TC 21-3

Soldier's Handbook for Individual Operations and Survival in Cold-Weather Areas

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Soldier's Handbook for Individual Operations and Survival in Cold-Weather Areas

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Preface

TC 21-3 provides aid for Soldiers in cold climates. To develop successful cold-weather field techniques, application training and operational experience are also necessary. Additional information can be found in ATP 3-90.97 and TM 4-33.31.

The principal audience for TC 21-3 is any Soldier operating in cold weather. Military history of operations in northern areas record that a Soldier's success or failure is measured by their regard for the dominant characteristics of a cold-weather environment. TC 21-3 is applicable to the Active Army, Army National Guard/Army National Guard of the United States, and United States Army Reserve unless otherwise stated.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Service members operate in accordance with the law of armed conflict and the rules of engagement. (See FM 6-27 for legal compliance.)

The use of a trade or brand name does not constitute endorsement of any specific commercial product, commodity, service, or enterprise by the United States Army.

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Chapter 1

Introduction to Cold-Weather Operations

DIFFERENT TYPES OF COLD CONDITIONS

1-1. There are different types of cold found throughout the world and each presents its own challenges. For Soldiers to be effective in a cold-weather environment, it is essential they first understand the effects of cold on the body and equipment. (See ATP 3-90.97 for more information.)

1-2. Weather is considered to be cold when the temperature registers 39 degrees (°) Fahrenheit (F) or 4° Celsius (C) above (+) zero and drops to negative (–) 40°F or lower. The Army groups cold temperatures into five categories:

- Temperature zone I (wet cold): +39°F to + 20°F (4°C to –7°C).
- Temperature zone II (dry cold): +19°F to –4°F (–7°C to –20°C).
- Temperature zone III (intense cold): –5°F to –25°F (–20°C to –32°C).
- Temperature zone IV (extreme cold): –25°F to –40°F (–32°C to –40°C).
- Temperature zone V (hazardous cold): –40°F (–40°C) and below.

Note. An explanation on how to convert Fahrenheit and Celsius degrees, as well as common United States customary and metric conversion units can be found in appendix A.

WET AND DRY ENVIRONMENTS

1-3. Wet-cold conditions often occur when snow and rain mix with cold weather. This type of environment is often more dangerous to troops and equipment than colder, dryer environments due to slushy, muddy ground, and wet clothing and equipment. Water conducts heat twenty-five times faster than air, causing core body temperatures to quickly drop when Soldiers become wet and caught in blowing wind.

1-4. Soldiers rapidly become casualties due to weather if not properly equipped and trained for this environment. Wet cold can quickly lead to hypothermia, frostbite, and trench foot. Wet-cold conditions exist in many other environments during seasonal transition periods. Under wet-cold conditions, the ground alternates between freezing and thawing due to fluctuating temperatures above and below the freezing point. This makes planning problematic. For example, areas that are trafficable when frozen could become severely restricted if the ground thaws. Waterproof footwear is essential.

1-5. Dry-cold conditions are easier to live in than wet-cold conditions. Like wet cold, proper equipment, training, and leadership are critical for successful dry-cold operations. Wind chill is a complicating factor in this type of cold. Of the four cold-weather categories, the dry-cold environment best enables troops to survive due to low humidity and permanently frozen ground. As a result, people and equipment are not subject to the effects of the thawing and freezing cycle, and precipitation is generally in the form of dry snow.

INTENSE, EXTREME, AND HAZARDOUS CONDITIONS

1-6. Intense cold exists from –5°F to –25°F (–20°C to –32°C) and can affect the mind as much as the body. Intense cold has a rapidly numbing effect. Simple tasks take longer and require more effort than when done in warmer temperatures. The quality of work degrades as attention to detail diminishes in this type of environment. Clothing becomes bulkier to compensate for the cold, causing Soldiers to lose dexterity. Commanders need to consider these factors when planning operations and assigning tasks.

1-7. Extreme conditions occur when the temperature falls below –25°F (–32°C), and the challenge of survival becomes paramount. During extremely cold conditions, individuals can easily prioritize physical comfort above all else. Soldiers may withdraw into themselves and adopt a cocoon-like existence. Leaders should expect and plan for weapon, vehicle, and munition failures when temperatures drop this low. Leadership, training, and specialized equipment are critical for successful operations in this harsh environment.

1-8. During hazardous conditions, commanders and planners assume a great deal of risk if they choose to engage in operations when the temperature falls below –40°F (–40°C). Extensive training is required before undertaking an operation in such extreme cold.

WIND CHILL

1-9. Wind chill is a measure of the combined effects of wind and temperature. Temperature alone does not give a true indication of the impact of cold weather. To effectively gauge the difference between temperature and the impact of cold, a wind-chill scale is used.

1-10. A simple and practical guide outlining the conditions when cold weather becomes dangerous and exposed flesh is likely to freeze can be found in chapter 4 of this publication. Familiarity with the included wind-chill chart helps Soldiers recognize these dangers.

EFFECTS OF COLD WEATHER ON MILITARY OPERATIONS

1-11. With its numbing effect on skin, cold hinders task performance. This fact is considered when performing routine tasks such as vehicle maintenance (see TM 4-33.31), and when making and striking bivouac areas.

1-12. When conditions become extreme and the temperature drops, survival becomes critical. Under these circumstances, Soldiers may tend to withdraw emotionally, not wanting to leave the warmth and protection of their shelter or tent. The remedy is physical activity. Remaining alert and active helps alleviate this problem. Execution of all military duties, and the fast and proper performance of group tasks is vital.

1-13. In addition to emotional withdrawal, many Soldiers, when wearing headgear and several layers of clothing, tend to assume a cocoon-like existence. When clothed like this, many Soldiers' hearing and field of vision are restricted; they tend not to notice their surroundings. Thinking and reasoning can become sluggish.

1-14. This process is characterized by individuals seeking the comfort of sleeping bags, and by the group remaining in tents or other shelters. Guard and security measures may be neglected, jeopardizing the safety of the unit. Talking or even acknowledging others can become nonexistent.

1-15. Group hibernation can also occur. It is a process characterized when an entire unit, usually a squad, seeks the comfort of sleeping bags and shelter. Mundane tasks such as maintaining equipment and even preparing rations are neglected in favor of staying warm. Security postures may also be neglected, jeopardizing the safety of the unit.

OVERCOMING COLD

1-16. It is essential the body stays protected. It is kept clean, dry, and warm, with all normal body processes maintained. Rest and nourishment are vital. The right approach to cold-weather living promotes health and provides strength and fortitude through challenging times. There are four basic rules for success:

- Stay in shape.
- Drink plenty of water.
- Eat to stay fit.
- Maintain a good attitude.

1-17. Cold-weather clothing and equipment is heavy and adds weight to the normal equipment load. This hinders movement in snow and uses a lot of physical energy. The importance of being in excellent physical condition in this environment cannot be overemphasized. Developing a tough, challenging, training program is essential.

