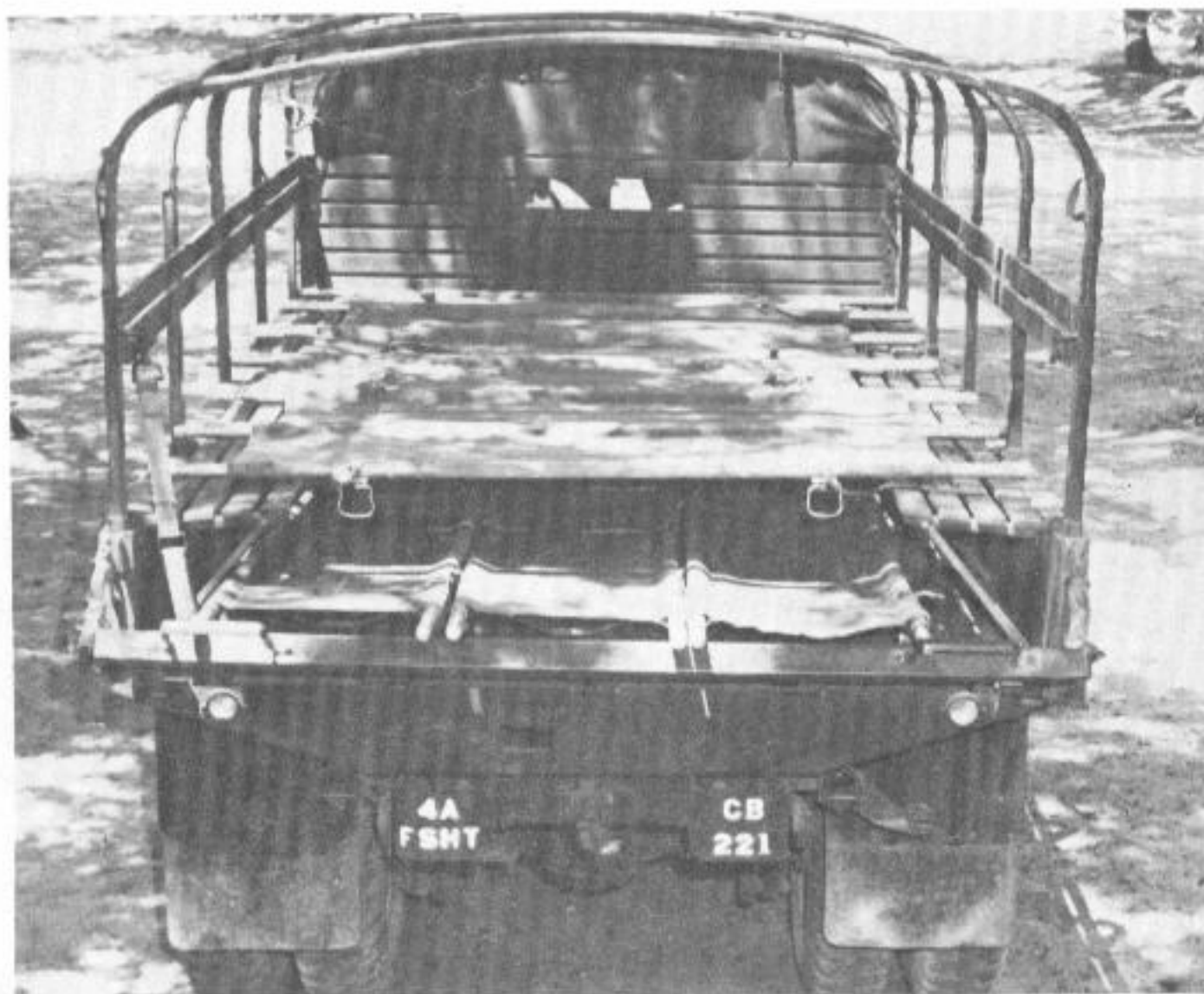
a. Remove canvas top by rolling toward front of truck. Remove center bows and secure to canvas roll. Raise seats. Raise tailgate slightly to horizontal position to prevent litters from sliding off.

b. Place a layer of three litters side by side, crosswise on vehicle resting on bow braces, and secure handles to bow braces.

c. Place two litters lengthwise, headfirst, in the bottom of truck with litter ends protruding and supported by tailgate. Bind protruding ends with rope.

(To unload, remove litters in the reverse order of loading.)

Figure 4-62. Loading the 3/4-ton cargo truck, 4 x 4, M37 and M57B1, with five litters.



- c. Remove canvas roll by rolling toward front of truck. Remove center bows and secure to canvas roll. Lower seats. Place six litters crosswise on seats for top layer of litters.
- d. Load six litters lengthwise in two rows of three litters each on floor of truck.
- e. Secure litters individually to seats. Raise tailgate as high as possible and fasten to prevent bottom layer from sliding out.

Figure 4-63. Loading the 2 1/2-ton truck, 6 x 6 wide bed, with 12 litters.



Figure 4-64. Carrier, cargo, amphibious, tracked, M116.

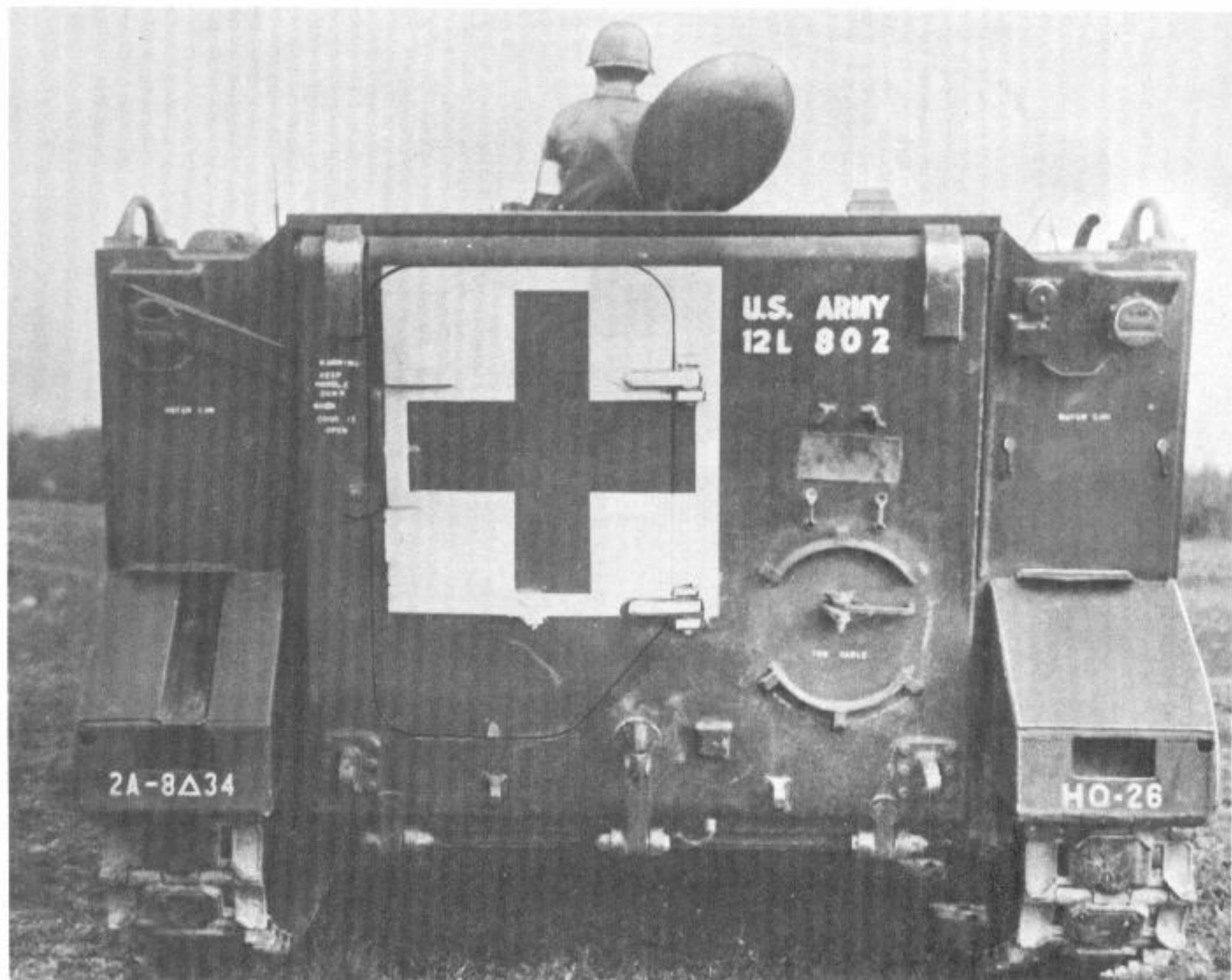


Figure 4-65. Carrier, personnel, full-tracked: armored, M113, T113E2, W/E.



At this command, No. 2 takes the following steps:

- a. Informs the driver when it is safe to lower the rear ramp.
- b. Enters the vehicle and assists the driver to install the chain conversion kit.

(Litter support chains are adjusted to D-rings which are welded to the overhead doors on the right side of the rear compartment so that two litter patients can be supported lengthwise on the vehicle to form a double tier. Litter support chains are adjusted to the left side of the rear compartment in the same manner to form another double tier.) (All litter chains are secured to bed of vehicle to keep tiers from swinging when vehicle is in motion.)

- c. Resumes place with rest of squad.

Figure 4-66. Carrier, personnel, full-tracked; armored, M113, T113E2, W/E, converted and ready for loading.



At the preparatory command, positions and procedures are as follows:

- a. No. 1 and No. 3, at the foot of the litter and facing the patient, stoop and grasp handles.
 - b. No. 2 and No. 4, at each side of the litter and facing the patient's shoulders, grasp the left and right poles, respectively.
 - c. At the command of execution, the litter is lifted and carried to the vehicle.
 - d. The driver grasps the handles at the head of the litter and assists in placing litter in right upper berth.
- (The pole on the right side of the litter is placed in the brackets installed on the right side of the vehicle. No. 3 and No. 4 secure the left pole to the chain by straps.)

Figure 4-67. Carrier, personnel, full-tracked: armored, M113, T113E2, W/E, driver receiving patient.

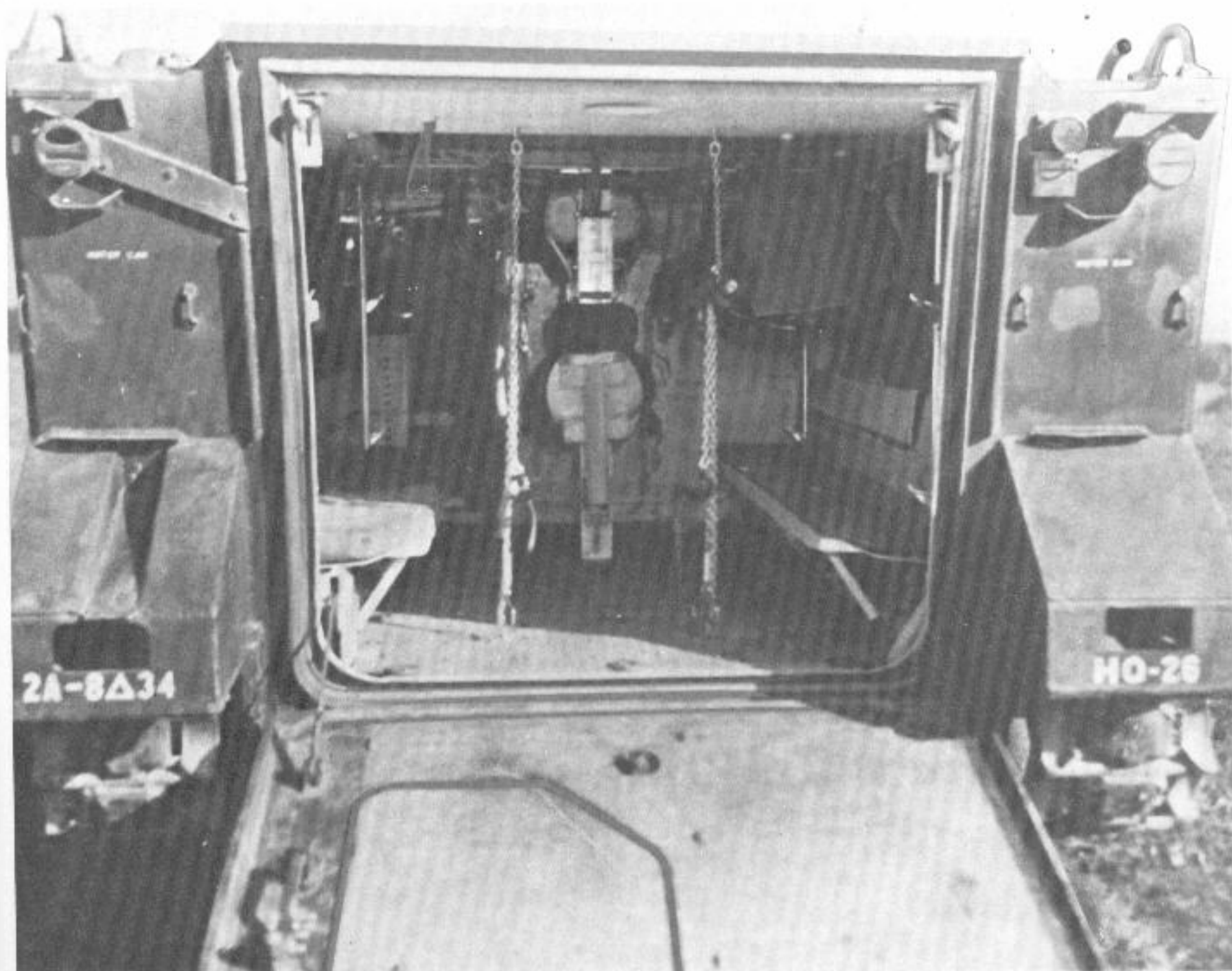


Figure 4-68. Carrier, personnel, full-tracked: armored, M113, T113E2, W/E, right upper berth, loaded and secured with litter straps attached to the chains.

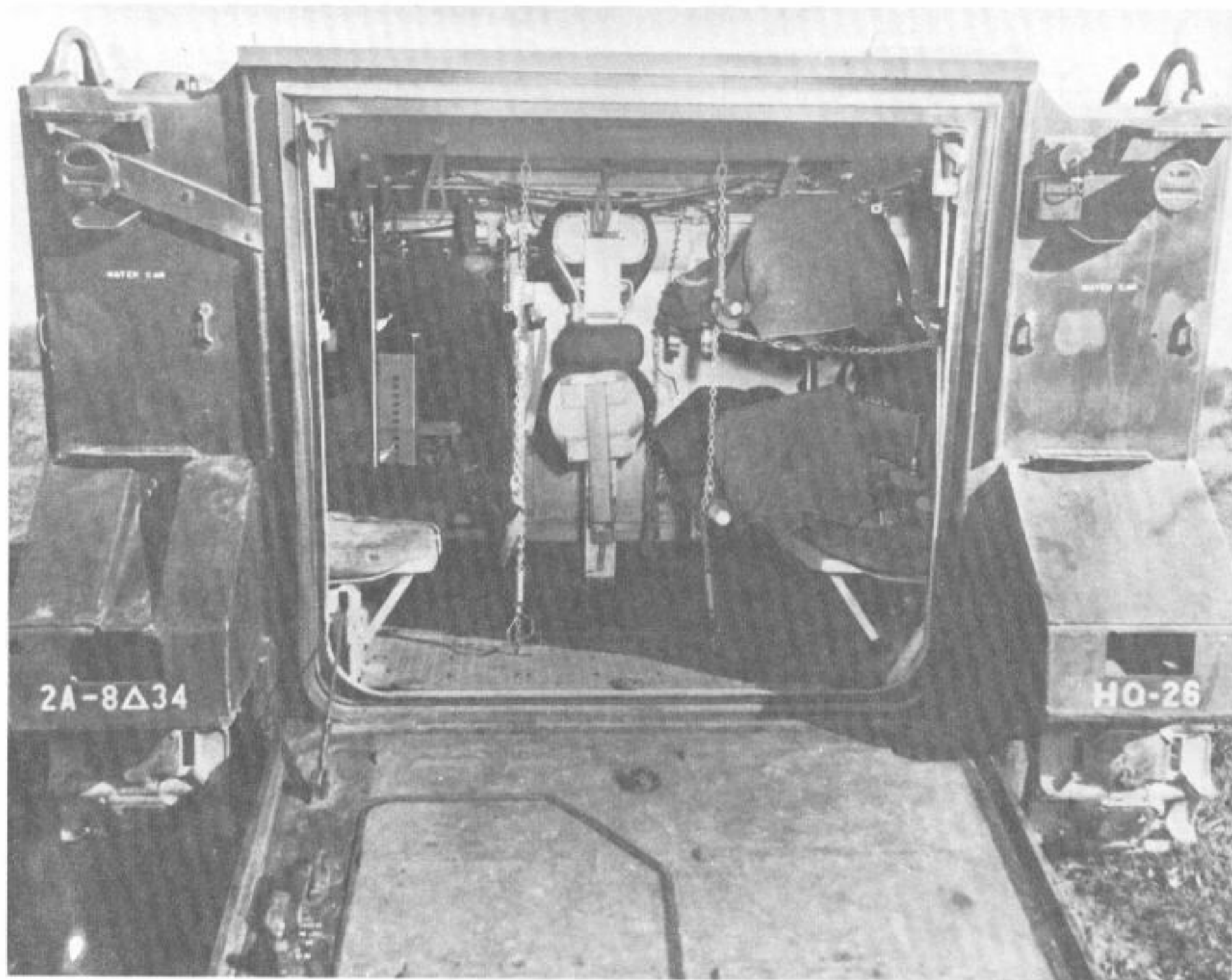
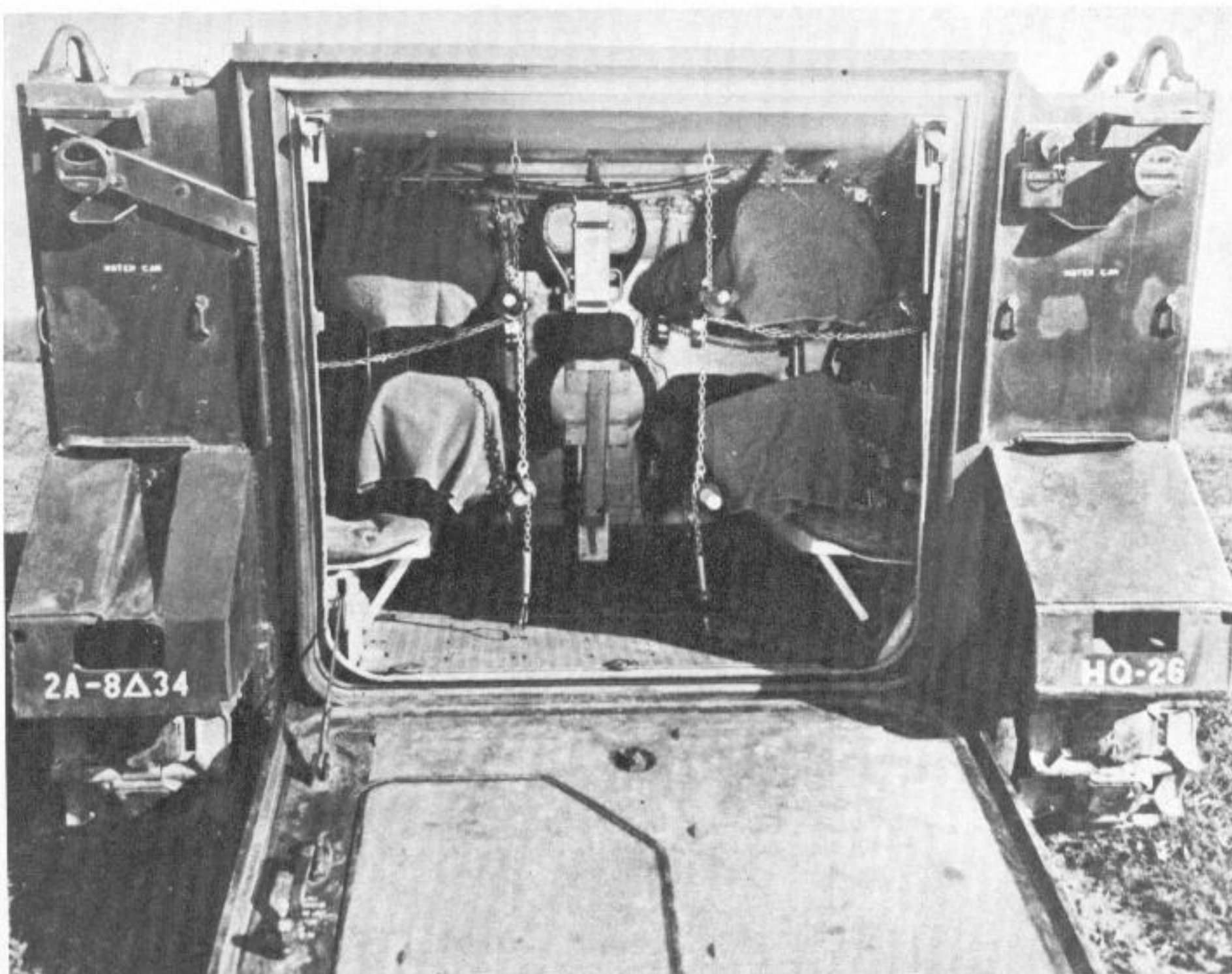


Figure 4-69. Carrier, personnel, full-tracked; armored, M113, T113E2, W/E, upper and lower (right) berths loaded.



Left side of vehicle is loaded as is the right side.

(No. 2 then informs the driver when it is safe to raise and secure rear ramp, and squad reassembles without command.)

Figure 4-70. Carrier, personnel, full-tracked: armored, M113, T113E2, W/E, vehicle fully loaded.