1-18. Water may be hard to procure, causing Soldiers to drink less than needed. This leads to dehydration. Drink at least 3.5 quarts (3.3 liters) of water per day to avoid dehydration and fatigue. Do not eat snow as a water substitute because it lowers core body temperature. It also contains a lot of air that can cause a very uncomfortable stomachache.

1-19. Regular, nutritious hot food is needed for top performance. Eating, even when not hungry, and calorie intake should be a near-continuous activity. Field rations are designed to be portable, pocket-sized, and should be used by every Soldier.

1-20. Maintaining a good attitude when environmental conditions are harsh can be difficult. Aggressive leadership actions that overcome the challenges of the environment are essential for mission accomplishment.

POSITIVE LEADERSHIP

1-21. While living and working in a frigid environment presents many new challenges, personal attitude about cold weather tends to reflect from the leader's point of view. A bad attitude and gloomy outlook can spread like wildfire. After 3 to 4 weeks of cold-weather training, most Soldiers can cope with the environment. Some Soldiers may not be as skilled as others, but most succeed. As a leader, set an example for other Soldiers.

1-22. Winter conditions can be frightening, especially when trying to meet new challenges. Any mistake could create a casualty. There are two adversaries to overcome in cold-weather operations: the enemy soldier and the freezing environment. The first step in defeating either problem is having the right attitude. Cold can be psychologically debilitating for a poorly prepared unit if leaders are unaware of the symptoms. Suggestions on how to defeat the cold include—

- Soldiers and leaders getting more involved with others if depression or moodiness sets in so that the weaker Soldier is not left out.
- Reviewing orders and drills if it becomes hard to remember things that were previously taught.
- Reminding Soldiers that their job is to close with and destroy the enemy.
- Keeping weapons and equipment in fighting order.
- Reminders that operations can easily become a camping trip with serious consequences if a common ambush cannot be avoided in a cold environment.
- Emphasizing following an order may take longer due to the weather but is no excuse not to do it.
- Having knowledge, proper equipment, and rigorous training can help anyone overcome the cold and be successful in combat.

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Chapter 2

Personal Clothing and Equipment

WEAR AND CARE OF INDIVIDUAL CLOTHING

2-1. The Army's cold-weather clothing system is designed for protection in various weather situations. The principal design features of this system are insulate, layer, and ventilate. Insulation material reduces the amount of body heat loss. Regulating the amount of insulation can affect the amount of heat that is lost or retained. (See figure 2-1.) Ventilation helps maintain a comfortable body temperature by allowing excess heat and moisture to escape.

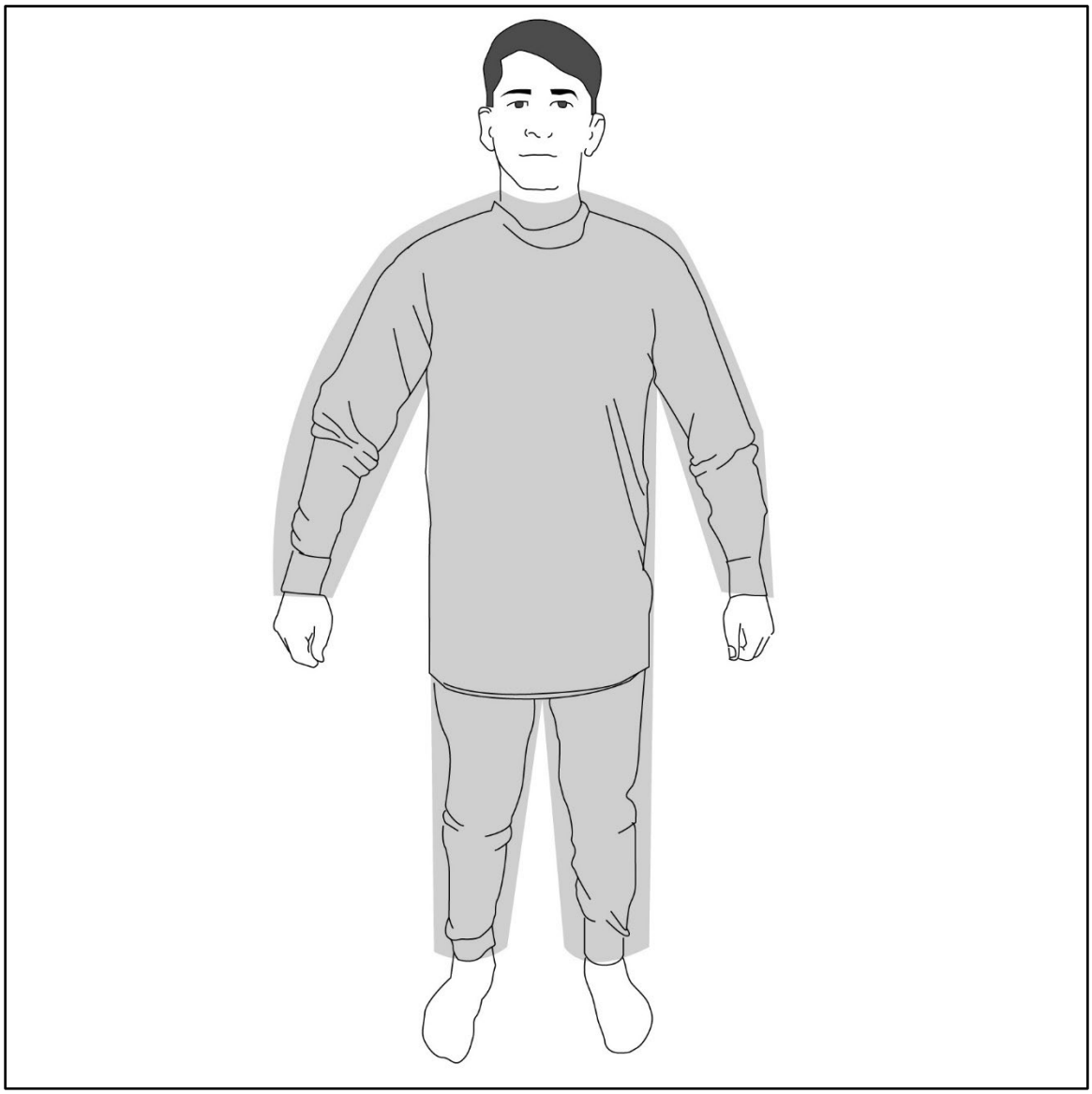


Figure 2-1. Insulation

2-2. Several layers of clothing provide more insulation and movement than one heavy garment, even if the heavy garment is as thick as the combined layers. Air pockets trapped between the layers provide insulation, warmth, and ventilation.

2-3. There are four ways to make these principles work: keep it clean, avoid overheating, wear it loose, and keep it dry. Remembering this mnemonic as *C-O-L-D* helps when dressing for the weather. (See figure 2-2.)