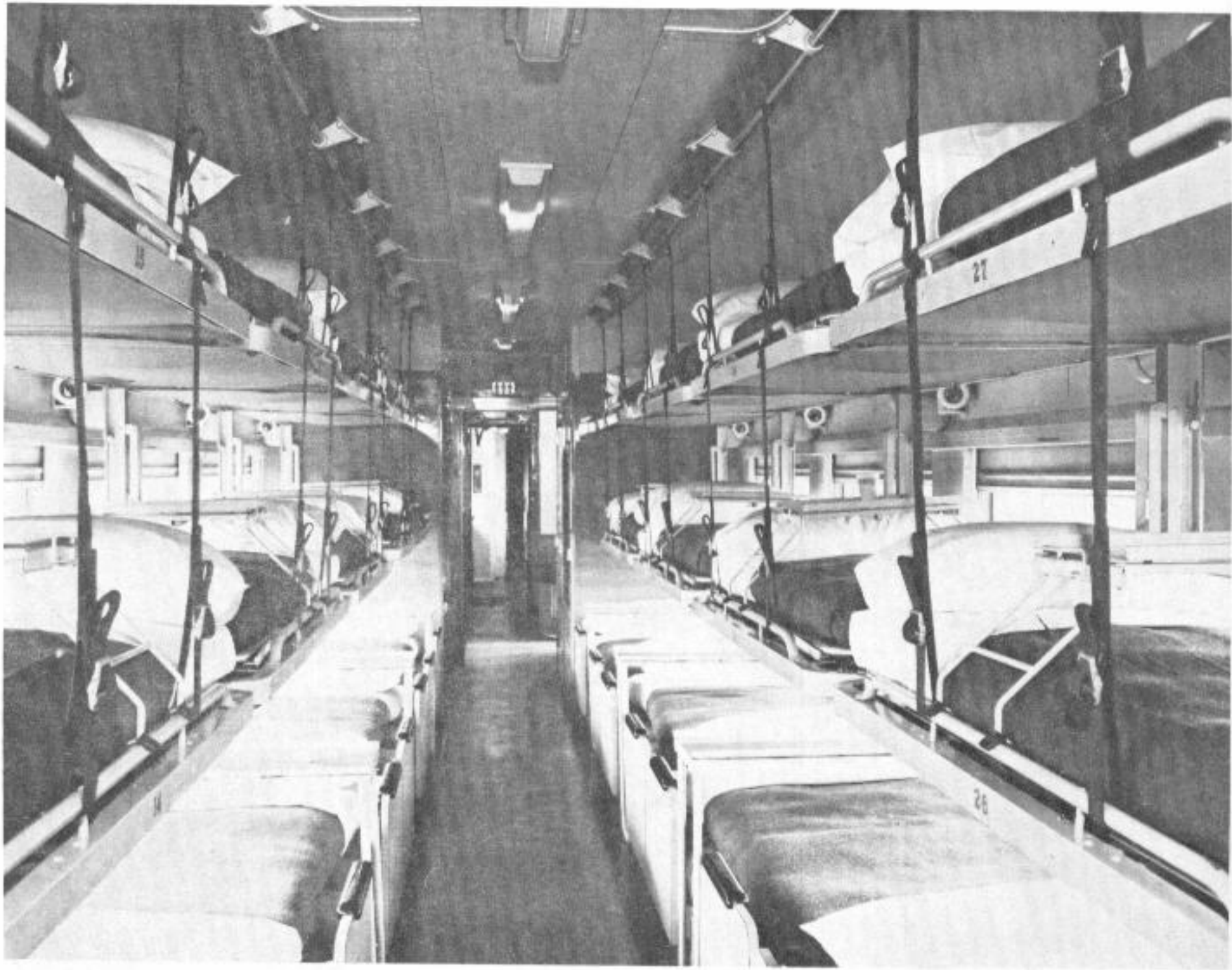


Figure 4-71. Ambulance unit car, made up for litter patients.



Figure 4-72. Ambulance unit car, made up for ambulatory patients.

CHAPTER 5

EVACUATION BY AIR

Section I. INTRODUCTION

5-1. General

The Department of Defense policy requires the use of aircraft as a means of transportation of the sick and wounded, unless medically contraindicated, and whenever appropriate aircraft can be made available. A major objective of patient evacuation by air is to transport the sick and wounded in the shortest time to and between medical treatment facilities so that they can receive appropriate medical care. The expediency and flexibility of air transportation are two major factors which lead to the attainment of this objective.

5-2. Advantages and Problems of Air Evacuation

a. General. Aircraft is the preferred means of transportation of the sick and wounded because of its many advantages. These advantages, as compared with other means of transportation, may be measured in terms of the lives, time, and resources saved. The speed with which aircraft cover long distances may create a tendency to overevacuate. This problem may be overcome, however, by exercising care in the selection of patients. In general, the time saved by the use of aircraft transportation results in the saving of lives, economy, and maximum use of resources.

b. Advantages.

(1) The speed with which the sick and wounded can be transported by air from locations with limited medical treatment capabilities to appropriate medical treatment facilities insures timeliness of treatment, thus contributing to the saving of lives, to the reduction of permanent disability, and to an increase in the number of patients returned to duty.

(2) The range and speed of aircraft make it possible to transport patients by air over relatively long distances in short periods of time. This requires less frequent displacement of medical treatment facilities, a factor which will be of even greater significance as battlefields become more dispersed.

(3) Helicopters can transport patients quickly over terrain where evacuation by other means would be difficult and perhaps impossible to accomplish. The minimum landing area required for helicopters and other V/STOL (vertical/short takeoff and landing) aircraft permits patients to be picked up well forward and delivered to the immediate vicinity of supporting medical treatment facilities.

(4) Because of the speed, range, flexibility, and versatility of aeromedical evacuation, patients can be moved directly to that medical installation best equipped for the care of the particular injury. Patient flow to overloaded hospitals can be diverted to others with fewer patients, thus minimizing the time from hospital admission to surgical treatment and adding to the chances of recovery.

(5) The selectivity in the use of medical treatment facilities made possible by aeromedical evacuation procedures permits economy in the use of these facilities. Fewer specialty treatment teams are required because of the capability to move patients to hospitals with the required specialties rather than attempt to place these teams in every hospital. Hospitals are required to move less often, thereby reducing periods of noneffectiveness during movement and re-establishment.

(6) The ease and comfort of aircraft movement reduces the patient's discomfort and the shock that might otherwise be suffered from more handling and longer, rougher movement. Thus they arrive at medical treatment facilities in far better condition with greater chances for recovery. These advantages combine to improve patient morale, as well as the morale of the fighting man when he realizes that, if wounded, he will quickly receive specialized medical treatment. This is a factor which will be of increased importance in the dispersed battlefields of the future.

c. Problems.

(1) *Overevacuation.* It is desirable to keep



Figure 5-1. C-130 Hercules.



Figure 5-2. C-7 Caribou.

the wounded man as far forward as his recovery will permit so as to preclude unnecessary personnel replacements for experienced personnel. The capability of modern aircraft to transport patients a great distance in a short time may create a tendency to evacuate patients too far to the rear and overfly intermediate medical facilities. This is particularly true if the request for aeromedical evacuation is not processed through medical channels. When evacuation requests are retained in medical channels, the surgeon, based upon medical considerations,

decides whether to evacuate by air and thus avoid unnecessary movements.

(2) *Weather and darkness.* Adverse weather limits the use of aircraft for aeromedical evacuation. Army aircraft are equipped with navigational equipment that provides the capability for instrument flights during IFR (instrument flight rules) conditions or marginal weather conditions. Night evacuations are accomplished routinely; however, the requester must be very exact in providing landing site informa-

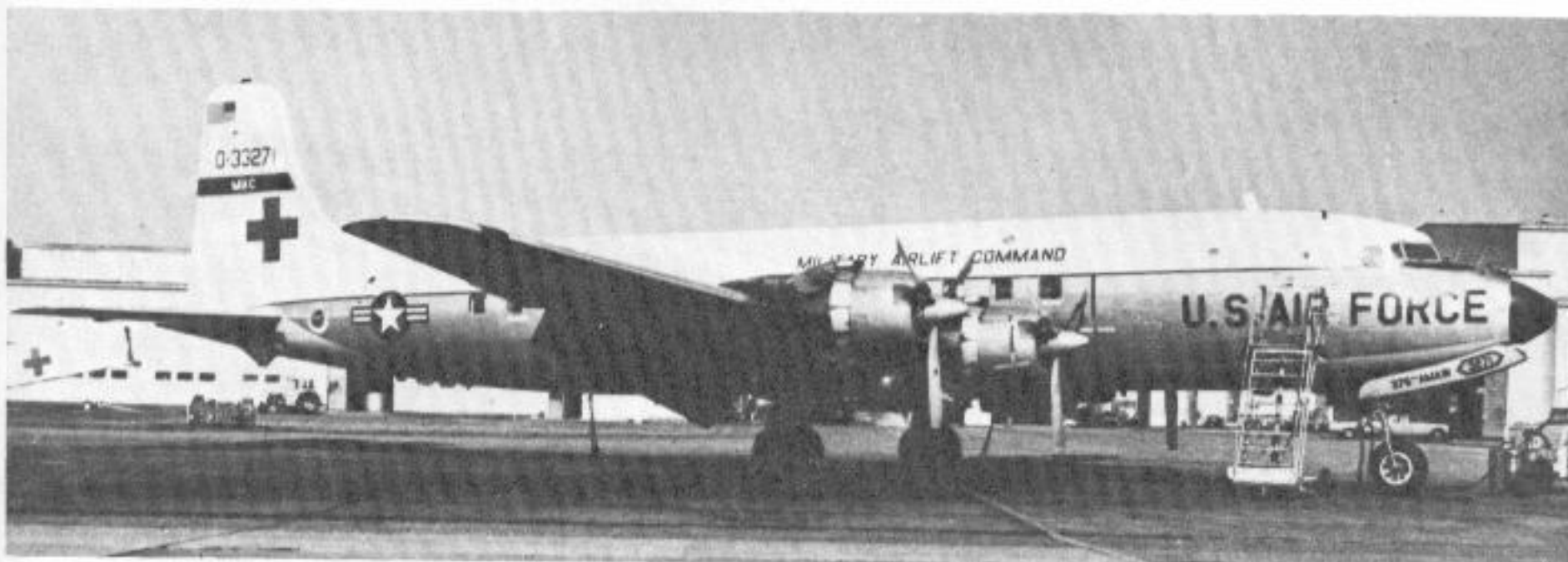


Figure 5-3. C-118 Liftmaster.

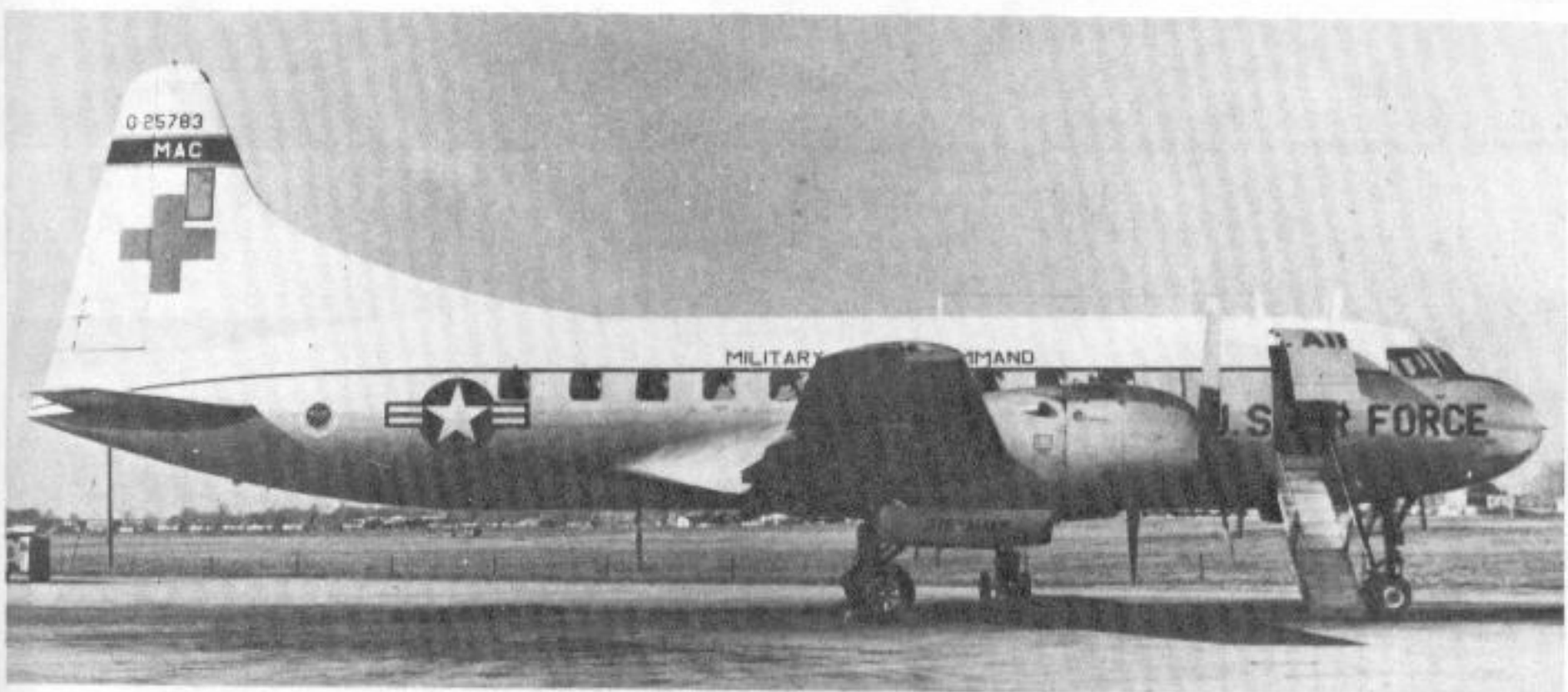


Figure 5-4. C-131 Samaritan.

tion such as coordinates, obstacles, signal devices, and radio frequencies.

(3) *Enemy action.* Enemy air superiority is a disadvantage in the employment of aircraft for aeromedical evacuation; however, the AMEDD air ambulance has an advantage in that it is highly maneuverable and capable of flying nap of the earth.

5-3. Army Evacuation By Air

The assigned mission of the Army is to provide aeromedical evacuation for the sick and wounded within the combat zone. This includes battlefield pickup of patients (except those from

an airhead or airborne objective area which is supported by Air Force airlifted logistical support), their air transportation to initial points of treatment, and any subsequent moves to hospital facilities within the Army combat zone. It is a mission of the AMEDD to carry out this function.

a. Army aeromedical evacuation is that part of the combat zone medical evacuation function which uses AMEDD air ambulances for patient evacuation to and between medical treatment facilities. AMEDD air ambulances are staffed with medical personnel and equipped with medical supplies and equipment necessary to provide



Figure 5-5. C-9 Nightingale.



Figure 5-6. C-141 Starlifter.

the required in-flight care and treatment of patients. Combat zone aeromedical evacuation operations under all conditions are conducted exclusively under the operational control of the responsible surgeon or medical unit commander.

b. Army air movement of patients is that

part of the combat zone medical evacuation function which employs non-AMEDD air vehicles under the operational control of the surgeon and in which prior medical treatment precludes the need for in-flight medical treatment and/or surveillances. Air movement of patients, by other than AMEDD air ambulances, may

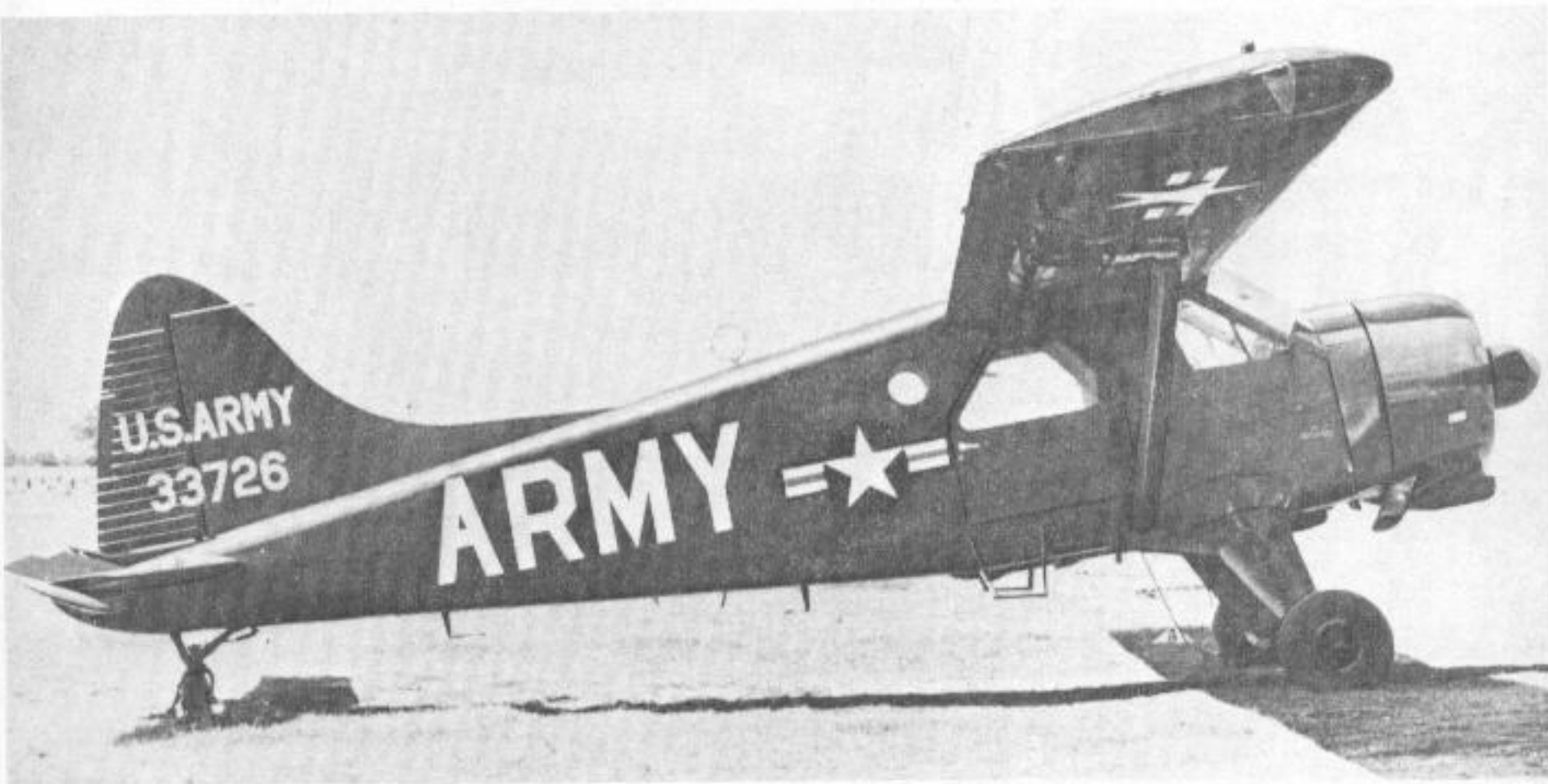


Figure 5-7. U-6 Beaver.



Figure 5-8. U-1A Otter.

be used to facilitate patient transfers. Non-AMEDD aircraft are employed for air movement of patients when requested by the appropriate surgeon to augment the AMEDD ambulance capabilities. When Army aviation elements are committed to air movement of patients, they respond exclusively to the

direction of the responsible surgeon in regard to destination and time frame in which the patients are to be moved.

5-4. Air Force Aeromedical Evacuation Systems

The assigned function of the Air Force is to



Figure 5-9. U-1A Otter, interior view, showing the cabin set up to receive three litter patients and four ambulatory patients.

provide air evacuation of patients from airheads in logistically supported airborne operations, between zones in a theater of operations, between theaters of operations, and from theaters of operations to and within the zone of interior. To carry out this function, the Air Force operates three major aeromedical systems.

a. Tactical aeromedical evacuation system. Tactical systems operate within theaters of operations or overseas areas to provide aeromedical support for the Armed Forces. This includes air transportation for patients from points of treatment within the combat zone to points outside the combat zone and between points within the communications zone. The operation of this system is the mission of the Theater Air Force, Tactical/Assault Airlift units and

aeromedical evacuation units of the Air Force.

b. Strategic aeromedical evacuation system. This system of aeromedical evacuation is responsible for air transport of patients from overseas areas of operations to the CONUS or other safe haven areas. The Military Airlift Command operates air routes to all major points throughout the world where American troops are stationed and utilizes the return airlift for strategic aeromedical evacuation.

c. Domestic aeromedical evacuation system. This is a daily system of flights which operate in the continental United States to transfer patients from aerial ports of debarkation to destination hospitals, and to transfer patients between federally owned medical facilities with-



Figure 5-10. U-1A Otter, crew chief receiving patient from litter bearer team.

in the continental United States. It is accomplished by the Military Airlift Command.

5-5. Medical Evacuation Units

a. Army. Air ambulance units of the AMEDD perform aeromedical evacuation within the combat zone.

(1) The Army's largest air ambulance unit is the medical air ambulance company, which is designed to support the highly mobile field army. The medical air ambulance company may be assigned to a field army, independent corps, or task force. The major responsibilities of these units are to provide aeromedical evacuation of patients; to provide emergency movement of medical personnel and accompanying equipment and supplies to meet a critical requirement; and to insure uninterrupted delivery of whole blood, biologicals, and medical supplies when there is a critical requirement.

(2) The helicopter ambulance detachment is a small, highly mobile, cellular organization which normally is attached to another medical

organization for logistical support. It may serve as an augmentation unit for the medical air ambulance company, or it may furnish aeromedical support to a division or small independent task force organizations. The mission, purpose, and employment of these units are similar to those of the medical air ambulance company.

b. Air Force. The Air Force has functionally organized units specifically designed for performing aeromedical evacuation. There are basically two types of units. Either type organization can provide for the operation of an Aeromedical Evacuation Control Center (AECC), aeromedical staging facilities, in-flight medical care teams, and liaison personnel. The two types are the following:

(1) Aeromedical airlift units (flights, squadrons, groups, or wings) which combine personnel for operation of the aircraft and medical personnel in the same organization.

(2) Aeromedical evacuation units (flights,



Figure 5-11. U-21A Ute.



Figure 5-12. UH-1D/H Iroquois.

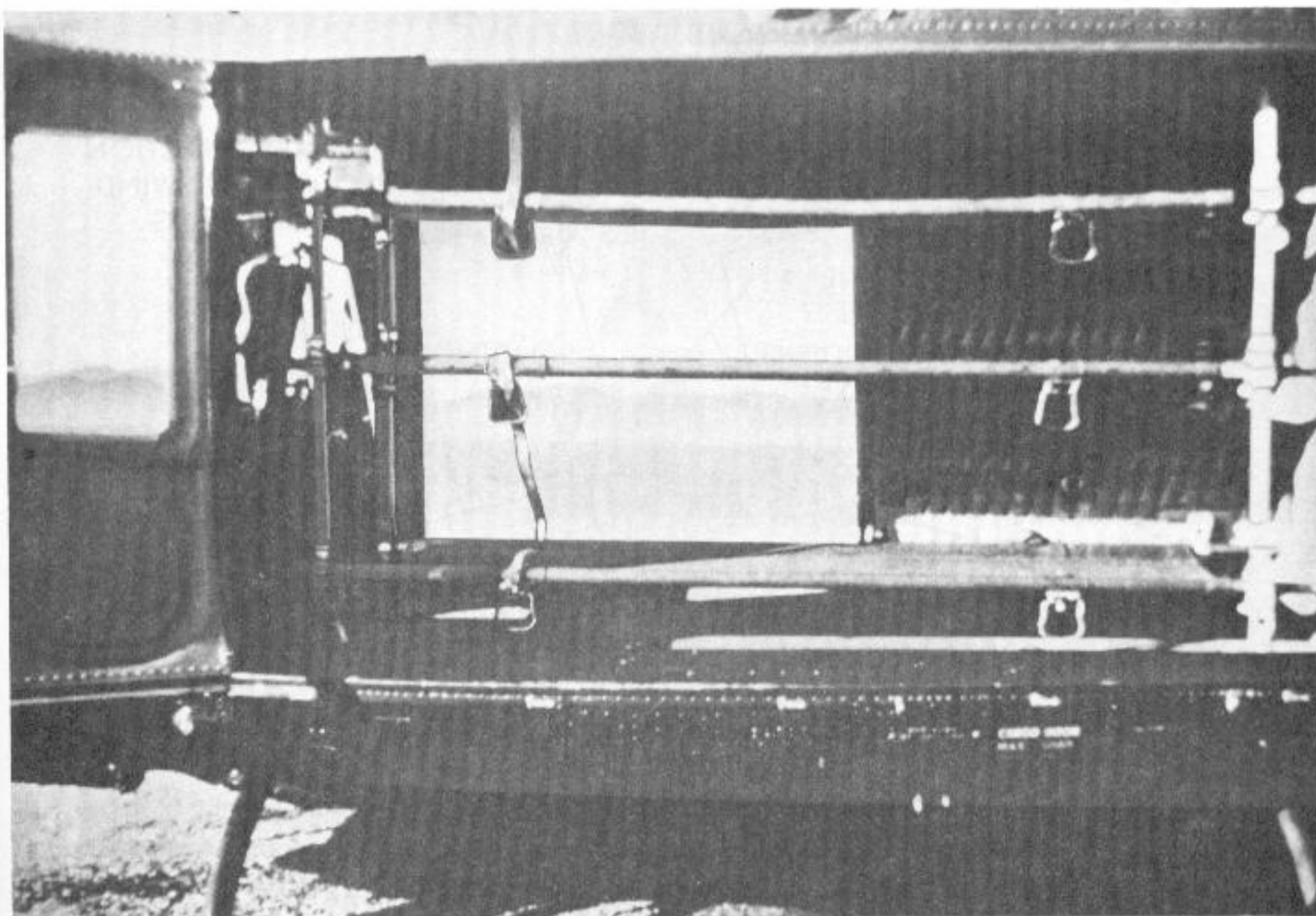


Figure 5-13. UH-1D/H Iroquois, interior view.

squadrons, or groups) which are purely medical organizations.

5-6. Patients Evacuated By Air

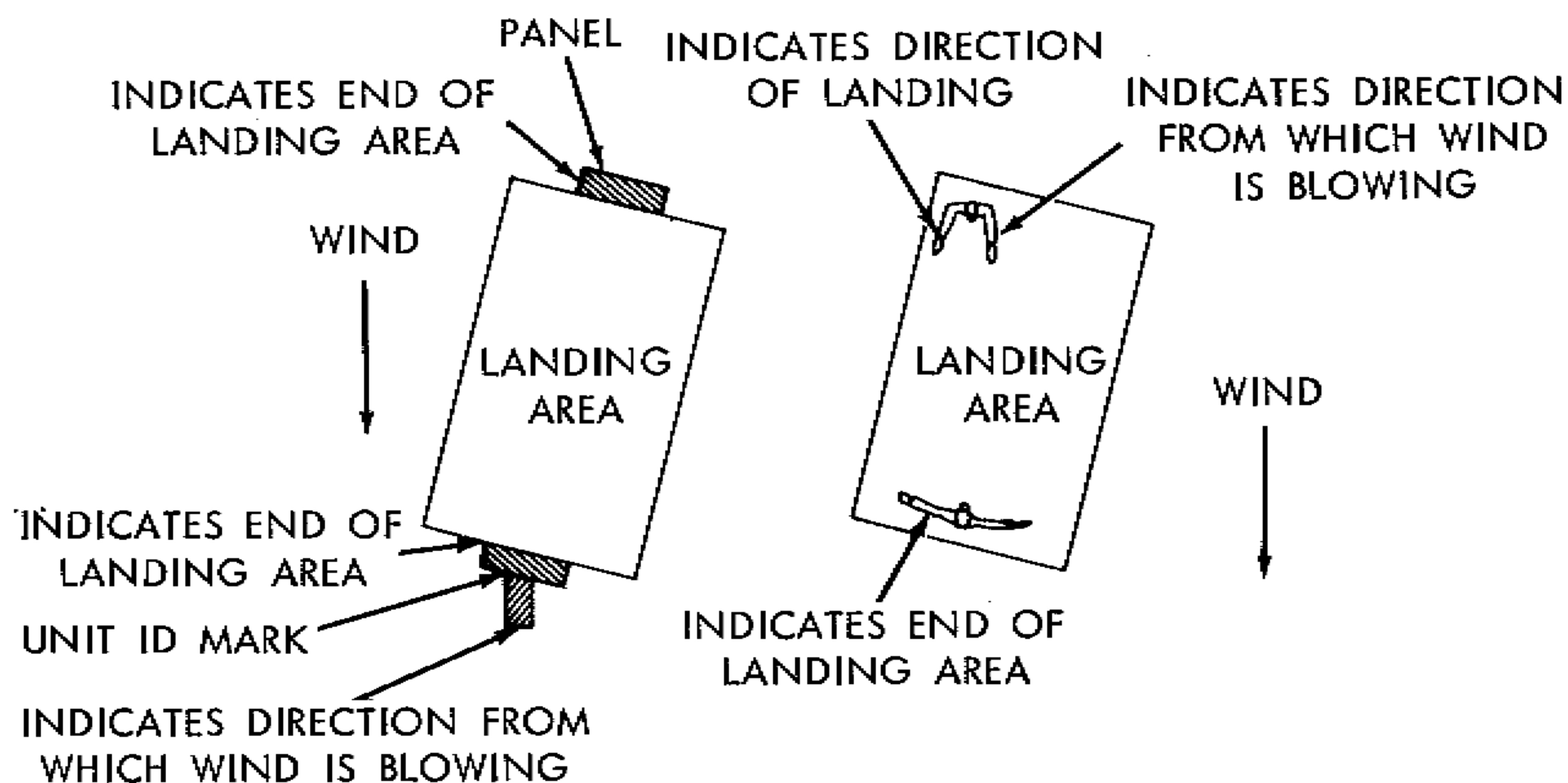
a. Criteria for Priority Movement. The need for evacuation of some patients is more urgent than it is for others. It is therefore necessary to classify patients according to the urgency of need for air movement so that, if aircraft space is limited, the most urgent cases have priority. Normally three movement classifications are used—urgent, priority, and routine (AR 40-535). Classification is a responsibility of the attending medical officer as the representative of the medical facility commander who made the request for evacuation.

b. Criteria for Acceptance. Patients selected for transportation by air must be passed as physically and mentally fit for the proposed flight by the medical officer in charge of the aeromedical treatment facility. Fitness considerations must be balanced with the availability of suitable in-flight medical attention, the

urgency of treatment in a reception area, and the proposed altitude and flight time of the aircraft (NATO STANAG NO. 3204, ANNEX B). Almost every patient can be evacuated by air, if the aircraft are suitably staffed and equipped with medical personnel and facilities. Careful screening of all patients by a flight surgeon, aviation medical officer, or in their absence, a medical officer, is accomplished in order to determine the advisability of transportation by air. Certain categories of patients, however, should not be transported by air if there are alternatives (AR 40-535). Each case must be judged on its own merits, weighing the advantages to the patient of transfer against the possible harmful effects of the flight (NATO STANAG No. 3204, ANNEX B).

c. Preparation of Patients for Air Transportation. The air transportation of patients is a co-operative ground-air procedure. The originating hospital must assume certain responsibilities in preparing the patients for transportation at the time request is made for air trans-

DAYLIGHT OPERATIONS



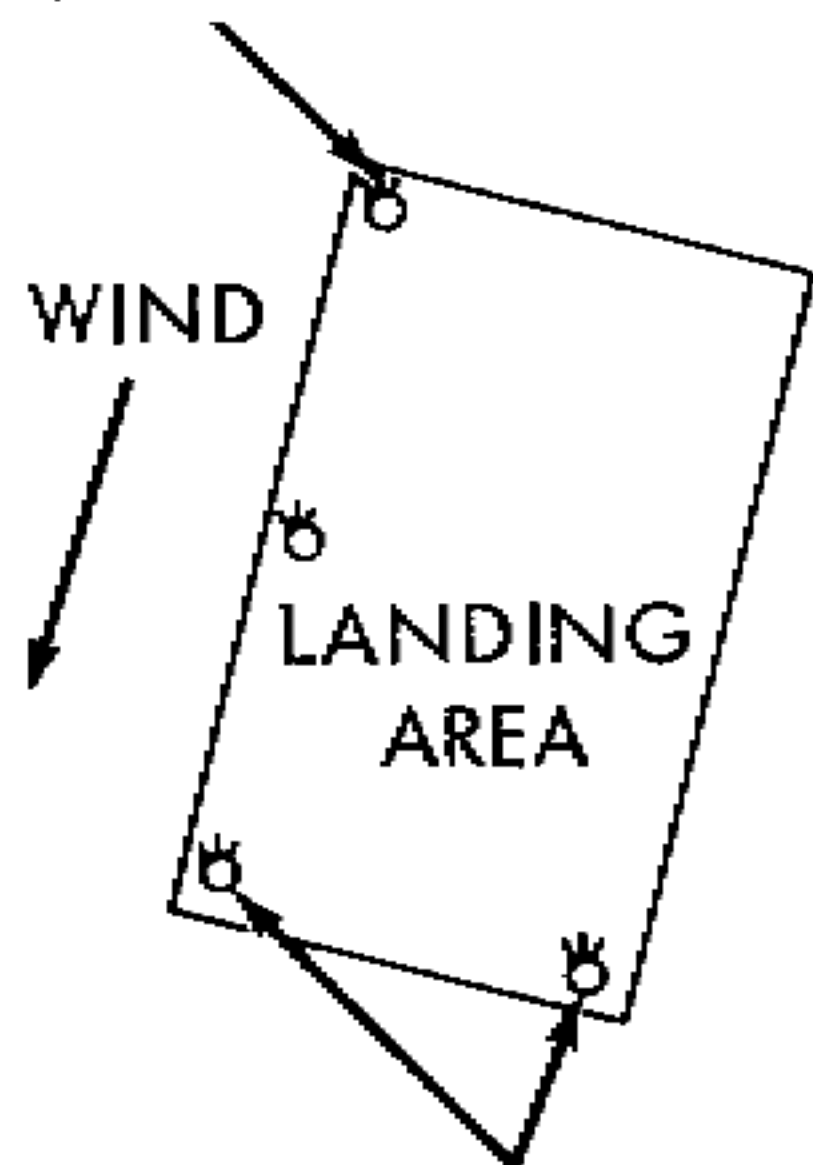
NIGHT OPERATIONS

SMOKE POTS OR LANTERNS

FLASHLIGHT POINTED TO GROUND

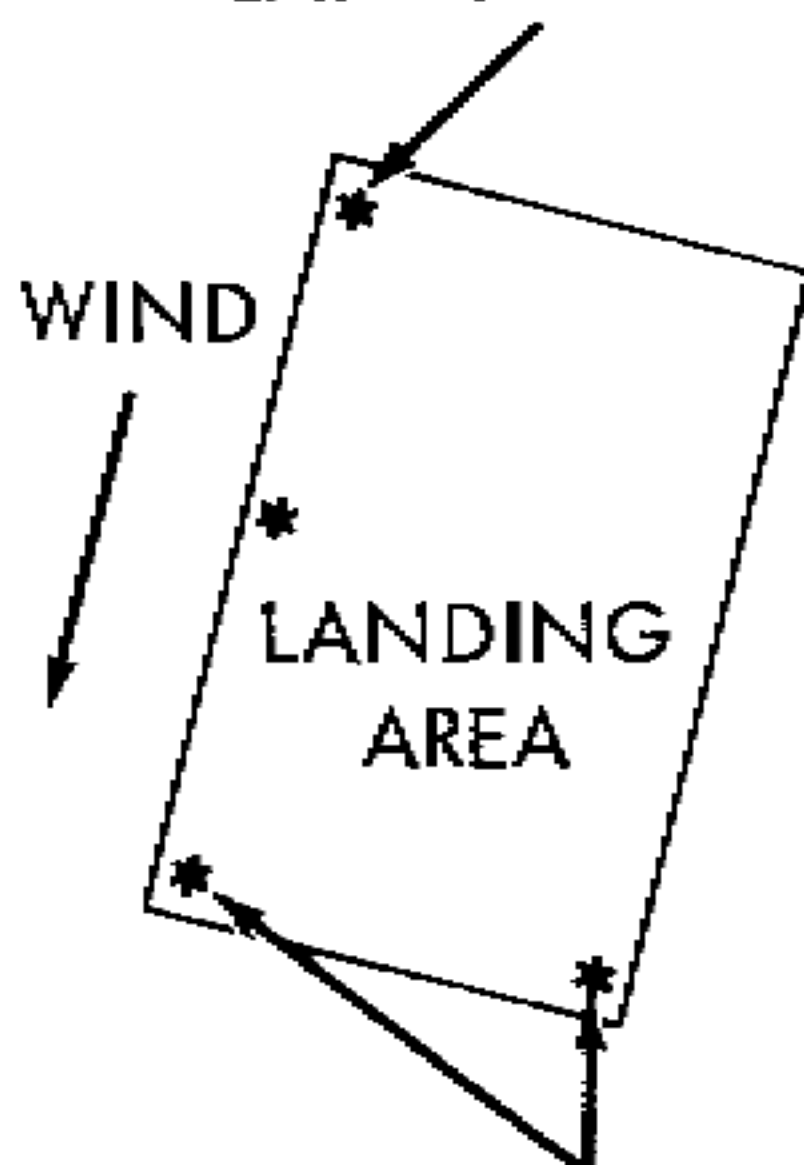
VEHICLE LIGHTS

INDICATES END OF
LANDING AREA



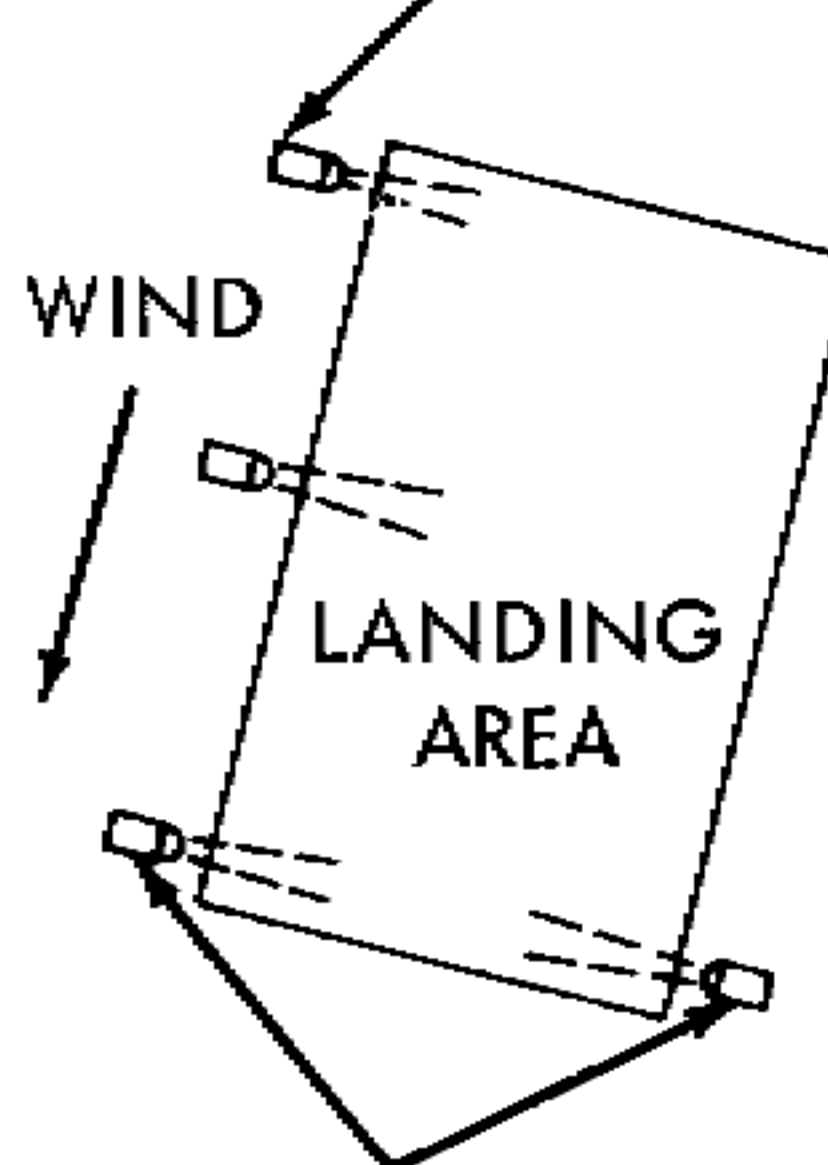
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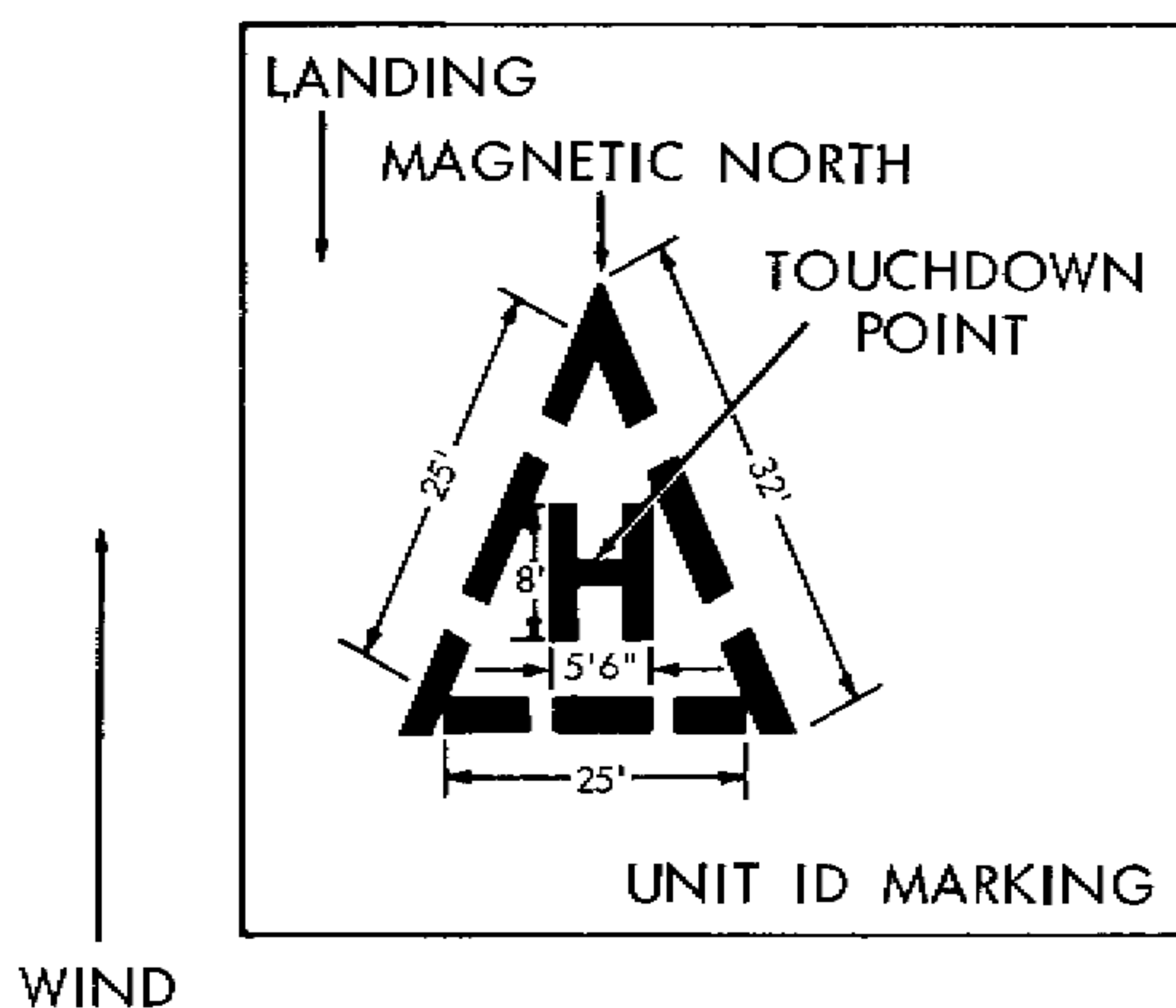


Figure 5-14. Marking and lighting of airfields.

portation. This includes the providing of special instructions, clinical records, special supplies and equipment, and the classifying of patients

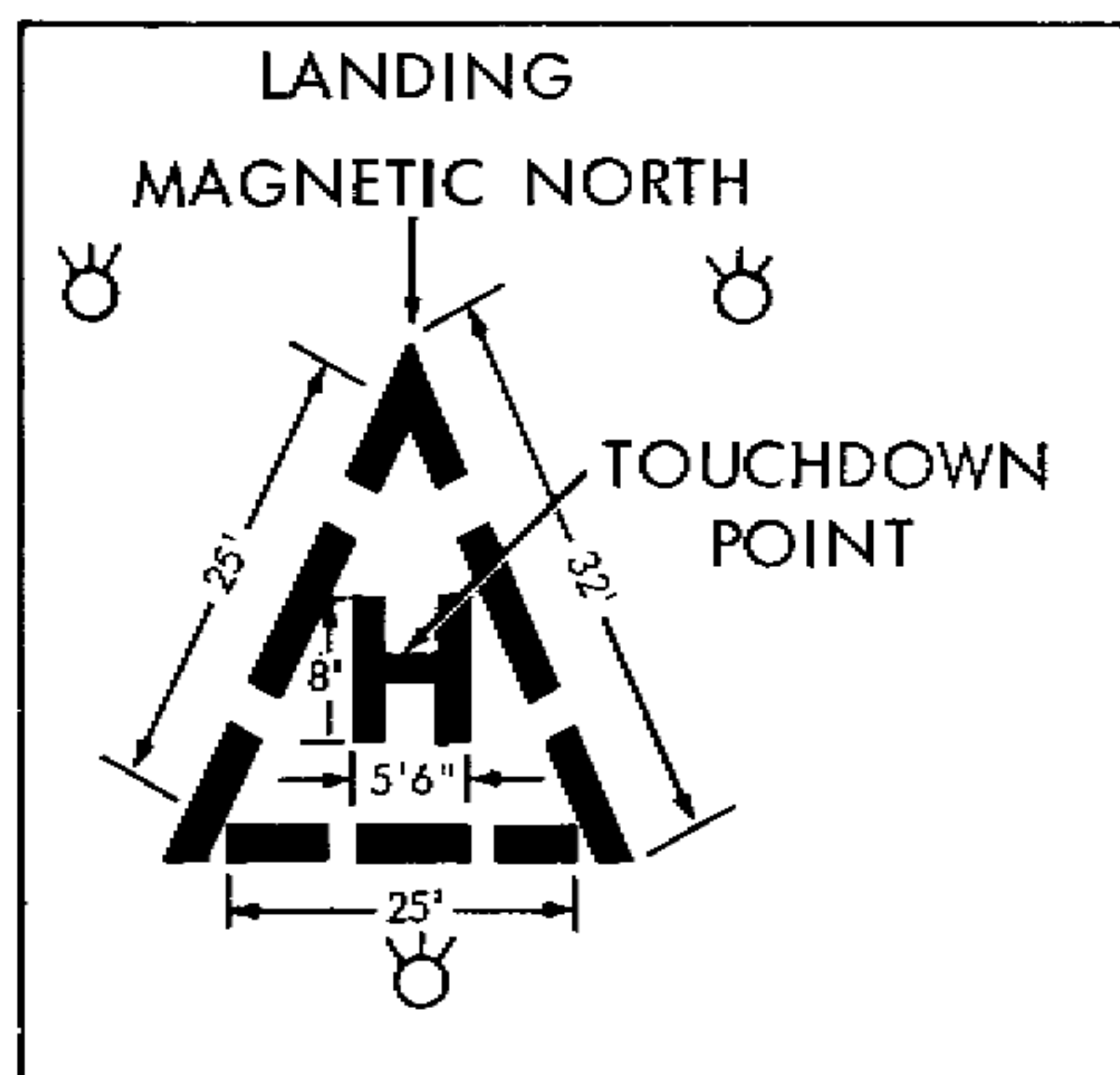
into categories according to physical and mental condition (AR 40-535). All agencies use this classification, which is primarily for identifica-