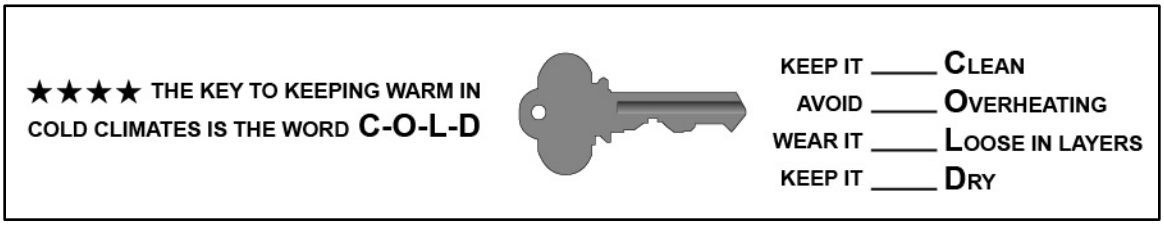


Figure 2-2. C-O-L-D

2-4. Dirty clothes are cold clothes. Dirt and grease clog the air spaces in clothing. reducing insulation and ventilation. Select comfortable clothing but do not overdress. In cold weather, it is better to be a little cool rather than risk overheating.

2-5. All items of the cold-weather uniform are large enough to allow wearing the appropriate number of needed layers. If the uniform items do not fit loosely, the insulation that generates warmth is greatly reduced.

2-6. It is very important to keep clothing dry. Wet clothing conducts heat away from the body faster than dry clothing. Moisture soaks into clothing from the inside and the outside. From the inside, guard against sweating and from the outside, guard against melting snow. Always brush snow and frost from clothing before entering any heated shelter or vehicle.

DRESSING FOR WET-COLD OR DRY-COLD WEATHER

2-7. As mentioned in chapter one, temperatures that are above 19°F (–7°C) are known as wet-cold conditions; temperatures consistently below 19°F (–7°C) cause dry-cold conditions. Wet-cold conditions usually involve a freezing and thawing cycle, often accompanied by rain or wet snow. This type of weather is hard to dress for and Soldiers battle ever-changing elements to keep clothing dry.

2-8. During dry-cold conditions, the ground is usually frozen and snow is dry. Although temperatures during these conditions may be lower than wet-cold conditions, it is easier to stay warm. The temperature zones below dry cold (intense, extreme, and hazardous) are also dry in nature, and Soldiers should dress for the dry-cold environment.

2-9. A major protection in reducing the effects of heat loss is caring for the head and feet. When in the shelter, be sure not to hang clothing on drying lines too close to the tent heater or stove fire. Too much heat damages fabric or dries leather, destroying the insulation value.

BALACLAVA

2-10. Wear the balaclava (hat) under the helmet or under the hood of the shell layer. To do so, there are three configurations. Fold the balaclava—

- Up, into a top-of-the-head hat.
- Down, with the face exposed.
- Down, with the face covered.

2-11. Up, into a top-of-the-head hat: fold the bottom of the balaclava to the inside to form a hat. Wear the hat with the face opening to the rear to prevent breath condensation forming on the face-forward portion. If there is a need to change this configuration later, a wet hat is not placed directly on the face.

2-12. Down, with the face exposed: pull the balaclava over the head with the lower portion of the face opening under the chin. Note that doing this repeatedly stretches the fabric and reduces its ability to stay over the nose when needed.

2-13. Down, with the face covered: pull the lower portion of the face opening over the mouth and nose. Use goggles to cover the eyes and any remaining exposed skin, if required.

BOOTS

2-14. Intermediate cold-wet boots (ICWB) with removable tan liners can be ordered using the national stock number (NSN) 8430-01-527-8274. They are rated from 68°F to 14°F (20°C to –10°C). Two pairs of liners are issued with this boot. When donning the boot with liners, put the liners on first and secure them with hook and loop tape. Then, insert the foot into the boot, ensuring there is no bunching as this causes blisters. When fitting this boot, make sure to wear the sock type used in the field and that the boot fits as comfortably as street shoes.

2-15. Extreme cold-weather boots (NSN 8430-00-655-5535) are also called white vapor barrier (VB) boots, or *bunny boots*. They are rated from 19°F to –60°F (–7°C to –51C) and are used in cold-dry environments. Some VB boots have a pressure relief valve. The valve is used to equalize air pressure. When rapidly changing altitude, briefly open the valve to equalize pressure and then close it. (See figure 2-3.)

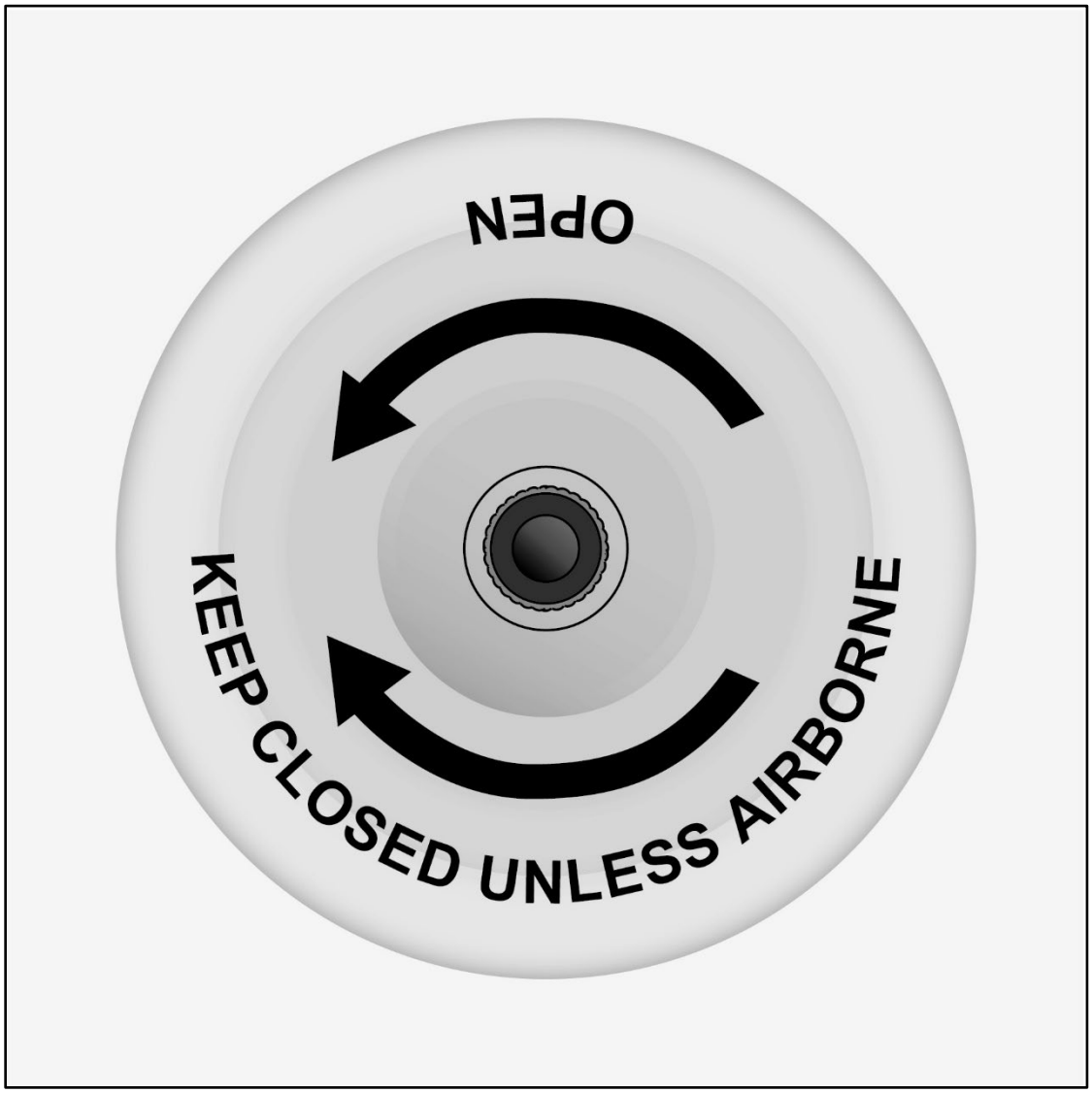


Figure 2-3. Pressure equalization valve

2-16. There is a fine line when Soldiers should switch from the ICWB to the VB boot. Temperature zone II dry cold (19ºF to –4ºF) is the recommended range to switch to VB boots. However, this depends on the

workload. Leaders should ensure that both types of boots are available in the event of a temperature swing or change of mission. This gives maximum flexibility.

2-17. When active, feet sweat. Due to the waterproof rubber lining, moisture remains on socks or in the bottom of the boots. The feet, even if damp, stay warm because the heat given off by the body remains inside the boots. If the boots are worn for long periods of time, the feet become white and wrinkled when the footwear is removed. This is not cause for alarm. Drying, massaging with foot powder, warming, and putting on dry socks corrects this.

2-18. If there are long periods of inactivity, feet may become cold. Exercises such as knee bends, stomping, running in place, or wiggling toes help make them warm. Staying active and caring for these boots is very important. They should be washed inside and out with soapy water at least once a month, or as required by the unit standard operating procedure (SOP). Do not wear VB boots in a sleeping bag, as the feet need to dry.

2-19. Inspect these boots often and repair any holes or punctures immediately. Temporary repairs can be made by patching the hole with any kind of tape. Even chewing gum can be used. Seal the hole quickly to prevent the insulation from becoming wet. If one of the boots feels heavier than the other, the insulation is probably wet, and should be turned in for new ones. Insulated boots are tested annually to ensure they are still waterproof and have less than 0.01 percent moisture in the insulation. The repair kit (NSN 8465-00-753-6335) is similar to a bicycle inner tube repair kit.

Note. This is a tactics, techniques, and procedures (TTP): use the upper leg portion of the sock to dry the toe box of the VB. Store a pair of socks in a zippered plastic bag in a cargo pocket for unexpected trips into the overflow or after extra-tough movement. A fresh pair of socks can significantly elevate mood. Always change socks when getting into a sleeping bag.

EXTENDED COLD-WEATHER CLOTHING SYSTEM, GEN III

2-20. The extended cold-weather clothing system (ECWCS) is issued as a kit, allowing flexibility through all temperature zones. System components use the most recent materials and technology. The result is a reduction in weight and bulk from the GEN II system without loss of protection from the cold. The GEN III ECWCS uses the layering approach to draw moisture away from the body and should be worn as discussed below.

2-21. The first layer of clothing is the base layer. It draws moisture away from the body, allowing it to evaporate. The next or middle layer is the insulation layer. It provides trapped air spaces that create warmth. The last layer is the shell layer. It protects all the other layers, blocking wind and precipitation.

SEVEN LEVELS OF DRESSING

2-22. Level I: lightweight cold-weather undershirt and drawers. This is a base layer consisting of a long sleeve top and full-length bottom garments constructed with silk-weight moisture-wicking polyester. The material aids in moving moisture from the skin to the outer layers of the garment. The top garment has holes in the sleeves for the thumbs. Place thumbs through the holes to keep the garment down around the wrist. Wear it next to skin or with a mid-weight cold-weather shirt and drawers for added insulation. This aids the transfer of moisture. (See figure 2-4.)



Figure 2-4. Lightweight underclothes

2-23. Level II: middleweight cold-weather shirt and drawers. This layer is also a base layer. However, it can also act as an insulation layer when used in conjunction with the Level I layer. It consists of a long sleeve top and full-length bottom garments constructed of polyester grid fleece. These garments provide light insulation for use in mild climates, and act as a base layer for colder climates. There is an increased surface area to help wick moisture away from the wearer during movement.

2-24. The top has a zipper that is used to form a mock turtleneck. When zipped down, it allows better ventilation as the workload increases. The top has holes in the sleeves for the thumbs. Place thumbs through the holes to keep the garment down around the wrist and wear this layer over the lightweight cold-weather undershirt and drawers or next to the skin, depending on weather conditions. (See figure 2-5.)

Note. This is a TTP: sew a 6-inch square of 100-gram (3.5 ounce) fleece as a pocket onto the Layer 2 shirt to store small batteries, energy bars, and other items that stay warm and can be ready to use. The Layer 2 neck zipper can be held closed with the addition of hook and loop tape across the top of the zipper.



Figure 2-5. Middleweight underclothes

2-25. Level III: fleece jacket. The jacket acts as the primary insulation layer for use in moderate to cold climates. Imitation fur mimicking insulation provides an increased warmth-to-weight ratio and reduces volume when packed. There are two inner mesh pockets to store things that need to be kept warm, such as batteries, rations, canteens, and other items. The zipper forms a mock turtleneck or can be used to ventilate the garment, as needed. Wear underneath the shell layers. This layer provides little protection from the wind or precipitation and should not be used as an outer garment. Always wear it in conjunction with a shell. (See figure 2-6.)



Figure 2-6. Cold-weather fleece jacket

2-26. Level IV: wind cold-weather jacket. Made of a lightweight, windproof, and water repellant material, this jacket is a minimum outer shell layer. When combined with body armor, the Army combat uniform (or both), the jacket improves the moisture-wicking performance of the insulation layers. It has two sleeve pockets and a mock turtleneck. Two chest-level pockets are designed with mesh pocket linings to help with ventilation while wearing body armor. This is best worn as wind protection during cool days. (See figure 2-7.)



Figure 2-7. Cold-weather wind jacket

2-27. Level V: soft shell cold-weather jacket and trousers (outer shell layer). Made of a highly water resistant, windproof material, it increases moisture vapor transfer over current hard-shell garments and provides a reduction in weight, bulk, and noise signature during movement. The increased breathability of the jacket improves performance of the insulation layers by decreasing saturation due to moisture accumulation. It has a storable hood that works with the ballistic helmet, and two hand-warming pockets on the chest with mesh lining to aid in ventilation. The jacket also has pit zippers and two sleeve pockets. Draw cords on the bottom prevents snow and wind from entering the system. Wear this jacket when the average temperature is below 19°F (–7°C). The necessary base and insulation layers depend upon the temperature, wind, and activity level. (See figure 2-8.)