DAYLIGHT OPERATIONS



NIGHT OPERATIONS

SMOKE POTS OR LANTERNS



VEHICLE LIGHTS

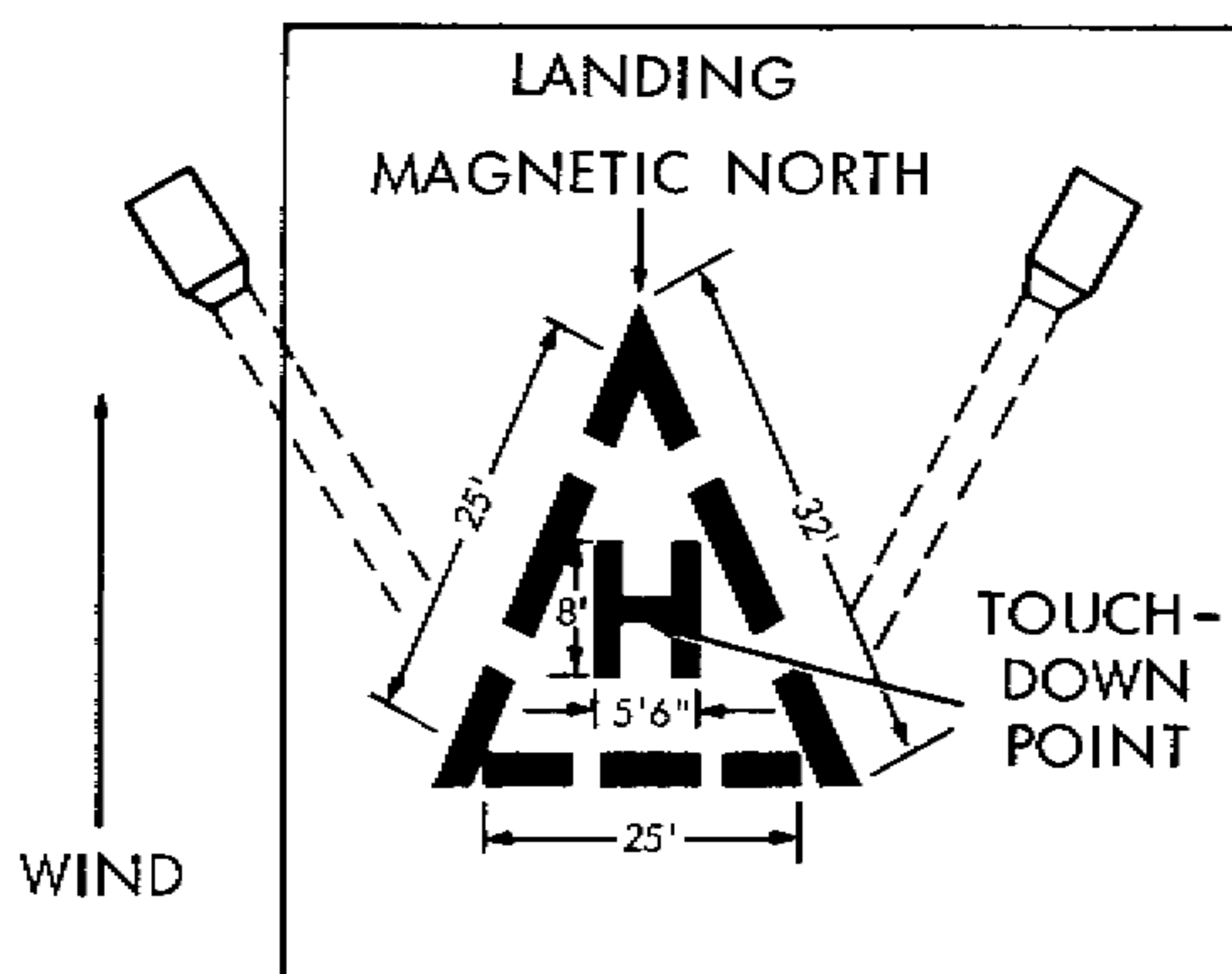


Figure 5-15. Marking and lighting of heliports.

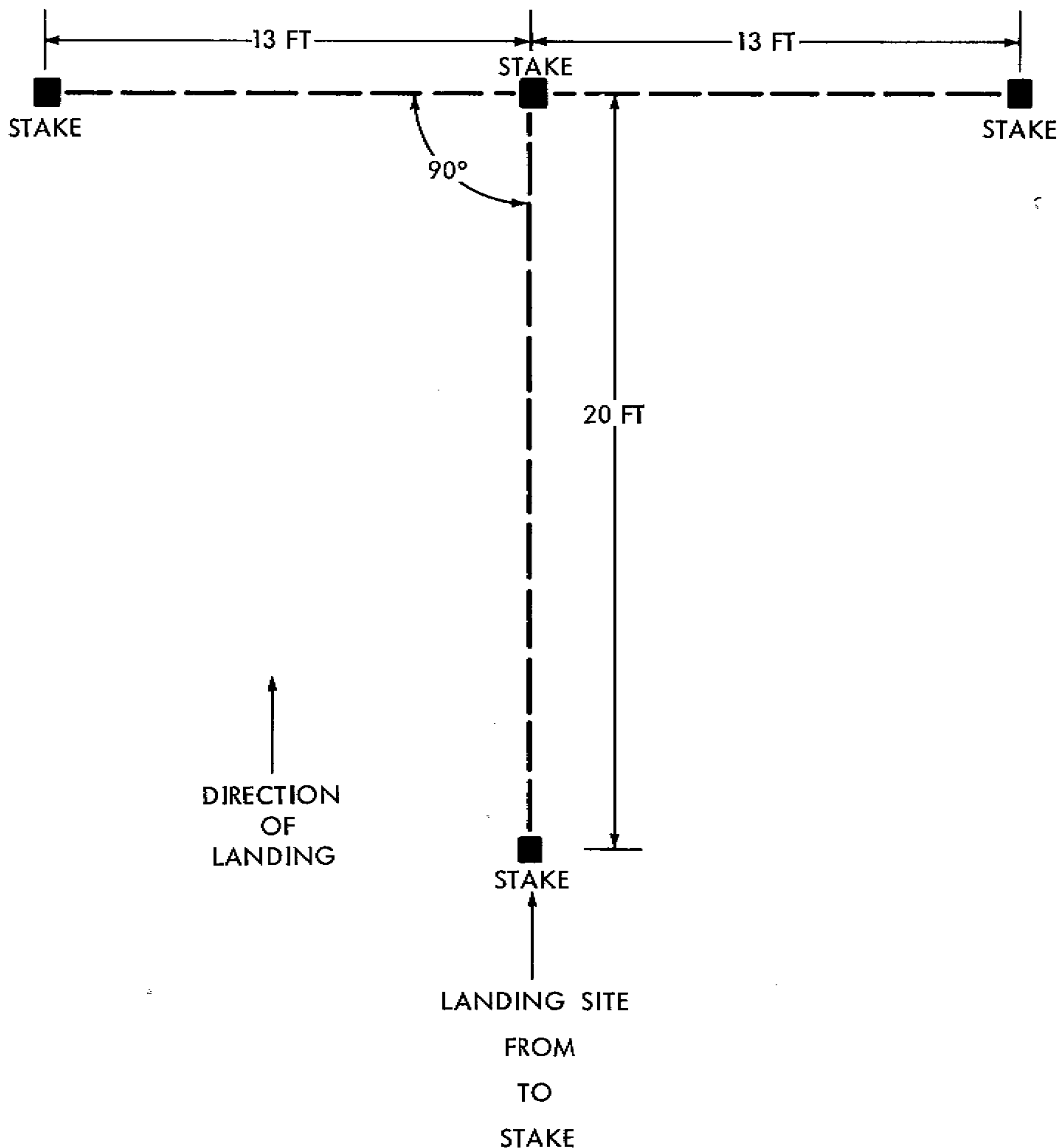
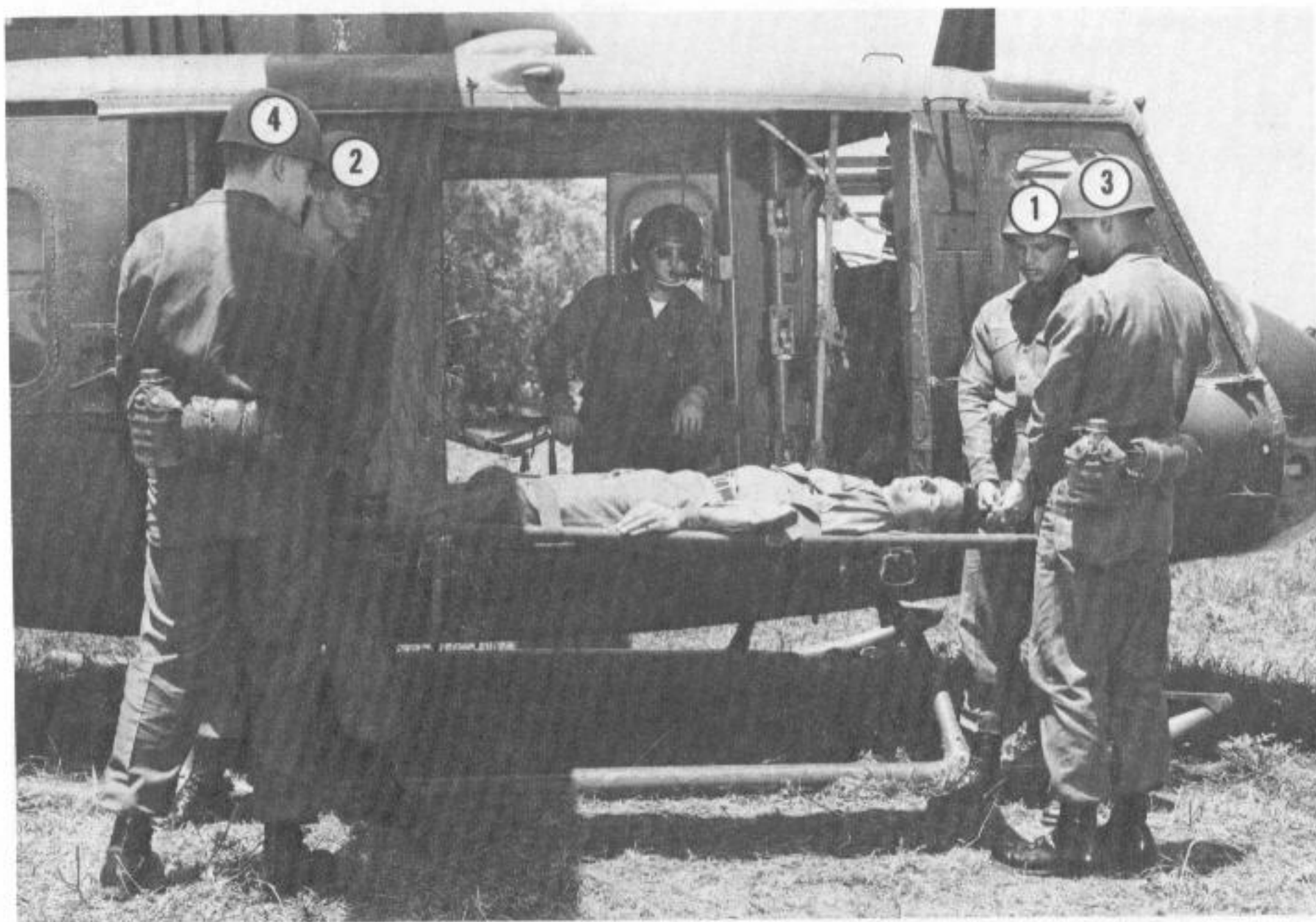


Figure 5-16. Layout of heliport night-landing system (field expedient).

tion and loading purposes from the point of view of in-flight safety and the capability of rendering a maximum amount of sustaining care to the patients.

5-7. Aircraft

The Armed Forces are authorized aircraft which are specifically designed for aeromedical evacuation and are organic to aeromedical evac-



At the first command, the litter team moves along the side of helicopter, approaching from the front until it is even with the cargo compartment.

Figure 5-17. Loading Army Medical Department (AMEDD) air ambulance (UH-1D/H) (right side if right side is loaded first) (step one).

uation type units. The majority of other utility and transport aircraft can be equipped and used for air transport of patients. These air-

craft range in size from the utility helicopter of the Army to the heavy transport fixed-wing aircraft of the Air Force.

Section II. AIR FORCE TRANSPORT AIRCRAFT

5-8. General

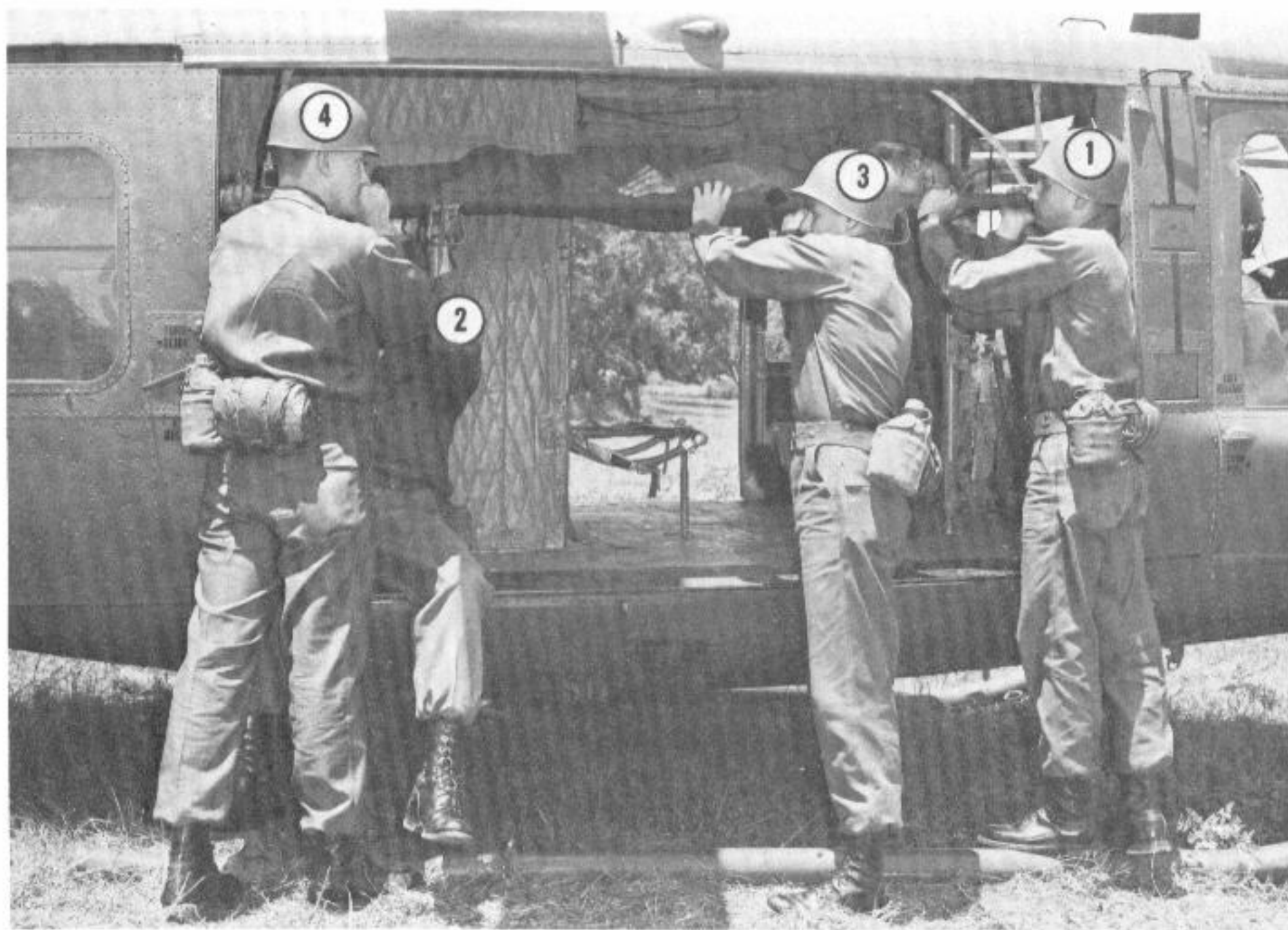
Most Air Force cargo aircraft can be used for aeromedical evacuation. The aircraft are used for the forward airlift movement of troops and supplies and then are reconfigured rapidly for the aeromedical evacuation mission on the return flight. Normally only aircraft in the domestic system are specifically designed for full-time utilization in the aeromedical evacuation role.

5-9. Types of Aircraft

a. The C-130 Hercules (fig 5-1) transport has

a pressurized cabin that can accommodate 20 litter patients and 30 ambulatory patients in peacetime or in wartime. The litters are carried aboard through the cargo loading ramp door, and are placed in four lengthwise rows in the cargo compartment. The aircraft can land and take off on short runways and can be used on landing strips such as those found in advance base operations. Its normal use is within a theater of operations for tactical/assault airlift. The C-130 can also be used for strategic airlift missions if required.

b. The C-7 Caribou (fig 5-2) is a sturdy trans-



- a. At the second command, team moves into semi-overhead carry, lifting the patient just high enough for the litter to fit into the brackets, and begins to load first litter.
- b. No. 1, after giving his handle to crewmember, takes No. 3's handle as No. 3 moves down side of pole.
- c. No. 2 places his handle on top of litter support bracket. (As crewmember is sliding No. 1's handle into bracket at head of patient, No. 2 slides No. 4's handle into bracket at foot of patient and he then moves near No. 1.)

Figure 5-18. Loading Army Medical Department (AMEDD) air ambulance (UH-1D/H) (step two).

port aircraft which may be operated from unprepared fields or hastily prepared strips. It is authorized four litter kits—a right aft kit, and left aft kit, a right forward kit, and a left forward kit. This aircraft has a capacity of 14 litter patients and 10 ambulatory patients in peacetime or in wartime.

c. The C-118 Liftmaster (fig 5-3) has a capacity of 18 litter patients and 25 ambulatory patients in peacetime and 24 litter patients and 25 ambulatory patients in wartime. It is equipped with standard litter support straps and wall brackets. Patients are loaded through the main cargo doors, located in the rear sections of the aircraft. Special lifting devices and ramps are used. The position of the litter

patient in this aircraft is feet forward. The C-118 is excellent for air evacuation because of its automatically pressurized and air-conditioned cabin. It is used in the intratheater overseas fleets but will be replaced by the C-9 Nightingale.

d. The C-131 Samaritan (fig 5-4) is used only in the European intratheater fleet and is also scheduled to be replaced by the C-9 Jet Aeromedical Evacuation aircraft. These aircraft are specially designed as "Flying Hospital Wards" for the aeromedical evacuation mission. The C-131 is a pressurized aircraft which can accommodate 12 litter patients and 17 ambulatory patients in peacetime and 12 litter patients and 21 ambulatory patients in wartime. A com-



- a. No. 3 moves down along side of pole.
- b. No. 3 and No. 4 hold weight of litter up while No. 1 and No. 2 secure litter at each end with litter retaining straps. (All three litters are loaded in the same manner.)

Figure 5-19. Loading Army Medical Department (AMEDD) air ambulance (UH-1D/H) (step three).

bined load uses 15 litters along the left side and 20 rearward-facing airline seats on the right side. It is equipped with standard litter securing devices to support three tiers of four each on each side. An additional tier of three can be loaded on the rear left side; however, this space normally is used for baggage and equipment stowage. Litter patients are loaded through the cargo door in the left rear section with the aid of a special ramp or mechanical loading device. If necessary, ambulatory patients can be loaded by way of the built in steps in the forward section of the aircraft. Presently the only C-131 aircraft specifically designated for aeromedical evacuation are operated on feeder routes within the European theater.

e. The C-9 Nightingale (fig 5-5) is a twin jet, T-tailed aeromedical airlifter which can transport 18 litter patients and 20 ambulatory patients. This aircraft is capable of independent operation, with little or no ground support and can operate into civilian airfields with a limited capability to provide ground support for jet aircraft. The normal medical crew consists of two flight nurses and three medical technicians. The cabin has a galley, forward and aft lavatories, and an aft stowage area. There is a large loading door, with an inclined stowage ramp system. This independent ramp system eliminates the necessity of having ground ramps available at every en route stop.

f. The C-141 Starlifter (fig 5-6) is a high-winged, four-engine jet which is used for all



Loading of the left side varies with that of the right side in the following:

a. No. 3 hands litter handle to crewmember.

b. No. 4 places his handle on litter support bracket and slides the litter handle into bracket.

(No. 3 and No. 4 move to side of litter and support weight of patient while No. 1 and No. 2 secure litter with the litter retaining straps.)

Figure 5-20. Loading Army Medical Department (AMEDD) air ambulance (UH-1D/H), (left side).

flights in the aeromedical evacuation within the strategic MAC system. It can carry 27 litter patients and 42 ambulatory patients in peacetime and 31 litter patients and 54 ambulatory patients in wartime.

5-10. Preparing the Aircraft to Receive Patients

The aircraft crew is responsible for preparing the aircraft to receive litter patients. Before the aircraft is loaded with patients, the medical crew director conducts an inspection of the aircraft to include the following:

a. Inspection of such accessories as litter

straps, clamps, stanchions, hot cups, and spare flashlights.

b. Inspection to insure that rigging is secure and that all equipment is in satisfactory operational order.

c. Check of equipment, such as medical chests, water and coffee jugs, walk-around oxygen bottles, trash receivers, and other movable items, to see that they are properly lashed to withstand flying conditions and constitute no hazard to occupants of the aircraft.

d. A communications check with the pilot to insure that the cabin-to-cockpit communications system is operative.

e. Inspection of the loading of patients' sur-



Figure 5-21. Army Medical Department (AMEDD) air ambulance (UH-1D/H) with maximum litter patient load of six.

vival equipment and other equipment to insure conformity with the existing instructions for that particular aircraft.