Figure 2-8. Soft outer shell wind jacket and trousers

Notes. This is a TTP: attach a piece of parachute cord long enough to go under the instep of the boot (like a stirrup) to the two loops on the leg opening of the trousers. This helps keep the trousers from riding up or letting snow fall into clothing.

Attach a 4-inch (approximately 10 centimeter [cm]) loop of gutted parachute cord to the zipper pull at the waist of the trouser drop seat. Thread the hook and loop waist adjustment tabs and secure. This keeps the zipper from migrating down and opening the trousers to the elements.

Attach a 4-inch loop of parachute cord to the zipper pull of all layers. This helps when wearing gloves or mittens. (See figure 2-9.)

2-28. Battle buddies should team up if anyone is having difficulty reaching the zippers. Struggling only creates aggravation. Restore lost body water with NSN 8030-01-408-9446, or other available products.



Figure 2-9. Securing trousers to the belt, boots, and zipper extension

2-29. Level VI: extreme cold/wet weather jacket and trousers outer shell layer. A waterproof layer for use in prolonged or hard rain and cold-wet conditions, this jacket has two pass-through chest pockets for ventilation and a storable hood that works with the ballistic helmet. Wear this jacket when the average temperature is above 19ºF (–7°C) and the weather is alternating between freezing and thawing. The base and insulation layers needed depends upon the temperature, wind, and activity level. (See figure 2-10.)



Figure 2-10. Extreme cold/wet soft outer shell wind jacket and trousers

2-30. Level VII: extreme cold-weather parka and trousers. Providing superior warmth, the parka and trousers compact easily with low weight and volume. These garments are highly water resistant and windproof. Sized to fit over body armor during static activities requiring maximum insulation, the trouser incorporates full side zippers for donning and doffing over boots and other layers. Designed to be the last level of protection worn in extreme cold weather over all other layers, it is primarily meant for static positions. (See figure 2-11.)



Figure 2-11. Extreme cold-weather parka and trousers

Notes. This is a TTP: place Layer 7 directly under the flap of the rucksack for easy access and storage during long halts while on movements. This takes less than 1 minute to perform. Leave the hood unrolled to quickly cover the head and hold in body heat. This also serves to keep snow from entering clothing. When cold, put it on and do 5 to10 minutes of full-body exercise.

The inside pockets can hold bottles of hot water to aid in retaining heat. Camouflage overwhites are added over the top of the outermost shell, as conditions warrant.

HAND WEAR

2-31. Gloves are better for activities that require dexterity. (See figure 2-12.) Soldiers should always wear contact gloves. This is a very thin liner glove that shields the hands from direct contact with cold objects. Mittens can then be worn on top of the contact glove. Be aware that snow sticks to wool gloves and melts when hands are placed back into the mittens.

2-32. If activities call for handling snow or ice, use a shell or the intermediate cold-weather glove, and brush off all snow that sticks to the glove. Do not wear regular gloves or mittens for fueling operations. Fuel takes on the ambient temperature, so if a Soldier is splashed by fuel, frostbite can be the result. To protect the hands, Soldiers should wear fuel handler's gloves.



Figure 2-12. Arctic mitten and intermediate cold-weather gloves

Note. This is a TTP: if hands are getting cold, bend at the waist and flap both arms as if trying to fly. The pressure of blood being forced into the fingertips can be felt. Another method is to vigorously rotate arms at the shoulder or rotate the body at the hip. The idea is to force blood back into the fingertips.

CAMOUFLAGE SYSTEM

2-33. Camouflage in a cold-weather environment uses techniques appropriate for different snow-covered terrain. All Arctic Soldiers are issued an overwhite uniform. Simply putting these items on as the weather turns cold does not constitute good camouflage technique. Some thought needs to go into blending into the surroundings. Changes may be frequent to match the changing terrain.

Note. Camouflage paint is not worn when temperatures are below 32ºF (about 5.7ºC). The main reason is that it becomes impossible to monitor Soldiers for cold-weather injuries such as frostbite when skin camouflage is worn.

- These are some of the combinations that are typically used in snow-covered terrain:
  - In thickly wooded areas, wear the Universal Camouflage Pattern/Operational Camouflage Pattern (UCP/OCP) pattern uniform or UCP/OCP pattern with white trousers.
  - In low brush or light scrub areas, wear the overwhite parka top with UCP/OCP pattern trousers.

- In forested areas, wear the UCP/OCP pattern top with overwhite bottoms.
- When above the tree line in open areas, wear full camouflage with all parts of the overwhite camouflage.

- Additional considerations:
  - Avoid routes requiring numerous changes in the camouflage pattern.
  - Have camouflage garments handy so changes in pattern can be made fast and on the move.
  - In thickly wooded areas, use the UCP/OCP ECWCS parka and the overwhite trousers. (See figure 2-13.)

2-34. Like anything else, there are exceptions. For example, after a heavy snowfall, complete overwhites may be appropriate for any of the above listed terrain.



Figure 2-13. Camouflage in a thickly wooded area

2-35. When in approximately waist-high vegetation, use the overwhite helmet cover, parka, and mitten covers. The fighting load carrier (FLC) is broken up with white engineer tape. (See figure 2-14.)



Figure 2-14. Camouflage for low brush or light scrub areas

2-36. On trails or road systems, Soldiers wear overwhite trousers, ECWCS parka, and the standard helmet cover. (See figure 2-15.)



Figure 2-15. Mixed camouflage for roads and trails

2-37. The entire overwhite system is used in open areas or when operating above the tree line. (See figure 2-16.)

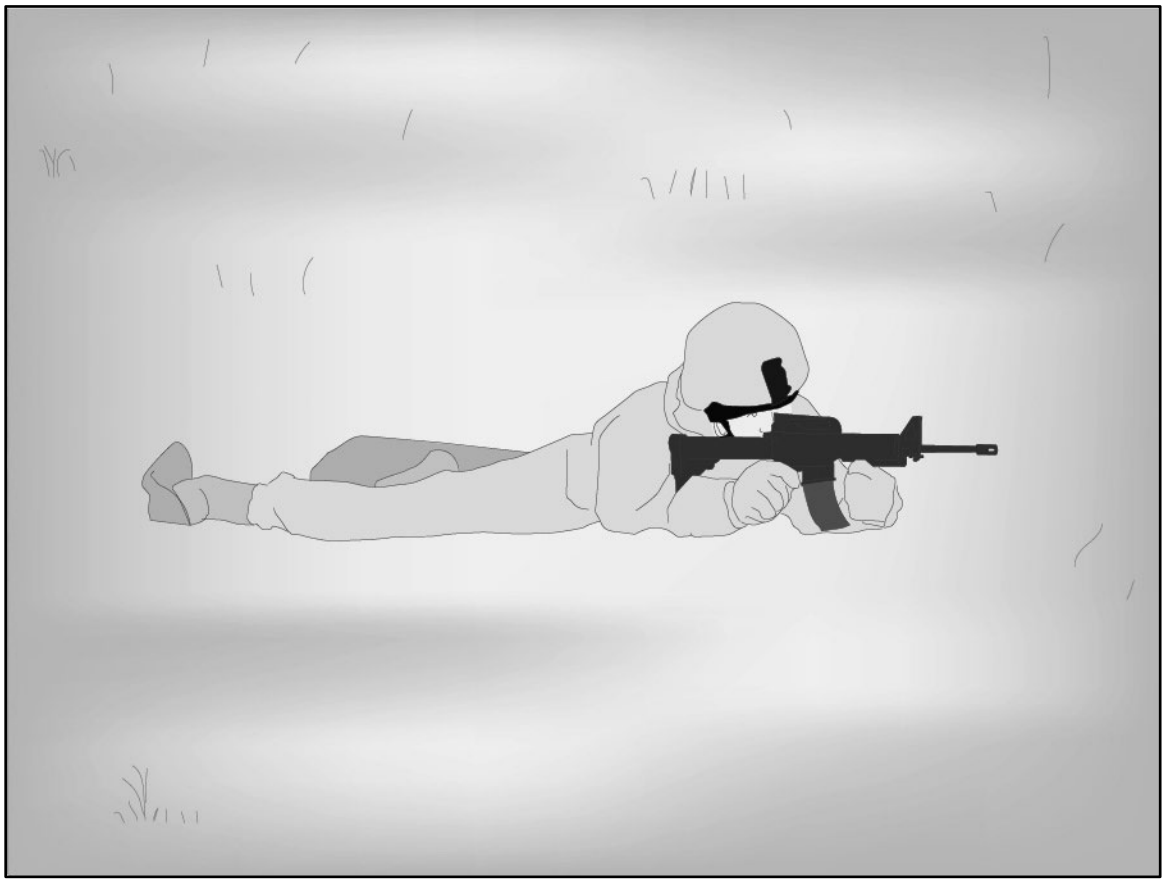


Figure 2-16. Snow camouflage above the tree line or in open areas

2-38. Different materials can be used for camouflage in a cold-weather environment. Tape is good but can become brittle and fall off. In this case, use cloth tape. Other resources include—

- Old overwhites or cloth.
- Spray paint (with the unit commanders' approval).
- Engineer tape.

2-39. Use as much white as necessary to make a pattern that blends in with the surrounding snow cover. Snow-covered terrain is rarely solid white. Leaving some black exposed on the weapon blends better than completely covering it with white.

Note. Take care not to interfere with moving parts, or normal equipment and weapons operations.

CLOTHING WEAR AND MAINTENANCE

2-40. Hang clothing separately from the drying lines inside the tent. Do not place anything too close to a stove and do not hang anything directly above the Space Heater Arctic (SHA) in the tent. If it falls off the line and lands on the heater it can cause a tent fire. Do not place wet clothing in sleeping bags. This only makes the bags wet (which is harder to dry than clothing). Small items can be placed between the sleeping bag and the sleeping mat under the legs. larger items can be allowed to freeze and then Soldiers can beat the ice out of them, which is very effective.

2-41. Use safety pins to attach damp socks or glove liners between the base layer and insulation layer. An ideal time for this is during the rest cycle. Clothing should be kept clean for it to function properly. The unit supply system can coordinate for bulk laundry, but this is time and resource intensive. For small items such as socks, turn a 5.56-milimeter ammunition can into a laundry machine.

2-42. This method also works for base layers, but the layers should be done one item at a time. Water can be from a creek or lake. Do not use the drinking water. To make a laundry machine—

- Place no more than five pairs of socks into the can.
- Fill with water and a couple of shavings from the bar of soap at the hand washing station.
- Place on top of the SHA for a few minutes to make the water warm to the touch.
- Close the lid of the can and shake vigorously for 5 minutes.
- Dump the water in the latrine area and squeeze the socks out.
- Repeat twice with rinse water.
- Hang to dry.

2-43. For shell layers, grasp two sides and rub them together vigorously to remove mud or dirt. This is called dry rubbing.

COLD-WEATHER EQUIPMENT MODULAR SLEEP SYSTEM

2-44. The Modular Sleep System and other components are designed to provide comfort in temperatures ranging from 50°F to –30°F (10°C to –34.4°C) when wearing various layers of extreme cold-weather clothing. This is a sized item, regular and long length. Individuals should ensure they check their system for fit. If the bag is too small or too big, the cold becomes more noticeable. The four-part modular sleep system (NSN 8645-01-547-2757) includes the—

- Patrol bag.
- Intermediate bag.
- Waterproof bivouac (bivvy) cover.
- Large stuff sack.

PARTS OF THE MODULAR SLEEP SYSTEM

2-45. The patrol bag is designed for use in temperate climates ranging from 30° to 50°F (–1°C to –15°C). The intermediate bag is designed for use in cold climates ranging from –10° to +30°F (–10°C to –1°C). The waterproof bivouac cover is the shell that protects the other layers and blocks wind.

2-46. When combined with the bivvy cover as the outermost layer, the system is designed for temperatures down to –20°F (–28.8°C) with the user wearing the Level I lightweight undershirt and drawers or Level II mid-weight shirt and drawers, both with standard cushion sole socks. It protects to –30°F (–34.4°C) when the user is also wearing the Level III fleece jacket and Level V soft shell trousers. These ratings are approximate and depend on the age and maintenance of the bags, along with the user's tolerance to cold. Some people sleep warmer than others.

2-47. The large compression stuff sack is constructed with water-resistant materials and enough adequate volume for all three layers. This sack compresses the system into one cubic foot. (See figure 2-17.)



Figure 2-17. Modular Sleep System

STAYING WARM

2-48. To stay warm, keep the bag dry. Sleeping bags become wet from outside moisture, water vapor, and human sweat.

2-49. Use the insulated sleeping pad under the sleeping bag for warmth and comfort, and to keep the sleeping bag dry. If the sleeping pad is unavailable, place insulation between the bag and ground.

Temperature in the Tent and Water Vapor

2-50. To avoid outside moisture such as rain and snow, or even an overly heated tent that creates mud, keep the tent fairly cool inside. If the snow is melting, reduce the heat from the heater system, spread a poncho on the ground under the mat, and use the bivvy cover to keep snow off the sleeping bag. Ensure boot soles are clean and free from snow before putting them inside the bag to keep them from freezing. Water bottles can also be put into the bag to prevent freezing but make sure the caps are secure.