5-11. Developing the Loading Plan

Loading patients aboard the larger transport aircraft requires planning, depending upon the capacity of the aircraft, the length of the flight, and the number of litter and ambulatory patients to be transported. Transport aircraft carry litters in tiers normally three or four litters high. In developing a loading plan, the objective is to place each litter patient in a position that will provide the most comfort for him and still not detract from the comfort of the other patients. It is necessary to consider the diagnosis, any preflight preparation or medication to be given the patient, the point where he is to be unloaded, and the amount of care required in flight. In developing the

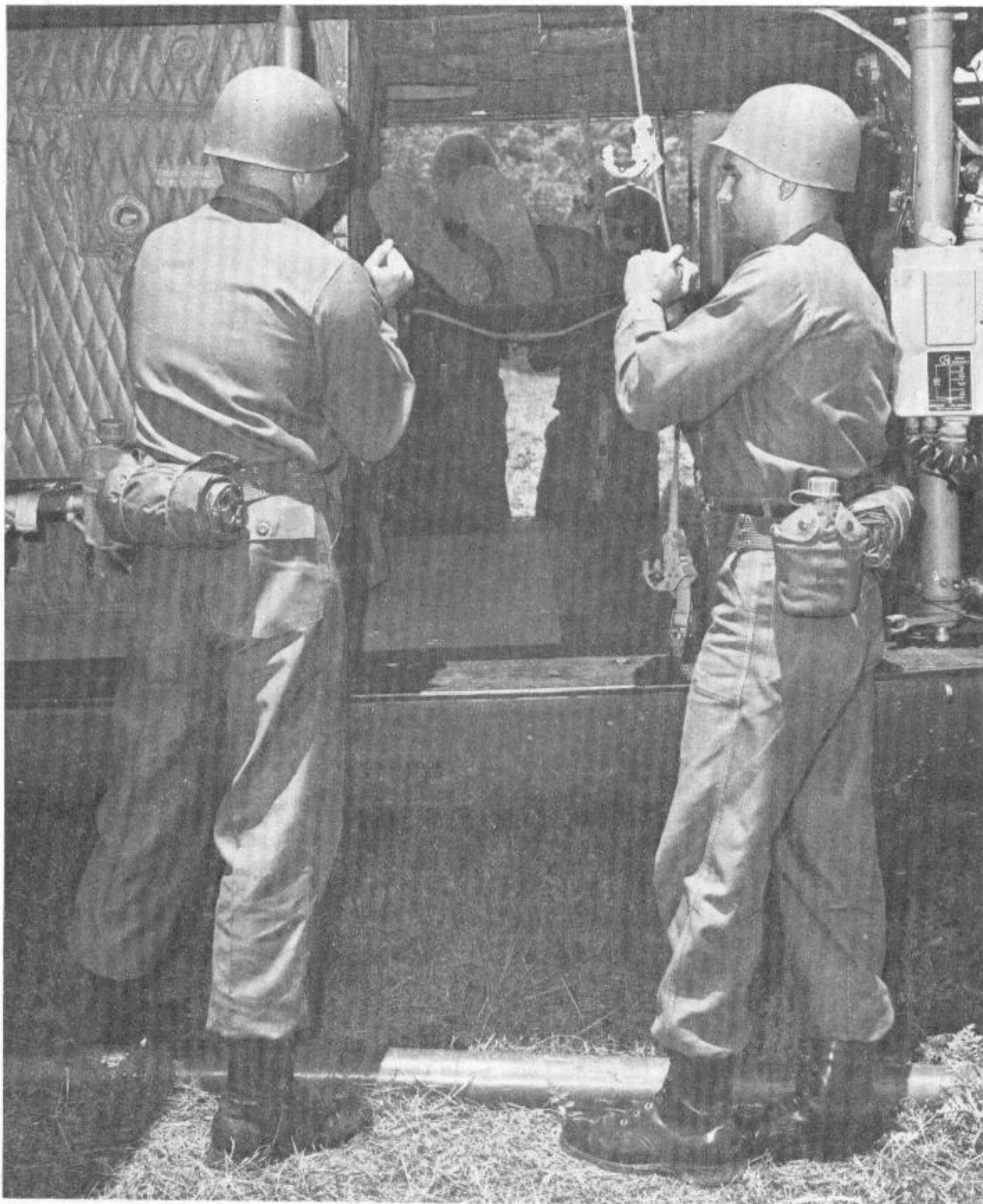
loading plan, the following general rules for loading are considered:

a. The correct placing of litter patients on the aircraft is determined by the patient's injury or illness. Patients in plaster casts or splints must be placed on the side of the aircraft which would make the injured limb accessible for treatment. Certain types of patients, because of their condition, may be required to travel in the sitting or semiprone position on a litter. In these cases, the space for two litters must be used.

b. Female patients should be segregated as much as possible from male patients.

c. Patients requiring bedpans, transfusions, or special treatment or dressings during flight should be placed in the middle tier where they are more accessible for care.

d. Patients who are unable to help themselves should, if possible, be located near the



No. 2 gives his handles to crewmember and moves around the front of the helicopter to the opposite side to assist crewmember in placing his handles in the litter support brackets.

Figure 5-22. Army Medical Department (AMEDD) air ambulance (UH-1D/H), loading first litter crosswise.

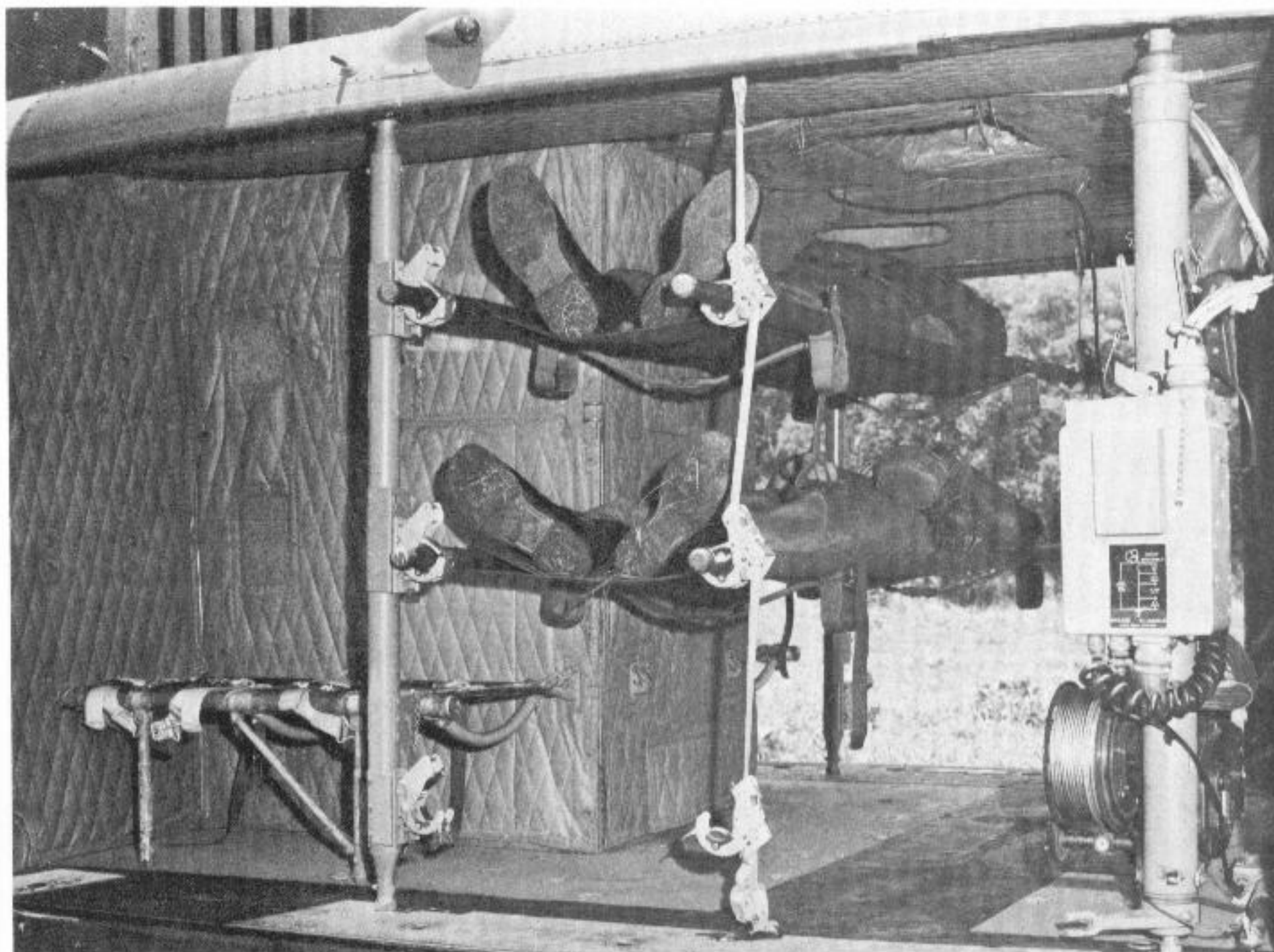


Figure 5-23. Army Medical Department (AMEDD) air ambulance (UH-1D/H) with two litters loaded crosswise.

main cargo door to facilitate their egress in event of an emergency.

e. Loading plans generally insure that patients suffering mental disturbances are located in positions that afford maximum observation. Those with a diagnosis of tuberculosis or other communicable disease should be loaded in rear litter tiers. Patients who are restless (such as those with head injuries) or are unconscious are placed on the bottom tier. Patients with coughs or those subject to air sickness should be placed on the bottom tier positioned at the down-wind end of the normal ventilation flow.

f. When all patients have been loaded, their personal effects can be stowed in the baggage compartment or the after part of the cabin in the aircraft.

g. A preflight briefing should be given to all patients. The medical crew director is responsi-

ble for insuring that it is conducted as flight routine before each flight. Briefing should be complete and conducted in such a way as not to alarm patients who in many cases are flying for the first time.

5-12. Responsibilities for Loading

The commander originating the patients is responsible for delivering them to the landing field and for loading them aboard the aircraft. The actual loading is always performed under the supervision of aeromedical evacuation personnel. In airhead operations, patients normally are transported by jeep or litter bearers to designated points within the perimeter of the airhead where assault aircraft normally are present. These points are identified by checkered flags. Here elements of the forward aeromedical evacuation flights take over the supervision of the loading operations.



Figure 5-24. Army Medical Department (AMEDD) air ambulance (UH-1D/H) with mixed load of three litters plus ambulatory patients.

5-13. Loading

Four men, plus the medical crew director and

flight line aeromedical operations officer, load fixed-wing aircraft.

Section III. ARMY FIXED-WING AIRCRAFT

5-14. General

The capability of Army fixed-wing aircraft to land on and take off from selected, small, unprepared areas permits the evacuation of patients from areas of operations which would be inaccessible to larger aircraft. These aircraft can fly slowly and maintain a high degree of maneuverability, which further enhances their value in forward areas under combat conditions. Army fixed-wing aircraft are limited in speed and range as compared with larger transport-type aircraft. When adequate airfields are available fixed-wing aircraft may be used in forward areas for evacuation of patients. This is a sec-

ondary mission for these aircraft, which will be utilized only to augment AMEDD air ambulance capabilities.

5-15. Types of Army Fixed-Wing Aircraft

Army fixed-wing aircraft capable of being used for air movement of patients are as follows:

a. *U-6 Beaver* (fig 5-7). This aircraft is the Army's standard fixed-wing utility class aircraft employed at division and higher headquarters to expedite operations in the combat zone. It can carry two litter patients or five ambulatory patients.

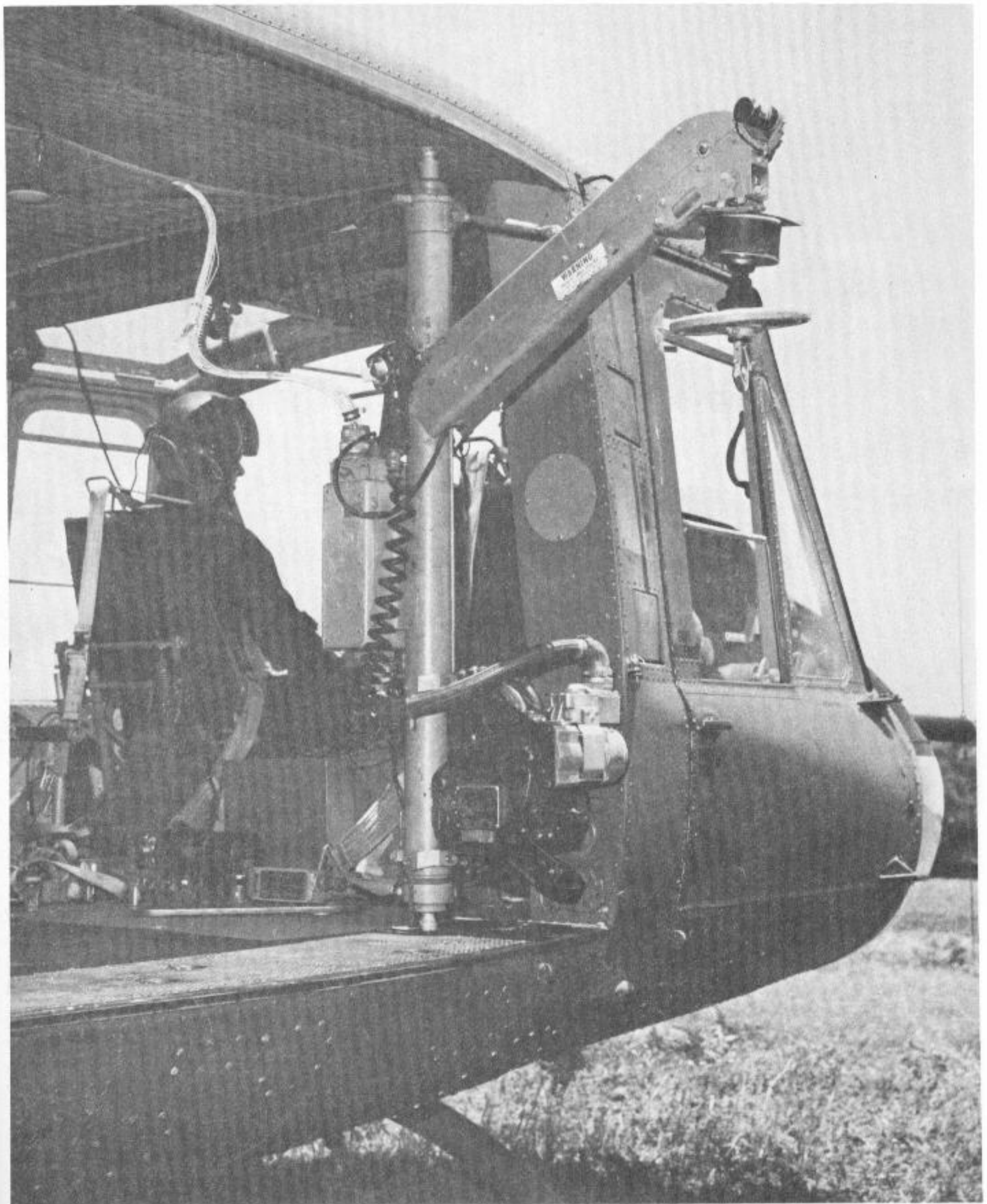


Figure 5-25. Helicopter internal personnel rescue hoist.



Figure 5-26. Litter patient being hoisted into UH-1D/H by helicopter internal personnel rescue hoist.

b. *U-1A Otter* (fig 5-8—5-10). This is a rugged aircraft with large wing surfaces and is assigned to fixed-wing tactical transportation companies. It is designed for maximum efficient operation from short unimproved fields. It can carry six litter patients or ten ambulatory patients.

c. *U-21A Ute* (fig 5-11). This twin turbo-prop utility aircraft is capable of accommodating ten ambulatory patients or three litter patients.

5-16. Loading Patients Aboard Light Fixed-Wing Aircraft

Loading patients aboard light fixed-wing aircraft is accomplished by the personnel that

transport the patients to the landing strip. Litters are generally loaded in order from the top downward and from the front to the back.

a. Four men, plus the crew chief, normally load fixed-wing aircraft.

b. The crew chief, or other member of the aircraft's crew, supervises the loading of all patients.

c. No. 2 of the litter bearer team would normally enter the aircraft to assist the crew chief, or other crew member in the supervisory position, in the loading of the litter.

d. Loading plans (para 5-11) may be required for CV series aircraft.



Figure 5-27. Seat rescue assembly, forest penetrating, 1-3 personnel capacity (forest penetrator).

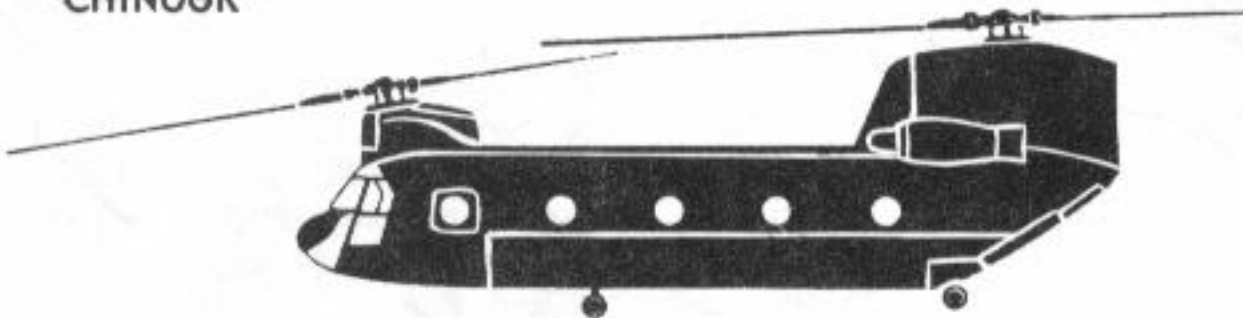


Figure 5-28. Patient being hoisted into UH-ID/H by seat rescue assembly, forest penetrating, 1-3 personnel capacity (forest penetrator).



(1)

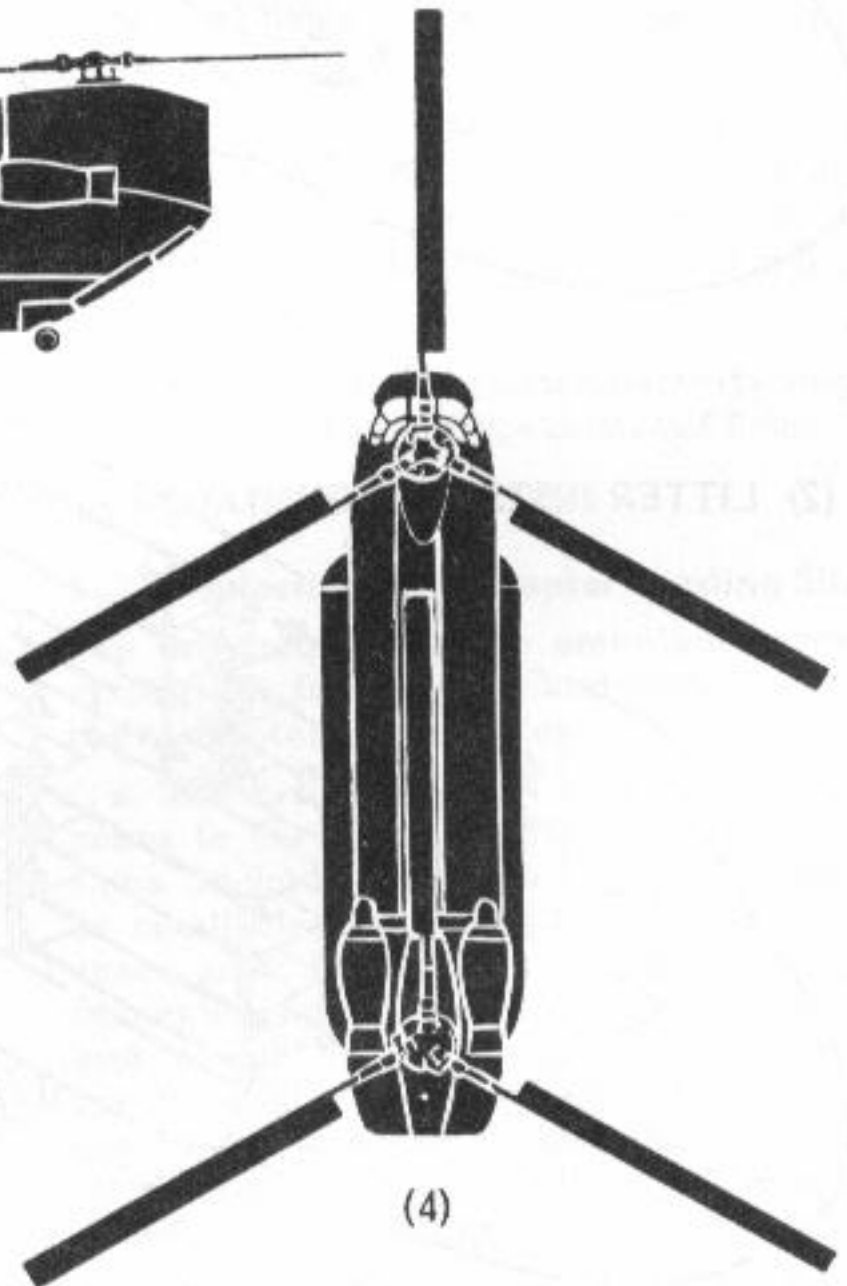
"CHINOOK"



(2)



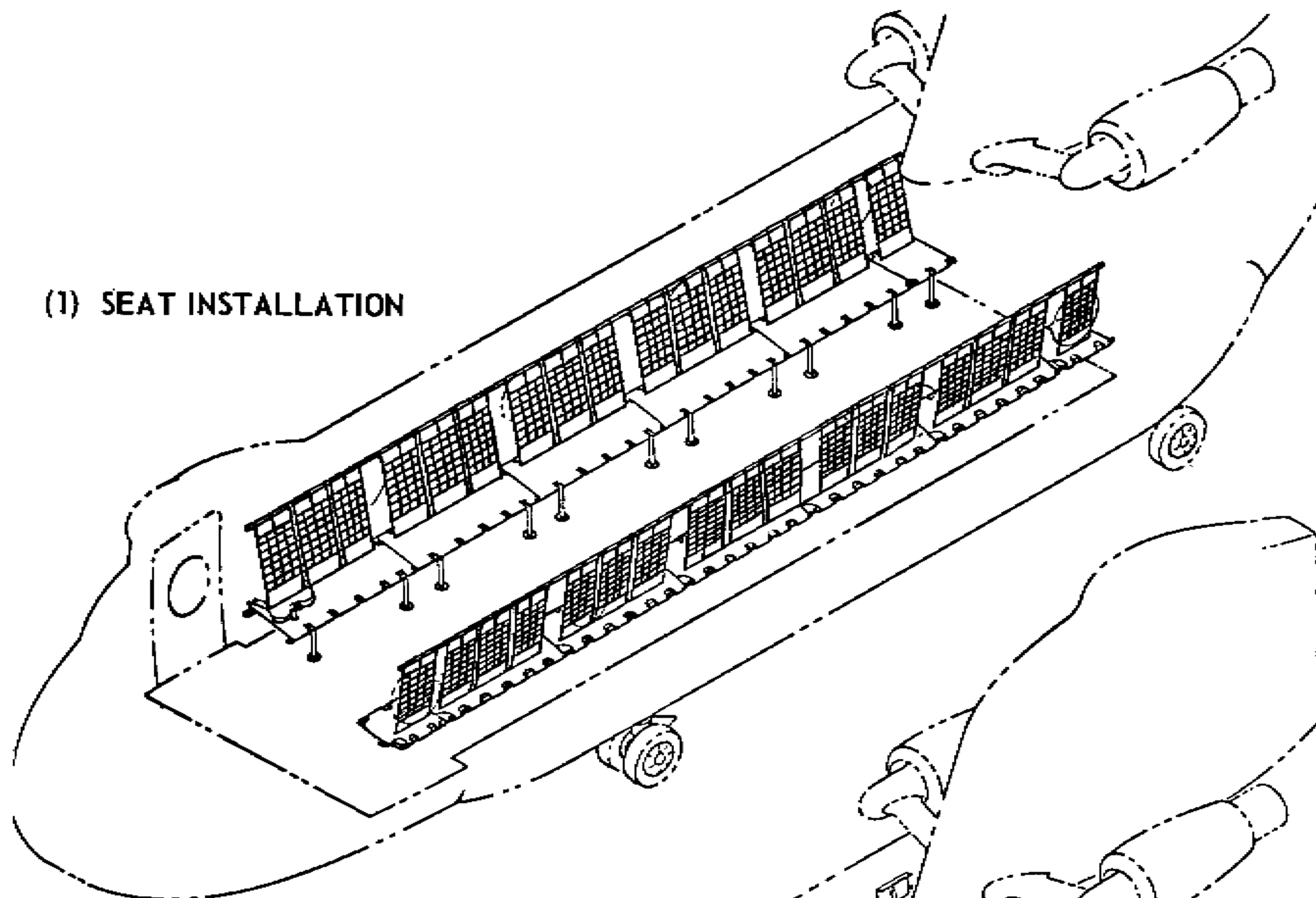
(3)



(4)

Figure 5-29. CH-47 Chinook helicopter.