2-51. When in the field, water vapor happens continuously throughout time and is difficult to avoid since humans produce moist heat over their bodies just by being alive. At least once a week, hang sleeping bags from the center pole of the tent to allow them to dry out. Separate all the layers individually to ensure thorough drying. Faces should not be placed inside the bag for warmth as this increases the amount of water vapor that condenses in the bag. Even the outside of the bag gets wet just from breathing. Allow water vapor to freeze, then dry rub or brush it off. There may also be frost on the underside of the bivvy cover. Brush this off before stowing the bag. Avoid wearing too many clothes to prevent sweating.

Transporting the Modular Sleep System

2-52. Always carry the sleeping bag in the issued carrying bag. This protects the bag and helps keep it dry. Ensure that the top of the bag is securely tied to prevent snow or water from getting inside and making the sleeping bag wet. It should not be strapped to the top of the rucksack, if possible. This exposes the bag to the elements and possible damage.

Notes. This is a TTP: eat just before getting into the sleeping bag. This generates energy and helps Soldiers stay warm.

Soldiers should relieve themselves before going to bed. The act of getting out of a warm sleeping bag and going outside can be a chilling experience.

To keep feet warm, zip the Level VII parka closed and slide it over the feet before getting into the sleeping bag. (See figure 2-18.) Immediately put the warm parka on after exiting the sleeping bag.

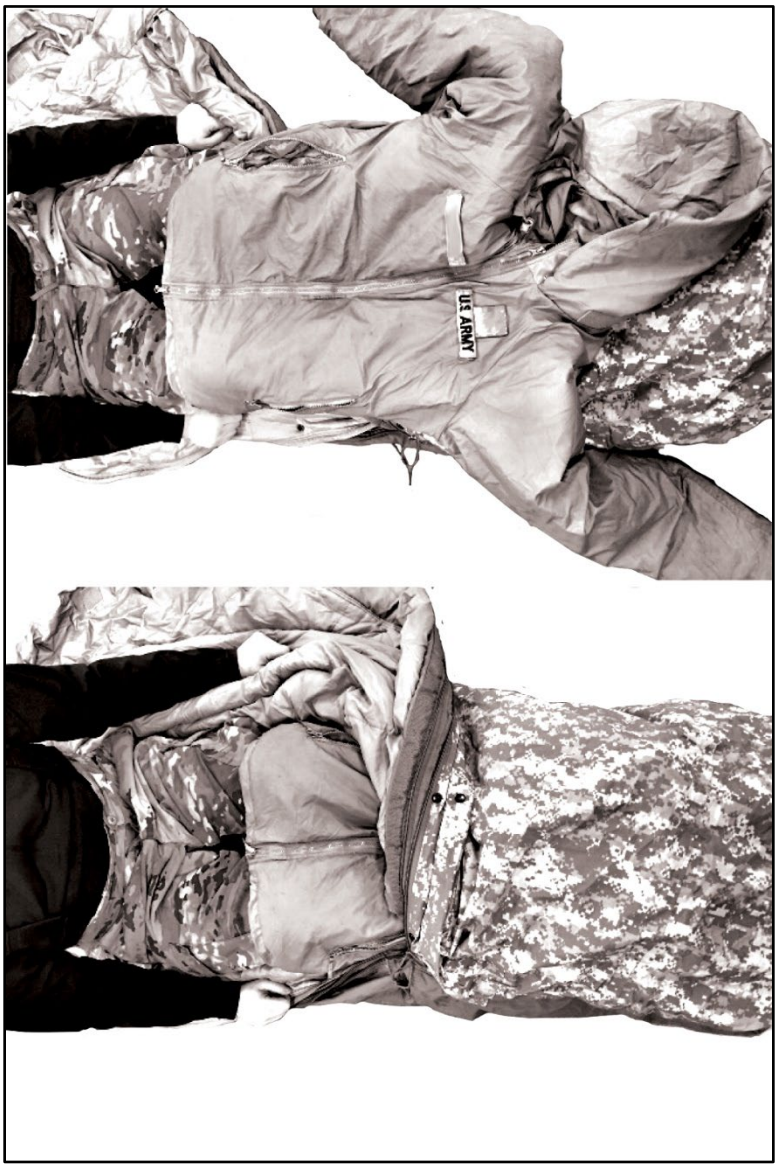


Figure 2-18. Use the Level VII parka to keep feet warm

PACKING THE RUCKSACK

2-53. Properly packing the fighting load and approach load should follow the A-B-C'S principle:

- Access (to mission critical items).
- Balance.
- Compress.
- Streamline.

ACCESS AND BALANCE

2-54. Mission critical items (ammunition, medical kits, and other items) should be readily retrievable at any given time. The location of these items is standard across the unit so they can be found in a hurry by anyone, anywhere. Keep similar items together. For example, several Soldiers carrying crew-served weapon parts should stay within close proximity to each other. Material for rope installations (artificial anchors, webbing, rope, and other items) should be carried in close proximity to the team that sets up the installation. Consumables such as water, batteries, and other needed articles should come out of the pack first, instead of the FLC. This way if a Soldier gets separated from their rucksack, resources are still available. In extreme cold, the heaviest insulation layer should be on top of the rucksack to quickly put on if needed during halts.

2-55. A rucksack that is lopsided and ill-fitting is misery. Soldiers must properly fit the rucksack to their bodies. (Refer to TM 10-8465-236-10 for more information.) Ensure that the body armor, FLC, and rucksack all work together. Remember that ounces make pounds and pounds make pain. Police Soldiers to reduce nonessential and redundant equipment. Strive to use multifunctional equipment as much as possible. Rations can be field stripped, and packaging removed from items. However, waterproofing is absolutely necessary. A drenching rain can more than double the weight of equipment very quickly. Do not load the sustainment pouches in lieu of the main compartment as they can flop around. Consider using the daypack or consolidating loads between two or more Soldiers.

COMPRESS AND STREAMLINE

2-56. Utilize the compression straps to keep the internal load from shifting. This also keeps the load closer to the body. Carry the load on the hips and legs, not the shoulders. Tighten the waist strap to a very snug fit just above the bony portion of the hips. The rucksack should remain in place on the pelvic area without any help from the shoulder straps. The straps should be tightened enough to keep the pack snug against the body.

2-57. Hanging equipment on the outside of the rucksack is a very poor practice. Heavier items can be felt swinging with each step. Items can snag on brush, make excessive noise, and possibly break or be lost in a tumble. When rock climbing, they get caught on nubbins and in cracks, causing a loss of balance or a fall. In snow-covered areas, a sled can be used to transport this equipment.

2-58. Items such as hydration bladders and assault packs act like a lever, increasing the perceived weight. Place these directly on top or inside, close to the body. Mortar tubes, man-portable air defense system (MANPADS), and other items may be better carried by hand with a sling, especially in heavy brush. Equipment such as a machine gun tripod or ice axe is usually carried on the outside of the pack. Attach them in a secure manner where they are least likely to create problems while on the move.

2-59. When loading the rucksack for skiing or climbing, pack heavier items toward the top and next to the frame. This places the weight on the hips, which is necessary for good balance. Place hard or sharp objects inside the load where they do not rub on the bag and the back. Articles that are often needed are placed in the outside pockets for easy reach. (See figure 2-19.)