(1) SEAT INSTALLATION



(2) LITTER INSTALLATION

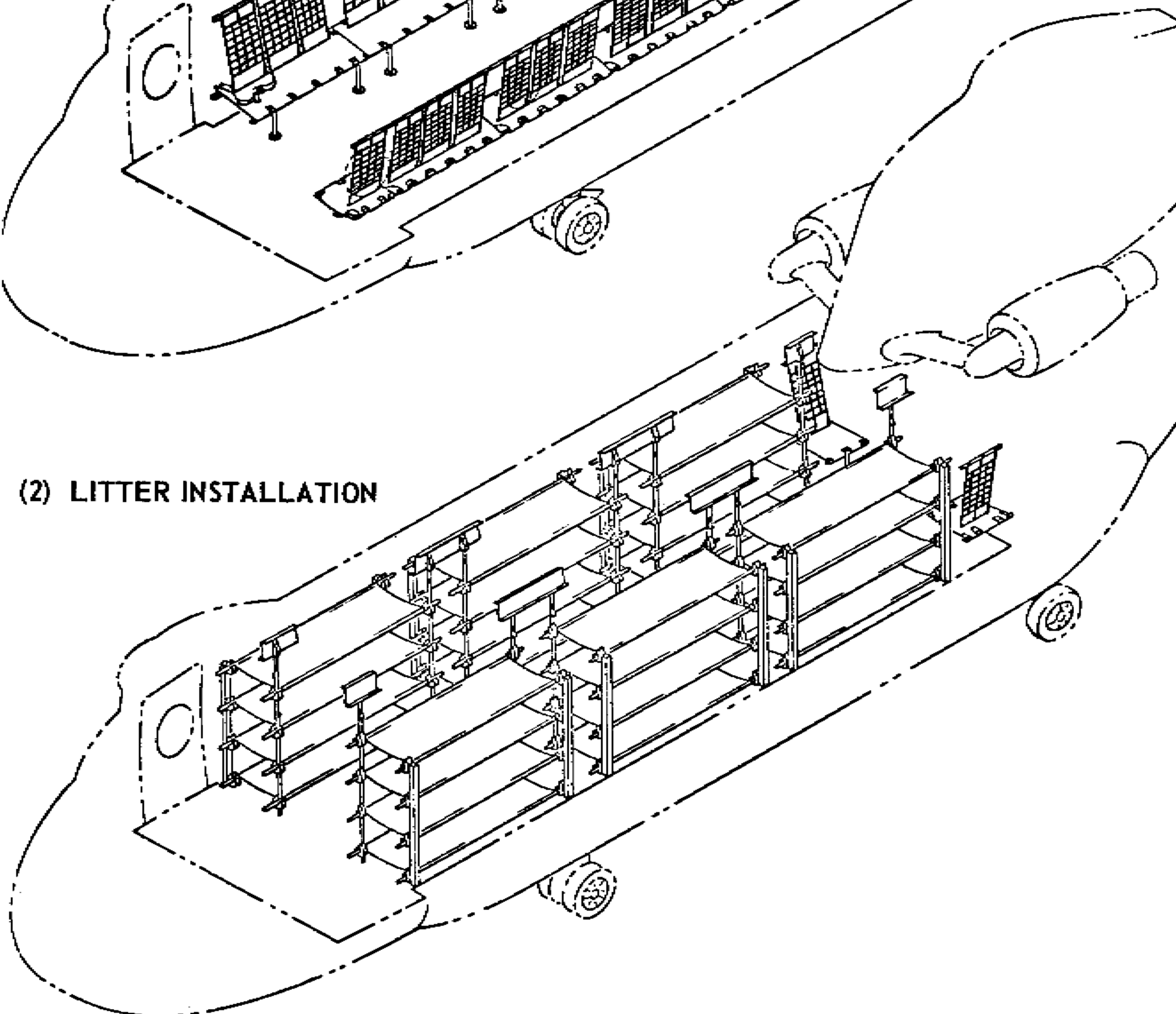


Figure 5-30. Interior view of CH-47, Chinook helicopter.

Section IV. ARMY HELICOPTER AIRCRAFT

5-17. General

Helicopters are rotary-wing aircraft capable of horizontal, vertical, lateral, and hovering flight. Their ability to circumvent terrain and obstacles and minimum requirements for takeoff and landing enable them to operate from areas otherwise inaccessible to fixed-wing aircraft or surface vehicles. The capability of helicopters for flight at relatively slow speeds permits operations during periods of reduced ceiling and visibility. Helicopters are organic to the AMEDD air ambulance units and aviation units of the division, corps, and field army.

5-18. Helicopter Designations

Helicopters are assigned a combination of significant letters and numbers which are used to designate basic mission and type—observation helicopter (OH), utility helicopter (UH), and cargo/transport helicopter (CH). The last two designations of helicopters can be used for air transport of litter patients.

a. UH-1D/H aircraft are used as AMEDD air ambulances. The UH-1D/H (fig 5-12 and 5-13) has a litter patient capacity of 6 or an ambulatory patient capacity of 9.

b. The CH-47 Chinook has a litter patient capacity of 24 or an ambulatory patient capacity of 33.

5-19. Loading Patients Aboard Helicopters

Generally, the procedures outlined in paragraph 5-16 are applicable for loading patients aboard helicopters. Loading plans may be required for the transport helicopters. Specific loading instructions for air ambulances are provided in paragraph 5-28. When loading and unloading rotary-wing aircraft, certain precautionary measures will be observed. Litter bearers should present as low a silhouette as possible, and must keep clear of the rotors at all times. Smoking is not permitted within 50 feet of an aircraft on the ground. Helicopters should not be approached until signaled to do so, and then should be approached at a 45° angle from the front of the aircraft. If the helicopter is on a slope and conditions permit, loading personnel should approach the aircraft from the downhill side. Directions given by the crew will be followed and litters will be carried parallel to the ground.

a. Litter patients should be positioned in the helicopter dependent upon the nature of their wounds or their condition. Personnel aboard the helicopter will supervise the loading and positioning of the patients.

b. The most serious litter patients should be loaded last so they will be unloaded first.

Section V. AMEDD AEROMEDICAL EVACUATION OPERATIONS

5-20. General

This section includes the provisions of NATO STANAG No. 2087, Medical Employment of Helicopters in Ground Warfare.

5-21. Missions

The primary mission of air ambulance units is aeromedical evacuation of patients. Secondary, missions include transportation of medical personnel, supplies and equipment, and air crash rescue.

5-22. Medical Employment of Helicopters

Medical employment of helicopters in ground warfare and organization will include planning and organizing for fulfillment of missions which fall within the purview of the Army, regardless of which force operates the helicopters. Control of operations will be in accordance with local directives and the organization of the forces concerned.

5-23. Selection of Helicopter Landing Sites

The unit requesting air ambulance service is responsible for selecting and properly marking the helicopter landing sites.

a. The helicopter landing site and approach zones to the areas should be free of obstructions. Inclosed areas of restricted space, such as small clearings, will be avoided. Sufficient space must be provided for the hovering and maneuvering of the helicopter during landing and takeoff. The approach zones should permit the helicopter to land and take off into the prevailing wind. It is desirable that landing sites afford helicopter pilots the opportunity of making shallow approaches.

b. Definite measurements for landing sites cannot be prescribed, since they must vary with temperature, altitude, wind, terrain, loading conditions, and individual helicopter characteristics. The minimum requirement for light helicopters is a cleared area 100 feet in diameter

with an approach and departure zone clear of obstruction.

5-24. Marking the Obstructions

Any object likely to be blown about by the wind from the rotor (for example, paper, cartons, ponchos, blankets, tentage, or parachutes) should be removed from the landing area. Obstacles, such as cables or wires at or near landing sites, which cannot be removed and may not readily be seen by a pilot, must be clearly marked.

5-25. Identifying the Landing Site

(fig 5-14—5-16).

a. The landing site should be outlined with material, such as engineer tape or rocks, of a color contrasting with the background.

b. Where the tactical situation permits, a landing site should be marked with a letter "H," using identification panels or other appropriate marking material.

c. If the tactical situation permits, the wind direction may be indicated by a small wind sock or rag tied to the end of a stick in the vicinity of the site, by a man standing at the upwind edge of the landing site with his back to the wind and his arms extended forward, or by smoke grenades which emit colored smoke as soon as the helicopter is sighted.

d. The following considerations for night operations should be applied:

(1) One of the many ways that a landing site is marked is with four lights placed, one at each corner of the usable landing area. These lights should be colored in order to distinguish them from other lights which may appear in the vicinity. The color in this case also constitutes one element in identifying the site. Flare pots, or other types of open lights, should not be used since they usually are blown out by the rotor down-wash and often create a glare and reflection on the aircraft windshields, which tends to blind the pilots. The site is further identified and distinguished from others operating in the general vicinity by a coded signal flash to the pilot from a ground operator using the directed beam of a signal lamp, flashlight, vehicle lights, or other means which have been agreed upon at the time the request for the mission was made. The coded signal is continuously flashed to the pilot until recognition is assured. The signal operator who has taken his position on the upwind side of the landing site then directs the beam of light downwind along the ground so as to bisect the landing

area. The pilot makes his approach for landing in line with the beam of light toward its source and lands at the center of the marked area. All lights are displayed for only a minimum time before arrival of the helicopter and are turned off immediately after the landing.

(2) When the use of standard lighting methods is not possible, pocket-sized red and/or white strobe lights are excellent means for the pilot to identify the landing zone. In addition, field expedients may be used when necessary. Cigarette lighters, burning C-ration cases, and small cans filled with fuel and sand have been used successfully in the past.

(3) Usually, the pilot will be able to take off without the assistance of lighting. During takeoff only those lights requested by the pilot are displayed; they are turned off immediately after his departure.

e. The ground contact team can ask the pilot to turn on his rotating beacon momentarily in order to identify the correct aircraft and confirm the position of the helicopter in relation to the landing zone, i.e., north, south, east, or west. The rotating beacon can be turned off as soon as the ground contact party has located and identified the correct aircraft. It will be helpful for the ground contact party to tell the pilot where he is in relation to the landing zone and, by observing the aircraft's silhouette, guide the aircraft toward the landing zone. When the aircraft is maneuvering toward the landing zone, two-way radio contact is maintained and the type of lighting or signal being displayed is described to the pilot via radio. The signal should be continued until the aircraft lands in the landing zone.

f. Proper utilization of FM homing procedures can prove to be a valuable asset, especially to troops in the field under adverse conditions. Through the use of FM homing, accurate location of personnel on the ground can be accomplished by the aviator in the air. In order for a homing operation to be successful, the personnel on the ground must be able to use the radio efficiently. Certain requirements must be known and executed.

(1) Personnel on the ground must know how to properly tune and operate the radio in order to gain maximum performance of the set.

NOTE: Procedures for tuning and operating a radio set can be found in the technical manual pertaining to the type of radio being utilized.

(2) Ground personnel who operate radios must have sufficient knowledge of FM homing procedures as they pertain to their actions.

The following items should be kept in mind when conducting homing operations:

(a) The distance range of FM radio communications is limited to line of sight. If possible, personnel should remain clear of obstructions and obstacles which could interfere with or totally block the radio signals.

(b) The radio set used must transmit within the frequency range of 24 to 49 mc in order to conduct homing operations.

(c) When the aviator asks the individual with the radio to "key the microphone," he is simply asking that the transmit button be depressed for a period of 10 to 15 seconds. This gives the pilot an opportunity to communicate the direction to the person using the radio on the ground.

5-26. Operation

Medical agencies are responsible for the movement of patients to and from helicopter landing sites, rapid loading and unloading of patients, and in-flight medical care. In the absence of military medical personnel, the senior military authority present will be responsible.

a. Responsibility for Loading and Securing. The pilot of the aircraft is responsible for insuring that prescribed methods of loading and securing litters and related equipment are followed by the personnel loading patients in the helicopter. The final decision as to how many patients may be safely loaded lies with the pilot in command of the aircraft.

b. Requests for Helicopter Evacuation. A helicopter evacuation request may originate from many sources, that is, an infantry platoon, a medical section, or a medical battalion. Requests for these missions will be processed through the fastest and most reliable means available. A sole user channel is desirable for the expedient transmission of aeromedical evacuation requests. Within the area of their responsibility surgeons may monitor requests and recommend priorities. Requests for helicopter evacuation should include the following:

(1) Location of pickup site. If coordinates are used, they should contain 6 digits and be preceded by the 100,000 meter grid designator.

(2) Radio frequency and call sign. The radio frequency and call sign should be that of the radio located at the site of the patients and not a relay frequency.

(3) Patient category of precedence (priority).

(4) Number of patients by type (litter and ambulatory).

(5) Security of pickup site (enemy location and/or weaponry).

(6) Type of wound, injury, or illness.

(7) Method of marking pickup site.

(8) Special equipment requirement (hoist, Stokes litter, forest penetrator, etc.).

(9) Weather at pickup site.

(10) Patient nationality.

c. Contact Man. Upon anticipating the evacuation of patients by helicopter, the unit commander should assure himself that a contact man familiar with the principles of helicopter operations is designated to conduct the operation at the landing site, load or unload the aircraft, and secure the site after the operation is completed. The contact man has the following duties:

(1) Select and prepare the landing site.

(2) Brief his crew on safety measures.

(3) Contact the pilot personally and receive any supplies which may be delivered.

(4) Direct the loading and unloading of the aircraft according to the pilot's instructions.

(5) Brief the pilot on the position of enemy troops, direct him to other units in the area if he should inquire, and make every effort to speed the helicopter on its way.

(6) Be prepared to report the type and quantity of supplies received, where they are delivered, and the patients evacuated.

d. Communications. Communications facilities between the individual in control of evacuation missions, the helicopters, and the requesting individual must be provided whenever possible. Communications will be minimized by accurate information in the original request for air ambulance service. Changes in the tactical situation may require relocating of the landing site or rerouting the flight to another facility.

5-27. Checklist

The following list contains the more important items which must be considered in selecting, preparing, marking, and operating a helicopter landing site. It is recommended as a checklist to insure that the landing site is adequately prepared for operation.

a. Is all pertinent information properly assembled for the request of a helicopter mission?

b. Are the terrain features such that the operation of the helicopter will be practical and safe?

c. Are the directions of approach of sufficient width and length and free of obstruction?

d. Is the site itself large enough for the safe

landing, loading, and takeoff of the largest type aircraft expected?

e. Are the correct identification symbols and wind indicators available for display in advance of the arrival of the helicopter, and are they of the proper color in accordance with information included in the request?

f. Is the contact man properly briefed for aiding the pilot in landing, unloading, and loading the helicopter, and briefing the pilot on enemy capabilities and location of friendly troops?

g. Have all personnel been properly briefed on safety precautions?

h. Have personnel been designated to clear the site of panels and other characteristics which, upon conclusion of the operation, might identify it as a helicopter landing site to the enemy?

5-28. Army Medical Department (AMEDD) Air Ambulance (UH-ID/H)

This helicopter has several litter and seating arrangements which can be installed within a few minutes to meet changing operational requirements. On each side of the helicopter cargo compartments there are facilities for carrying a tier of three litters loaded lengthwise in the aircraft. This gives the helicopter a maximum litter capacity of 6, or it can carry 9 ambulatory patients. If the litters are loaded crosswise, a mixed load of three litters and four ambulatory patients can be transported.

CAUTION: Litter patients receiving intravenous fluids should not be loaded on the top row of litter tiers. Patients with a Thomas leg splint and splint support and footrest must be loaded last and placed directly on the floor of helicopter.

Normally, the helicopter has a crew of four — a pilot, co-pilot, crew chief, and medical attendant.

a. *Loading* (fig 5-17—5-21). The litters are loaded from top to bottom. They can be loaded from either side of the aircraft. Figures 5-17 through 5-19 illustrate procedures for loading from the right side. Figure 5-20 illustrates procedures for loading the left side. The first command is Prepare to Load, LOAD. The second command is Semi-overhead Carry, MOVE.

b. *Mixed Loading* (fig 5-22—5-24). When this helicopter is equipped for mixed loading, three litters can be loaded crosswise and four ambulatory patients loaded in the side seats.

(1) The *first* command is Helicopter, POSTS. At this command the litter team moves up

to the right side of the helicopter with the litter perpendicular to the cargo compartment.

(2) The *second* command is Prepare to Load, LOAD. At this command the team moves into a litter post carry. Number 2 gives his handles to the crewmember and moves around the front of the helicopter to the opposite side to assist the crewmember in placing his litter handles in the litter support brackets.

(3) After the first litter is loaded, the team will leave the helicopter as a team to load the next two litters. The second and third litters are loaded in the same manner as is the first. After the three litters are loaded, the ambulatory patients will approach the aircraft and take their seats.

c. *Unloading.* To unload the aircraft, the reverse of the loading procedure is followed. The tiers are unloaded, *from bottom to top*, first one side, then the other.

(1) The *first* command is Helicopter, POSTS. At this command, the litter team members move to the helicopter and take their proper places at the litter.

(2) The *second* command is Prepare to Unload, UNLOAD. At this command, they perform their duties in the reverse manner of loading, with each team member performing the same duties as in the loading of the helicopter.

d. *Helicopter Internal Personnel Rescue Hoist* (fig 5-25 and 5-26). The internal rescue hoist enables the evacuation helicopter to evacuate patients when a landing zone is not available. Rescue and medical personnel may also be lowered into otherwise inaccessible sites by use of the hoist. The hoist has a cable with a length of 256 feet and can lift loads weighing up to 600 pounds. The rescue hoist can be used with a Stokes metal litter (modified with suspension cables) or with a seat rescue assembly, forest penetrating, 1-3 personnel capacity, commonly referred to as a forest penetrator.

(1) *Stokes metal litter (modified).* To prepare for a patient recovery, ground personnel should—

(a) Allow Stokes litter to touch ground (this will discharge static electricity).

(b) Unhook litter from helicopter hoist hook.

(c) Move suspension cables to sides of litter and unfasten restraining straps.

(d) Place patient in Stokes litter and secure restraining straps.

Caution: Patient must be removed from standard or improvised litter before being placed

in Stokes litter. Do not place any equipment (rifle, grenades, radios, etc.) in Stokes litter with patient.

(e) Bring lifting rings to center position and fasten to helicopter hoist hook.

(f) Signal hoist operator when ready for lifting and steady Stokes litter with hands to prevent unnecessary oscillating until out of reach.

(2) *Seat rescue assembly, forest penetrating, 1-3 personnel capacity (forest penetrator)* (fig 5-27 and 5-28). When a landing zone is unavailable the UH-ID/H can attach a forest penetrator to its rescue hoist to lift patients not requiring a Stokes litter. Where conditions permit, as many as three patients can be lifted at one time. The helicopter pilot will decide the number of patients to be lifted. The forest penetrator can be used with a hoist on the UH-ID/H or the CH-47. It can be used to lift all types of patients except those with spinal injuries, pelvic injuries, and neck injuries. The forest penetrator is basically a rescue seat with folding prongs and safety straps, each encased in a zippered protective covering. To load the forest penetrator, the following steps are taken:

(a) Allow forest penetrator to touch ground before handling to discharge static electricity.

(b) Fold down three of the wing seats and snap into place.

(c) Unzip one of the protective covers containing a safety strap, remove strap, place strap under the patient's armpits and around his back, and fasten the hook on the penetrator. Do not unhook the strap.

(d) The ground personnel signal the helicopter when the patient is ready to be hoisted.

5-29. CH-47 Chinook Helicopter

The CH-47 Chinook helicopter (fig 5-29 and 5-30) is powered by twin-turbine engines mounted on the rear of the fuselage. The engines simultaneously drive two 3-bladed rotors, one mounted on the front and the other on the rear of the helicopter. The helicopter is equipped with four nonretractable landing gears. An entrance door is located at the forward right side of the aircraft. At the rear of the cargo compartment is a hydraulically powered loading ramp. The cargo compartment is 366 inches long, 90 inches wide, and 78 inches high. These dimensions are uniform throughout the cargo compartment. The front blades normally are 7 feet 4 inches off the ground and the rear blades are 16 feet 2 inches off the

ground. However, it is possible for these blades to bend lower under certain conditions, so care must be taken when approaching the helicopter from the front. The CH-47 has a maximum length, including rotor blades, of 98 feet 11 inches, and a maximum width, including rotor blades, of 60 feet. This helicopter should not be brought into a landing site that is smaller than 125 feet in diameter. In an emergency this aircraft is capable of flying with only one engine.

a. *Patient Capacity.* The CH-47 helicopter has a maximum patient capacity of 24 litter patients or 33 ambulatory patients. The 24 litter patients can be loaded by installing three tiers of litters, four high, along each cargo compartment wall normally occupied by the troop seats. The two 1-man seats in the rear section of the cargo compartment may remain in place to serve as seats for medical attendants. If needed the 1-man seat at the left front may also remain in place. Seating arrangements for 33 ambulatory patients can be made by the use of ten 3-man seats and three 1-man seats. A row of five 3-man seats is installed along each side of the cargo compartment. One-man seats are installed at the forward and rear ends of the left hand row of seats and one at the rear of the right hand row of seats. The following combinations of loads of litter and ambulatory patients are possible, utilizing maximum space:

Ambulatory	Litter
33	0
27	4
21	8
18	12
12	16
6	20
3	24

b. *Litter Support Kits.* Four litter support brackets are permanently attached to each litter pole and each litter strap. The brackets are spaced 18 inches apart. A locking device in each bracket secures the litter handle in place. Twelve litter poles are provided for use in adapting the helicopter for medical evacuation. An attachment fitted to the bottom of each pole has two indentations, on opposing sides, which fit between two studs located in a floor channel. The upper side of the pole contains two keyhole slots by which the pole is anchored to studs on the seat-back support tubes. A metal spring retainer inside the pole locks under one of the studs when the pole is installed, thus preventing accidental dislocation of the pole. When not in use the litter poles are stored in the front of the cargo com-

partment. Twelve litter straps provided with the litter poles are used to support the litters. The straps can be adjusted upward and downward by means of the slide adjusters near the upper and lower ends of the straps. The straps are stowed in overhead recesses located directly over the floor studs to which the straps will be attached. The stowage recesses are covered with canvas flaps which are zipped along two sides. When installing the litter support kits, it is not necessary to remove the seats. The seats are folded against the wall and attached to the under side of the seats with the stowage straps.

c. Loading. The loading of litters will be accomplished through the lowered rear door and ramp. The forward litter tiers should be

loaded first, top to bottom, and then progressively rearward. The litter patients will be carried through the lowered rear cargo door and ramp in a two-man carry until the litter is alongside the tier that is to be loaded. The litter team will then move into a four-man carry and lift the litter to the necessary height. The loading of the litter is similar to that of the conventional load in the UH-ID/H except that the litter team will load the litter without any help from a crew member. Litter patients requiring inflight medical care should be positioned so as to facilitate this care. If the helicopter is to be loaded with a combination of ambulatory and litter patients, the litter patients should be positioned at the rear of the ambulatory patients whenever possible.

CHAPTER 6

TRANSPORTATION BY WATER

Section I. INTRODUCTION

6-1. Responsibilities

a. Evacuation of the sick and wounded of the Armed Forces by ocean-going vessels is a responsibility of the Department of the Navy. The areas of Navy responsibility include transoceanic, intra-theater, and coastwise evacuation.

b. Patient evacuation over water barriers, such as rivers and lakes, normally is a responsibility of the medical service of the Armed Force concerned.

c. The Navy also is responsible for the medical care and treatment of patients when they are embarked on Navy ships or small craft. All but the very smallest craft used for evacuation of patients are staffed with Navy medical personnel. Army or Air Force personnel may be assigned to these vessels to augment the Navy medical staff.

6-2. Types of Ships and Craft Used

a. The large, ocean-going ships used for the evacuation of the sick and wounded are of several types and configuration—hospital ships

(AH); amphibious assault ships (LPH); amphibious attack transports (LPA); amphibious tank landing ships (LST); and, when properly fitted for the evacuation task, troop transports (AP). All but the hospital ships must be augmented with medical personnel and material for the evacuation role.

b. Small craft which are used in the evacuation of patients from shore to ship include small landing craft, such as the landing craft, vehicle, personnel (LCVP); the landing craft, mechanized (LCM); and the landing vehicle, tracked, personnel (LVTP). Amphibious vehicles, such as the amphibious truck, 2½-ton (DUKW), and the amphibious lighter, resupply, cargo, 5-ton (LARC-5), are also used in shore-to-ship evacuation. Assault boats may be used in evacuating patients across small bodies of water. Small surface craft are used for evacuation in aircraft crashes occurring over bodies of water. Airboats and air cushion vehicles may also be used in transporting patients across small bodies of water.

Section II. SHIPS

6-3. General

a. During amphibious operations, ships and craft of the Navy provide care, treatment, and evacuation of patients. Several types of ships are used. Amphibious ships which move troops and cargo to the area of operations receive patients from combat units and medical installations ashore. The landing ship, tank (LST) can be used in amphibious operations as an emergency treatment and patient sorting (evacuation control) ship. Hospital ships are primarily floating hospitals and provide definitive care. They remain in the area of operations to provide hospitalization, evacuating patients to the communication zone or zone of interior by other means.

b. Water transportation for the evacuation of patients from the theater of operations to the zone of interior is accomplished by the

Military Sea Transportation Service (MSTS) under the control of the Navy. The Military Sea Transportation Service uses troop transports augmented with medical personnel and material or transports specifically configured and outfitted for the evacuation task. Water transportation for evacuation from the theater of operations to the zone of interior is used as a supplement to aircraft transportation and as an alternative means when aircraft transportation is not available or advisable.

c. All of the Navy ships discussed in this section, which normally are equipped for patient handling, can increase their emergency patient handling capacities by augmentation of medical personnel and materiel.

6-4. Hospital Ships

(fig 6-1)

The hospital ships are the floating hospitals



Figure 6-1. Hospital ship.

of the Navy and are designated by the Navy as AH (followed by a number). They bear names which are descriptive of what they offer the sick and wounded. Examples are USS REPOSE and USS SANCTUARY.

a. These vessels are constructed and used so as to conform to the provisions of the Geneva Convention, under which they are immune from enemy attack. The exterior of the ship is painted white with red crosses painted on each side of the hull, on the stack, the vertical surface of the forward superstructure, and on the horizontal deck surfaces so as to afford the greatest possible visibility from the sea and from the air. The Red Cross flag is flown and lights, sufficient to show the character of the ship, are displayed at night. Hospital ships may be used only for the care of the sick, wounded, and shipwrecked, and their names and descriptions must be provided to the enemy before they are employed.

b. The number of medical personnel assigned to a hospital ship is roughly equivalent to that assigned a 600-bed hospital, and includes medical and surgical specialists of most categories. The hospital ship has a helicopter platform to receive patients by air and litter hoists to receive patients from small craft. The hospital ship has all the facilities of a well equipped hospital, including operating rooms, X-ray, clin-

ical laboratory, blood bank, pharmacy, optical shop, decompression chamber, intensive care unit, wards, and a dental section. Patient delivery is primarily by helicopter.

c. The hospital ship provides medical support to the fleet and to the amphibious force to which it is attached. It remains in the area of operations providing patient care for embarked patients and transfers convalescent patients to other units leaving the area. In addition to its own requirements, it carries sufficient medical stores to provide resupply for the medical service of advance units and ships of the fleet.

6-5. Amphibious Ships and Transports

The various types of amphibious ships and transports used in patient handling and evacuation include the amphibious assault ship (LPH), amphibious attack transport (LPA), landing ship tank (LST), and troop transport (T-AP).

a. The amphibious assault ship (fig 6-2), designated by the Navy as LPH (followed by a number), is the best suited of amphibious combatant ships for patient management and is used as a primary casualty receiving ship in amphibious operations. They are augmented with medical personnel and material during critical periods with a capability to provide care for 300 wounded. Facilities consist of surgery,

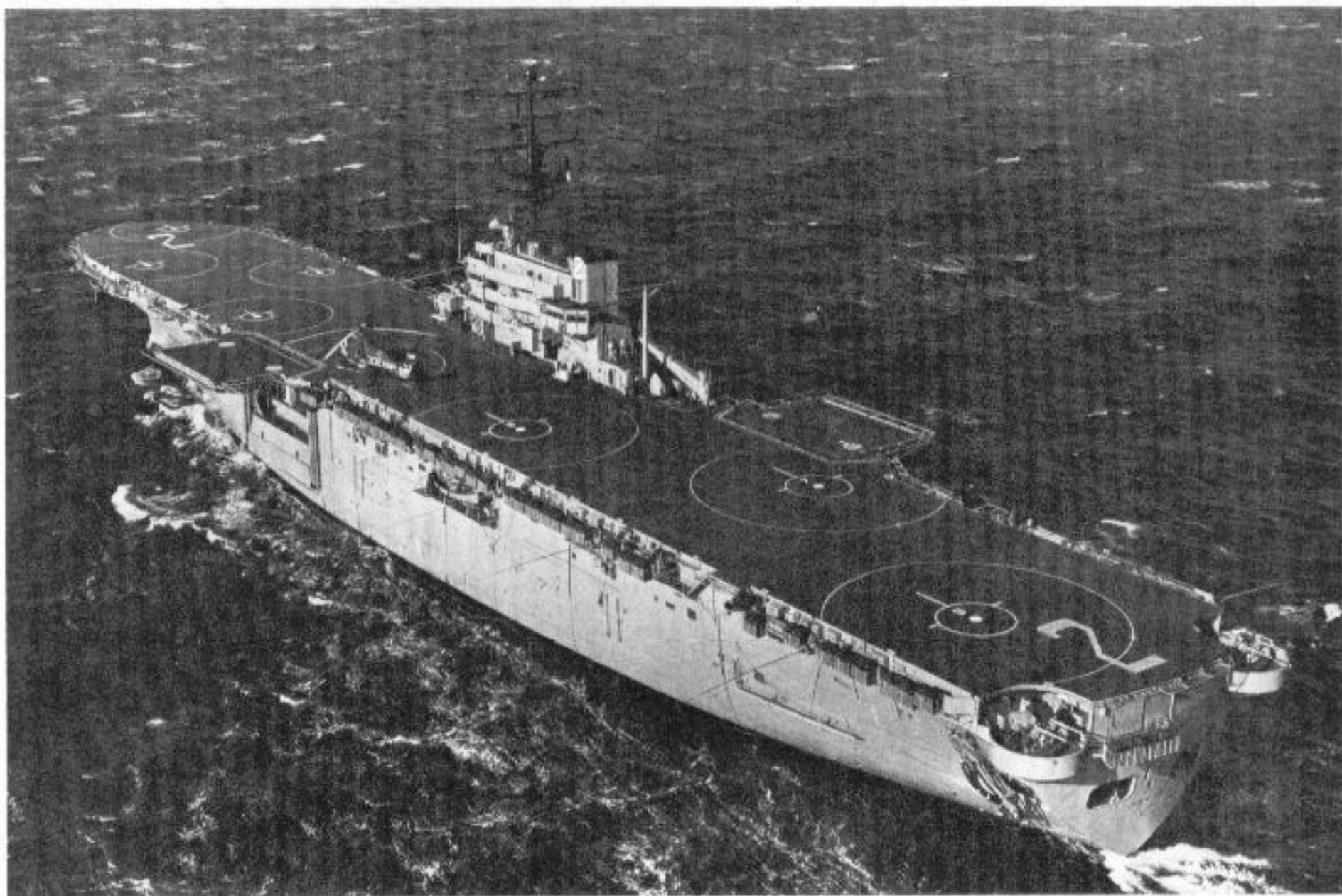


Figure 6-2. Amphibious assault ship (LPH).

X-ray, clinical laboratory, pharmacy, blood bank, wards, and a dental section. Patient delivery is primarily by helicopter.

b. Amphibious attack transports (fig 6-3), designated LPA (followed by a number) are also used as patient receiving ships in amphibious operations and can handle 250 patients. Medical facilities are similar to the LPH. These ships have a helicopter platform which can be used for the delivery of patients and patients can also be delivered by small surface craft. The attack transport can also be used as a patient evacuation transport capable of evacuating 250 litter or 500 ambulatory patients to the rear area or CONUS.

c. The landing ship, tank (fig 6-4), designated LST (followed by a number), is another type of ship used in amphibious operations. Current doctrine provides that helicopter evacuation be the primary method of transporting patients from the battlefield or beachhead to the ships offshore. The LST, when designated and augmented with medical personnel and material,

can be used for casualty evacuation control and emergency treatment for patients evacuated by boat when required by the tactical situation or in mass casualty situations. The ship is designed for the landing of personnel and equipment by ramp on the bow (later designs have a stern gate which also can be used). This type of ship does not have medical facilities for the patient evacuation role; however, by using troop living and equipment spaces after offloading, and with medical augmentation, the capability for this task is provided.

d. When required, troop transports (fig 6-5) are used for transportation of the sick and wounded from the theater of operations. These transports, designated by the Navy as T-AP (followed by a number), although not outfitted with special medical facilities, may be used when augmented with medical personnel and material. Patient capability varies with each class of ship.

e. The staffing of all ships with medical personnel is a Navy responsibility. Army and Air

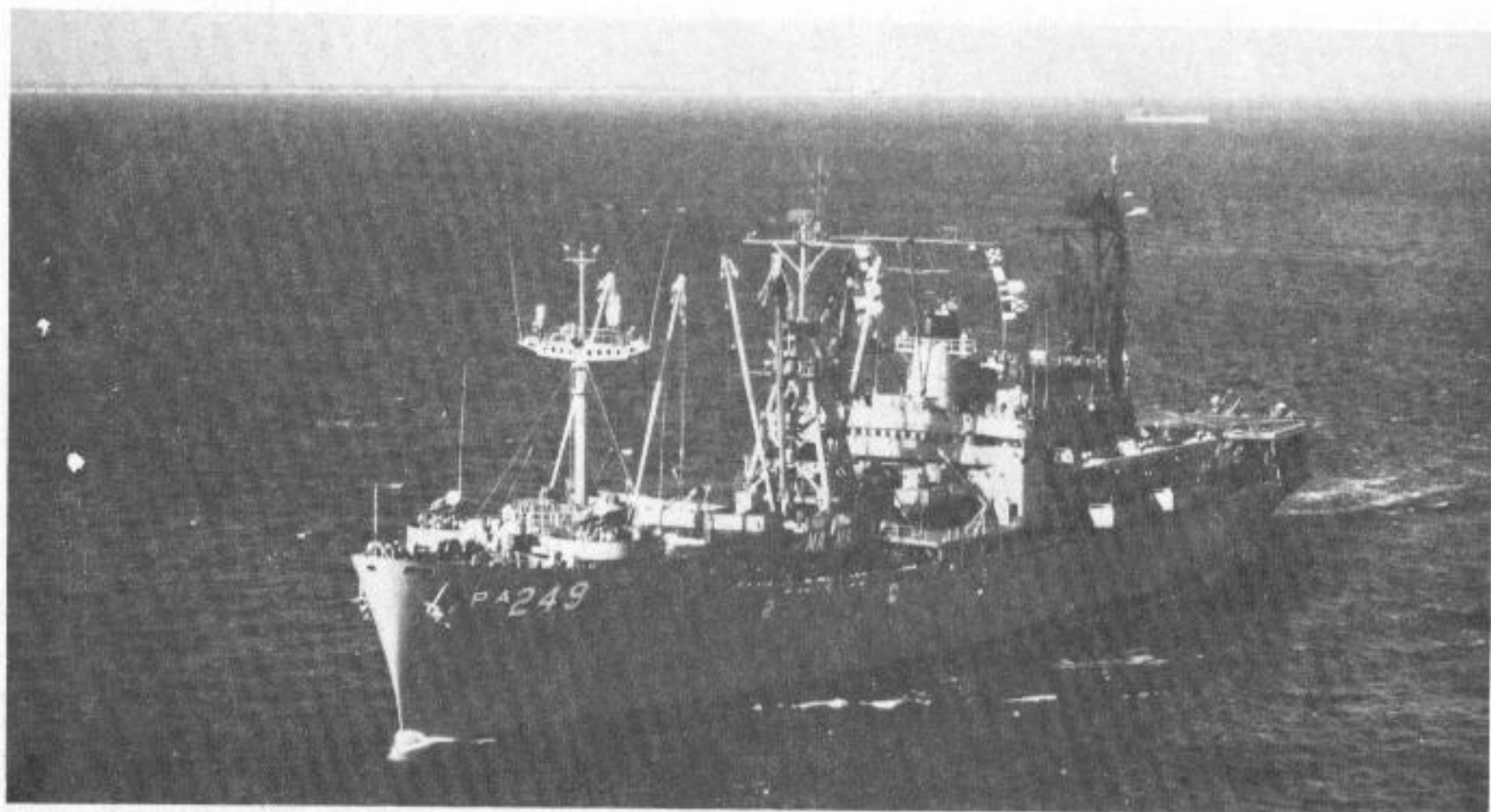


Figure 6-3. Amphibious attack transport (LPA).

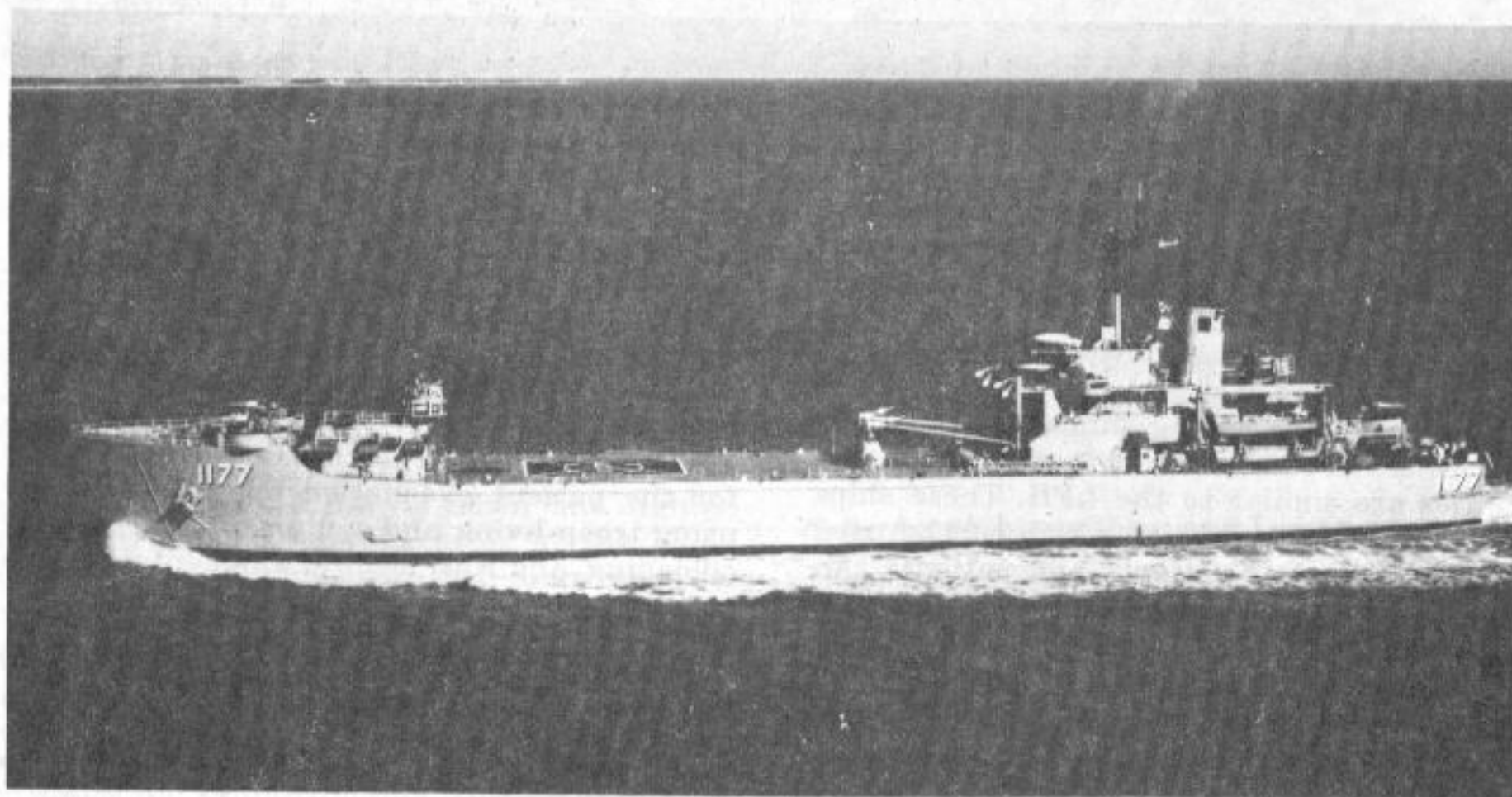


Figure 6-4. Landing ship, tank (LST).

Force medical personnel may be assigned to supplement the ship's medical complement.

f. All ships discussed in this section, other

than hospital ships, are armed. Because their primary mission is military in nature, they are not protected by the Geneva Convention.

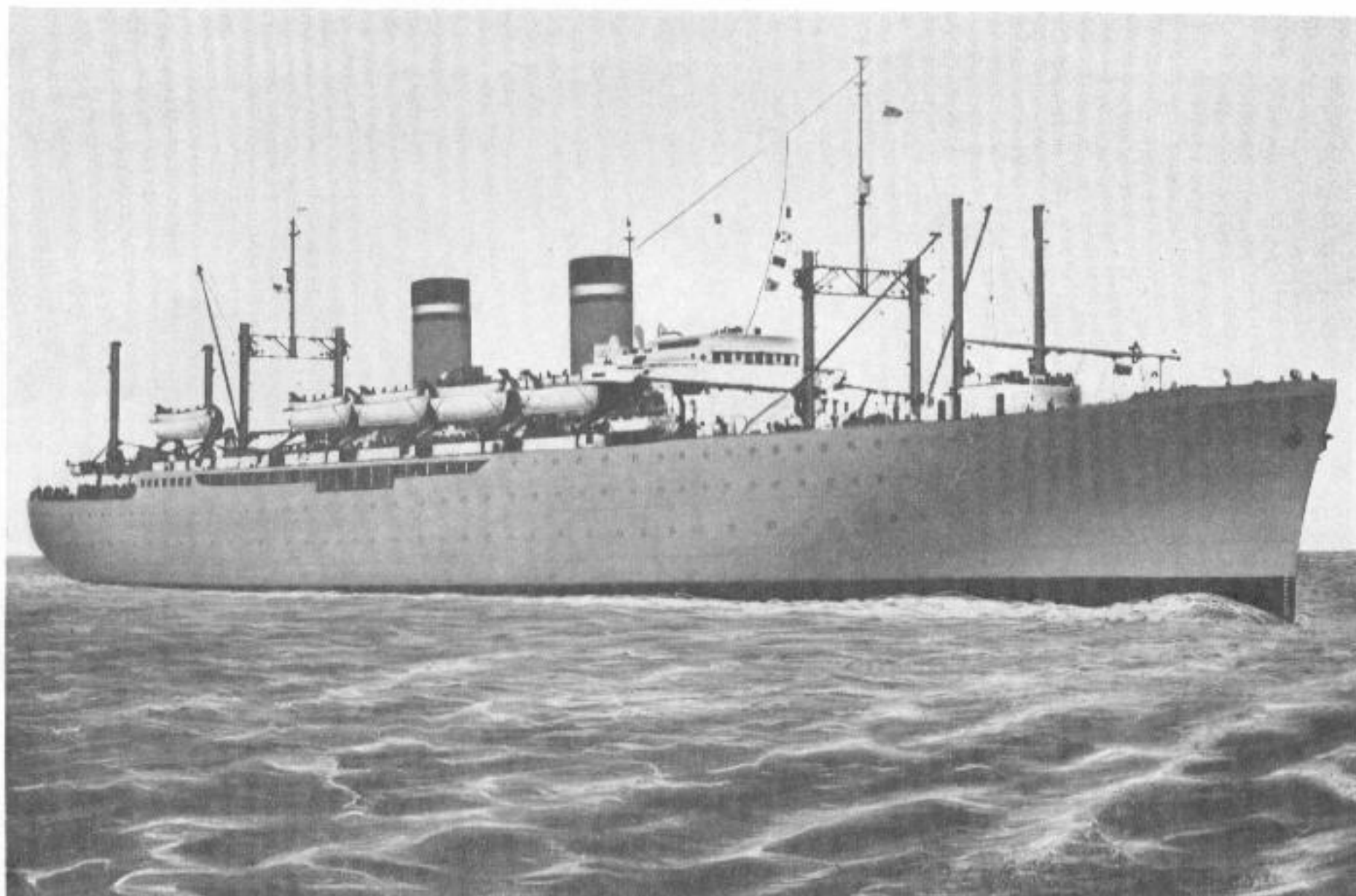


Figure 6-5. Troop transports (T-AP).

Section III. SMALL CRAFT

6-6. General

a. In the early phase of amphibious operations, docks or piers may be inaccessible or nonexistent and embarkation must be accomplished when the recipient ship is anchored at some distance from the shore. In these situations, the patients are transported from the beach to the ship by small craft, such as small landing craft, amphibious vehicles, and helicopters.

b. Riverine warfare is conducted in an environment characterized by periodic inundations; a road net that is either inadequate, nonexistent, or controlled by the enemy; and an extensive network of rivers and canals. Combat service support of riverine warfare follows conventional procedures, as modified by the existing situation. In riverine operations, assault boats, airboats, and air cushion vehicles provide a relatively fast means of evacuating casualties from platoon and company areas of operation to the battalion aid station. Helicopters evacu-

ate sick or wounded personnel to a hospital-equipped, self-propelled barracks ship (APB), or a non-self propelled landing ship (APL).

6-7. Small Landing Craft

The various types of small landing craft used in the evacuation of patients from shore to ship include the landing craft, vehicle, personnel (LCVP); the landing craft, mechanized (LCM); and the landing vehicle, tracked personnel (LVTP).

a. The LCVP (fig 6-6) has a patient capacity of 17 litter patients or 36 ambulatory patients. Only seven litter patients can be carried if the vehicle is to be hoisted aboard for loading.

b. The LCM-6 (fig 6-7) has a patient capacity of 30 litter patients or 120 ambulatory patients. The LCM-8 (fig 6-8) can carry 50 litter patients or 200 ambulatory patients.

c. The LVTP-5 (fig 6-9) can carry 34 ambulatory patients and the LVTP-6 (fig 6-10) can carry 20 ambulatory patients.

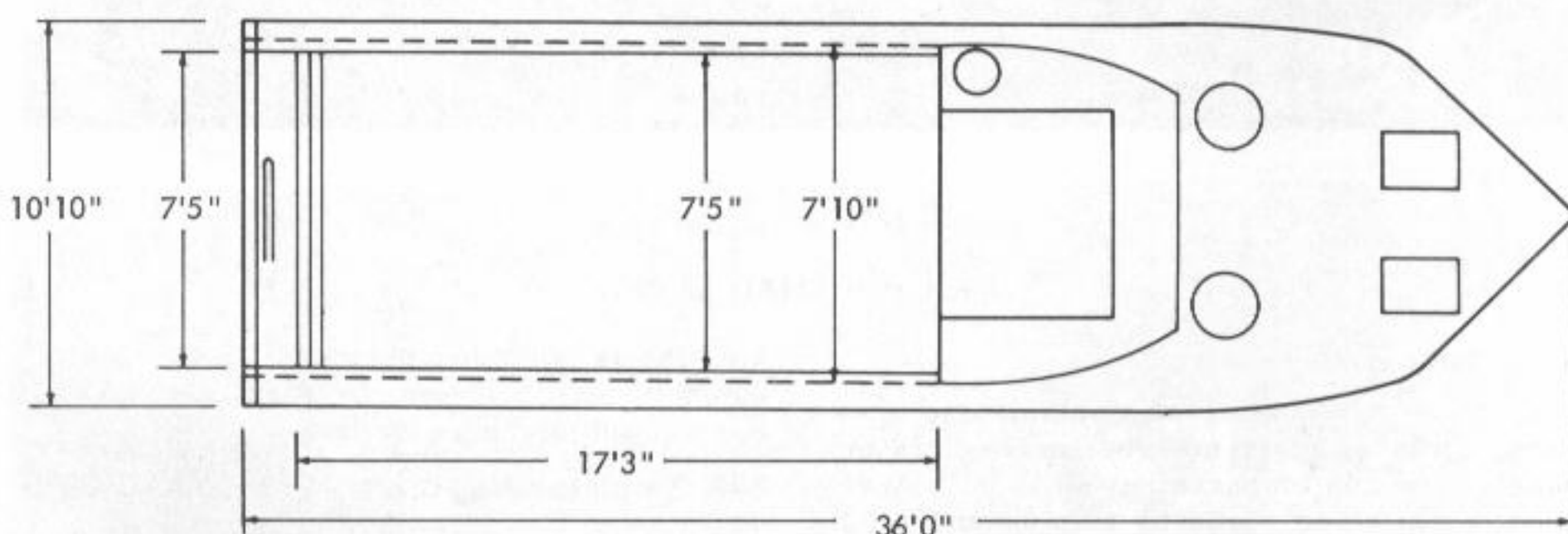


Figure 6-6. Landing craft, vehicle, personnel (LCVP).

6-8. Amphibious Vehicles

Amphibious vehicles are also used for patient evacuation from shore to ship.

a. Truck, Amphibious, 2 1/2-Ton (DUKW) (fig 6-11). This vehicle usually is available only to troops in or contemplating amphibious operations. It is most useful in transferring patients from shore to ships nearby. The same truck that moves supplies to the shore may carry patients back to the ship. The maximum capaci-

ty of the truck is 12 litter patients, six on the bottom and six on the top.

b. Lighter, amphibious, resupply, cargo, 5-ton (LARC-5) (fig 6-12). The LARC-5 and other amphibious vehicles can also be used for patient evacuation from shore to ship.

6-9. Methods of Embarkation

Upon arrival at their ship, transport, hospital ship, or LST, patients are embarked from small craft in the following ways:



Figure 6-7. Landing craft, mechanized (LCM-6).

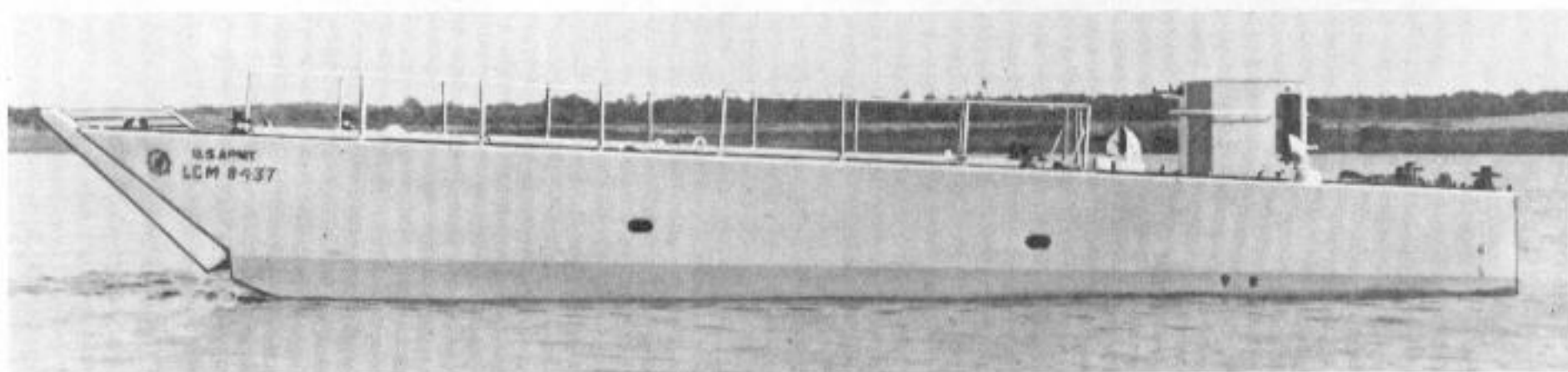


Figure 6-8. Landing craft, mechanized (LCM-8).

- a. Litter hoist—manual or mechanical, singly or in multiples on prepared frames or platforms.
- b. Ladder—Jacobs or cargo net. This method is suitable only for fully ambulatory patients.
- c. Hoisting of boat by davits to deck level.
- d. Marriage of boat by davits to bow ramp of LST.
- e. Embarkation of DUKW or LVTP on LST via bow ramp.

6-10. Assault Boats

Engineer assault boats, when available, are readily adaptable for use in patient evacuation across rivers or other small bodies of water. Two litter patients can be placed lengthwise in the bottom of the boat and four above them crosswise, with the litter handles resting on the gunwales and the litter stirrups just inside the boat holding the litters in place. Room is



Figure 6-9. Landing vehicle, tracked, personnel (LVTP-5).



Figure 6-10. Landing vehicle, tracked, personnel (LVTP-6).



Figure 6-11. Truck, amphibious, 2 1/2-ton (DUKW).

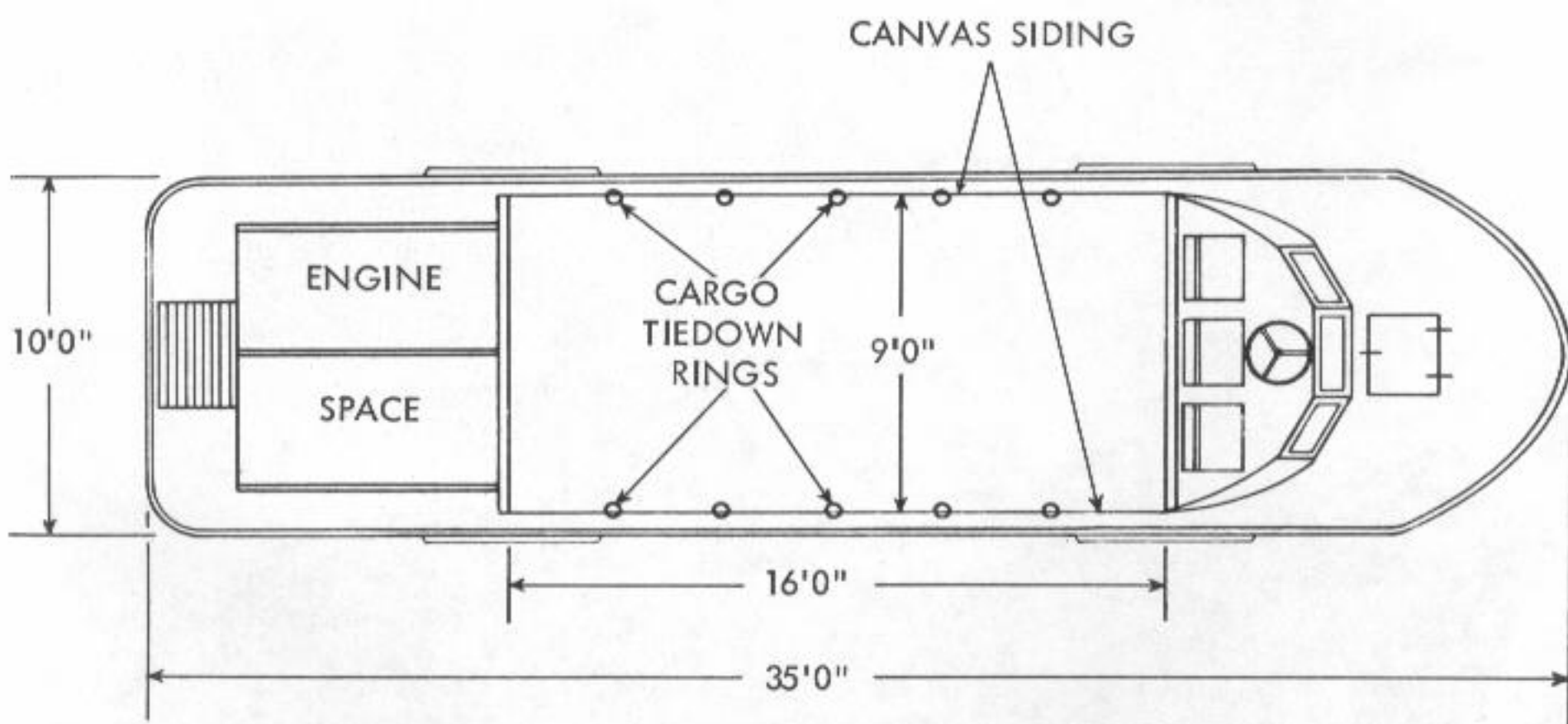
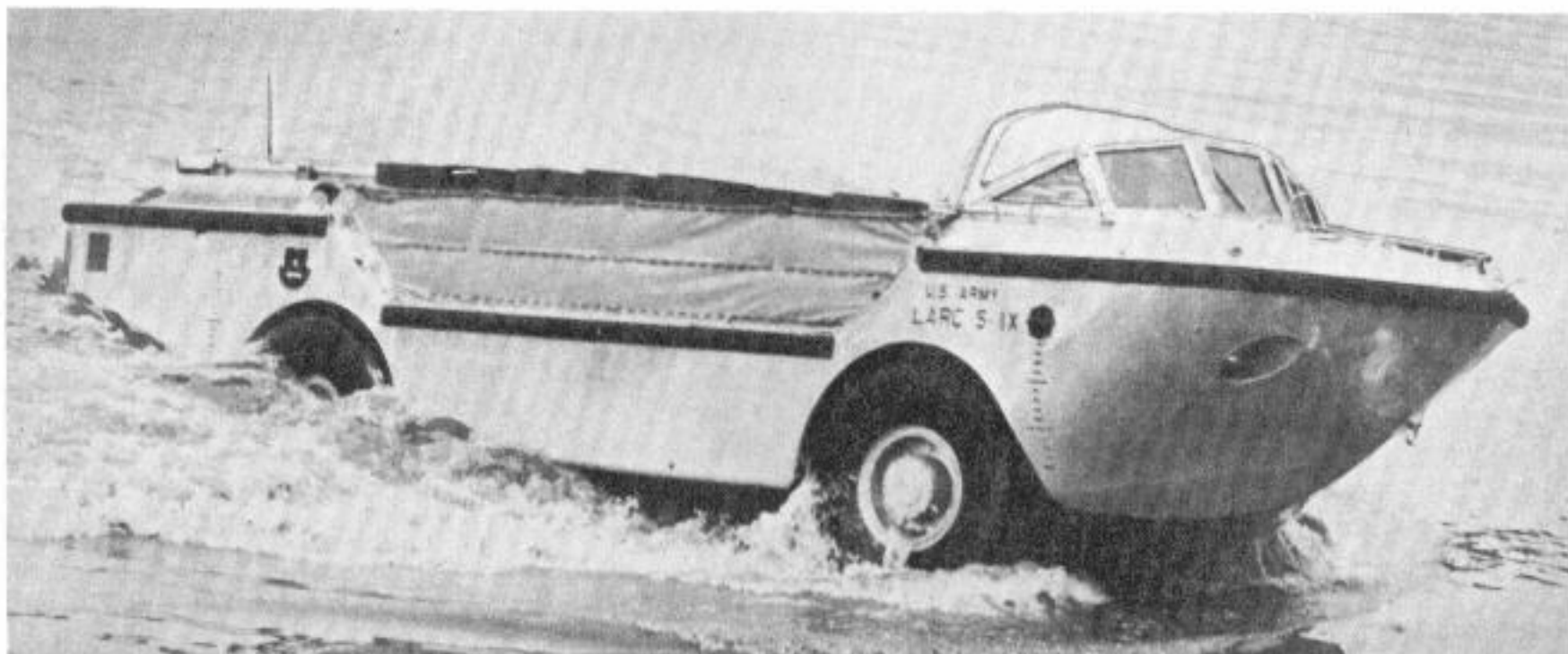


Figure 6-12. Lighter, amphibious, resupply, cargo, 5-ton (LARC-5).

thus allowed in the bow and stern for personnel to paddle the boat.

6-11. Airboats

The airboat is fast and maneuverable and it can traverse shallow waterways containing dense grasses.

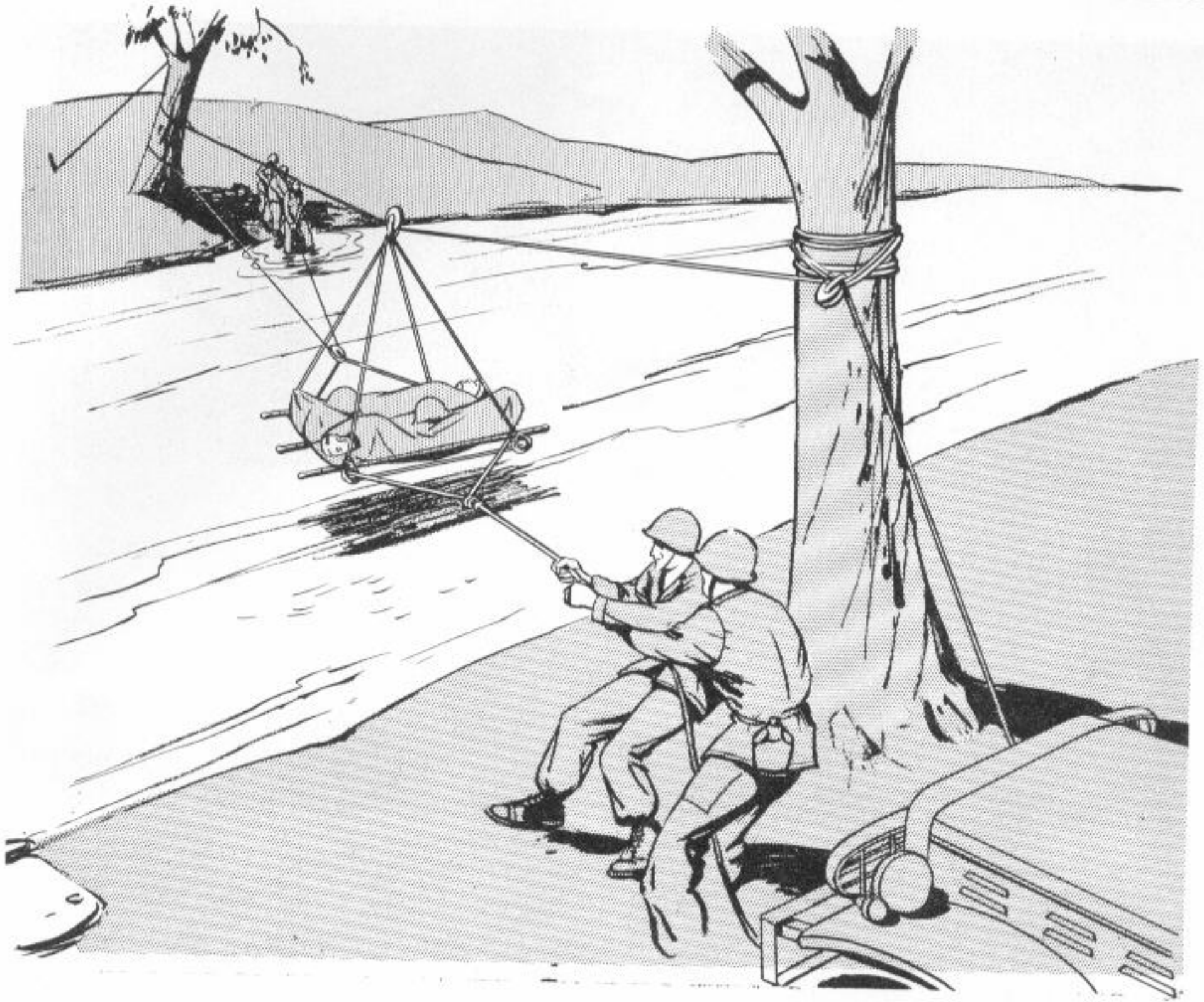
6-12. Air Cushion Vehicles (ACV)

The air cushion vehicle is fast and can traverse

land, water, and swamp areas with ease. It has an excellent ditch-crossing capability.

6-13. Cable and Rafts

a. *Cables* (fig 6-13). Two litter patients can be transported across the stream by the cable and sling method. The entire apparatus can be erected in less than half an hour with the use of equipment readily available to medical



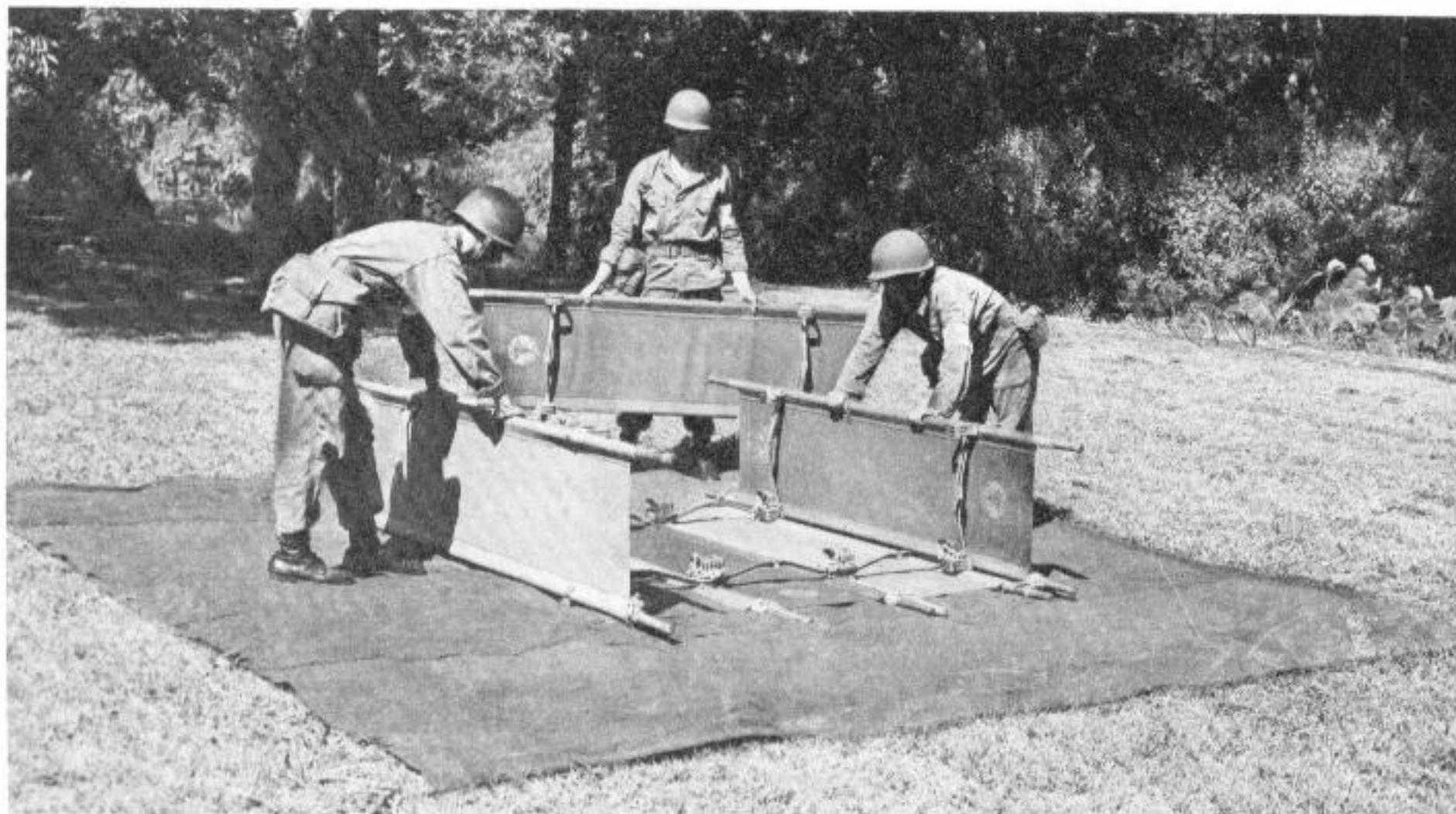
- a. String the cable of a 2 1/2-ton winch truck through a pulley and fasten it to a tree.
- b. Carry it across the stream and fasten it to another tree or other holding device on the opposite shore.
- c. Allow a second pulley to run free along the cable.
- d. Take two saplings, poles, or other appropriate objects of the width of two litters, and suspend them from the second pulley by ropes. The litters rest upon these poles, with the litter stirrups just inside the poles and holding them in position.
- e. A man on the near shore pulls the litters across, and a second man, on the far shore, maintains control by holding them back, when necessary.
- f. When the litters have crossed, the patients are removed, the device is pulled back to the other side, and two more patients are sent across.

Figure 6-13. Cable and sling method using winch cable from 2 1/2-ton truck.

troops. Once constructed, it permits an uninterrupted flow of litter patients across the stream. Because of the limited length of the cable available, the use of this method is restricted to bodies of water less than 200 feet in width.

b. *Litter and Paulin Raft* (fig 6-14 and 6-15). Two litter patients plus escort can be transport-

ed across a river, lake, or small body of water by a litter and paulin raft. A raft may be constructed of seven litters and the paulin from a 2 1/2-ton truck. With proper direction, it can be constructed in 15 minutes even by untrained men. It is very stable and can be operated by paddling or being pulled.



- a. Spread the paulin open on the ground, and place three litters, stirrups up, in its center.
- b. Place the other four litters on their sides to form the basis of the four walls of the raft, their handles interlocking and lashed together with lengths of rope.
- c. Lift the sides of the paulin, fold sides over the four litters and tie in place, thus completing the raft walls.

Figure 6-14. Litter and paulin raft, construction.



Figure 6-15. Litter and paulin raft, patient being transported.

APPENDIX

REFERENCES

AR 40-2	Army Medical Treatment Facilities-General Administration.
AR 40-4	Army Medical Department Facilities.
AR 40-20	Evacuation of Patients.
AR 40-535	Worldwide Aeromedical Evacuation.
AR 95-100	Clarification of Roles and Missions of the Departments of the Army and the Air Force Regarding Use of Aircraft.
AR 310-25	Dictionary of United States Army Terms.
AR 310-50	Authorized Abbreviations and Brevity Codes.
AR 700-26	Designating, Redesignating, and Naming Military Aircraft.
DA PAM 108-1	Index of Army Films, Transparencies, GTA Charts, and Recordings.
DA PAM 310-2	Index of Blank Forms.
DA PAM 310-3	Index of Doctrinal, Training and Organizational Publications.
DA PAM 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9) Supply Bulletins, and Lubrication Orders.
FM 1-5	Aviation Company.
FM 1-100	Army Aviation Utilization.
FM 8-10	Medical Service, Theater of Operations.
FM 21-11	First Aid for Soldiers.
FM 22-5	Drill and Ceremonies.
FM 31-72	Mountain Operations.
FM 101-10-1	Staff Officers' Field Manual: Organization, Technical, and Logistical Data, Part 1 — Unclassified Data.
TM 5-270	Cableways, Tramways, and Suspension Bridges.
TM 8-230	Medical Corpsman and Medical Specialist.
TM 9-500	Data Sheets for Ordnance Type Materiel.