Figure 2-19. Properly packed rucksack

2-60. Adjust the straps so that the top part of the body can move and arms swing freely. Adjust the shoulder straps so that the lower back straps fit just above the belt line.

LOAD-CARRYING EQUIPMENT

2-61. The modular lightweight load-carrying equipment (MOLLE) rucksack is used to carry the approach load and any additional items for the fighting load. (See figure 2-20.) In cold-weather operations, follow the packing list set by the unit SOP when organizing the rucksack. The main consideration is to avoid unpacking during halts to retrieve frequently needed items. The following illustrates a method of organizing the rucksack:

- Detachable sustainment pouches contain rations to be eaten for morning and evening meals, and—
  - Pack extra socks and a spare hat.
  - The openings behind the pockets can be used for skis or other items.
- External attachment points are used to secure additional pouches (such as the entrenching tool) to the side of the pack.
- The top flap contains camouflage overwhites and the pack cover:
  - Stow the Layer 7 parka directly under the top flap, allowing Soldiers at a halt to reach under the flap and don the parka directly over the FLC; they do not get cold and can immediately restow as movement begins.
  - These actions should take less than a minute.
- In the main compartment, place the sleeping bag at the bottom of the rucksack:
  - Spare clothes are placed around the sleeping bag to completely fill spaces; empty voids cause loads to shift.
  - The top section of the pack should be used for rations and mission items such as combat lifesaver bags.
  - Put small arms ammunition in the radio compartment separate from other items, so it can be found in a hurry and is not subject to falling into spaces.
- When wearing the overwhites, a white cotton cover is provided to camouflage the entire rucksack, excluding the shoulder straps.
- Check the rucksack for damage before and after an operation:
  - Repair any damage immediately or turn the rucksack in for a replacement through supply channels.
  - Ensure the rucksack fits properly before going to the field.
- When quick removal of the rucksack is needed, unsnap the fastener, pull upward on the quick-release fasteners on the shoulder straps, and let it drop to the ground.
- To attach skis to the side of the pack, slide the ski behind the sustainment pouches and secure the shovels with cord or rubber bands to keep them steady.
- Remember that with skis attached, the Solider is now taller and the skis can hit things overhead.



Figure 2-20. MOLLE with skis

2-62. There are two methods for securing snowshoes. (See figure 2-21.) The left rucksack in figure 2-21 depicts bungee cord or parachute cord lashed to the outside. This allows snowshoes to stay assembled. The right rucksack in figure 2-21 shows the snowshoes disassembled and stowed under the top flap of the Level VII parka. This is more compact for carrying in helicopters or airborne drops. The snowshoes are reassembled before use.

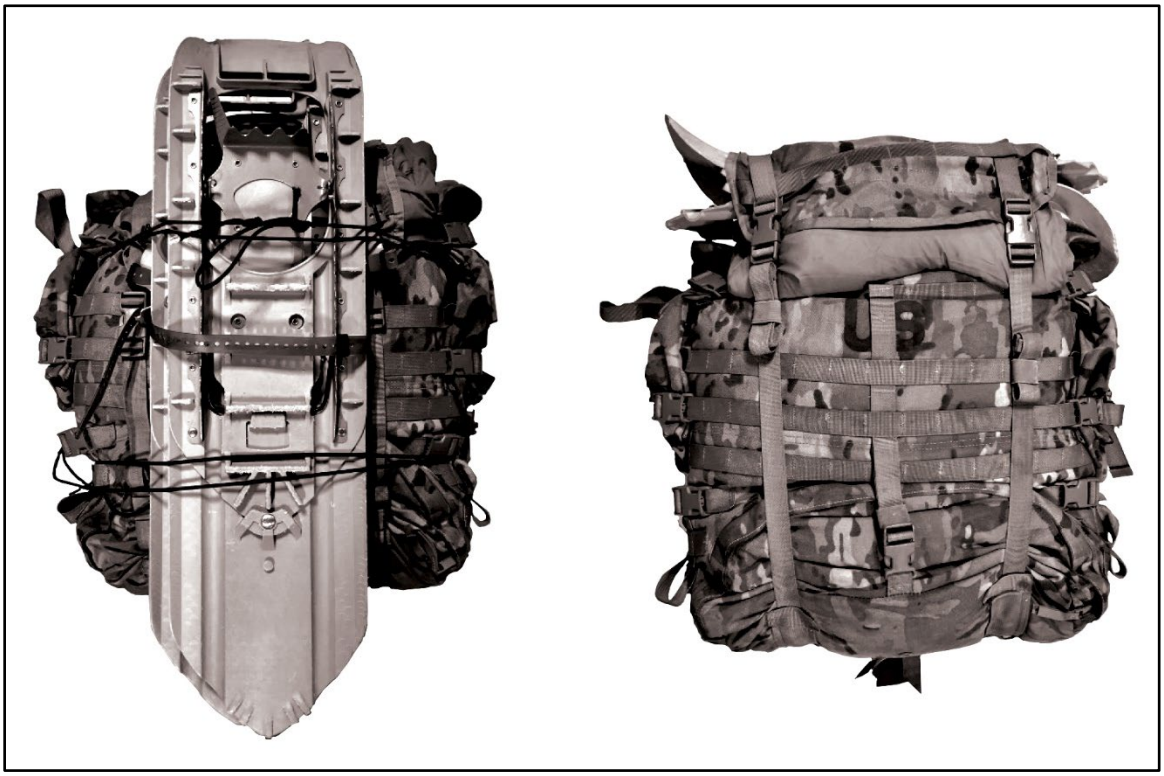


Figure 2-21. Two methods of securing snowshoes

2-63. During operations in mountainous areas, an ice axe is a useful tool. Stow it by sliding it behind the sustainment pouch and secure it with its leash. (See figure 2-22.)

Note. Due to the harsh nature of cold-weather areas, the rucksack and its contents can be the difference between life, death, or serious injury in these regions of the world.



Figure 2-22. Ice axe attached to the rucksack

MOVING EQUIPMENT OVER SNOW

2-64. Before being instructed to use snowshoes or skis, the chain of command first determines if movement by foot is possible. In shallow snow (8 inches [20.3 cm] or less) or heavily crusted snow, movement on foot might provide better maneuverability with the least effort. In deeper snow, snowshoe or ski flotation is just as important as weapons and clothing.

SNOWSHOES

2-65. The military snowshoe is light and durable, providing the needed flotation to travel over snow. Approximately 22 inches (55.8 cm) long and 8 inches (20.3 cm) wide (without flotation tails) and weighing less than 4 pounds (1.8 kilograms), military snowshoes are made with a hard plastic deck, and steel crampons and bars to aid traction. (See figure 2-23.)

2-66. After traversing a hard-packed area, it is recommended to keep the tails on to prevent unexpected falls into deep snow without the adequate flotation to stay upright. The addition of ski poles helps a Soldier maintain balance, aid with propulsion, and can be used as a weapon rest when engaging targets.

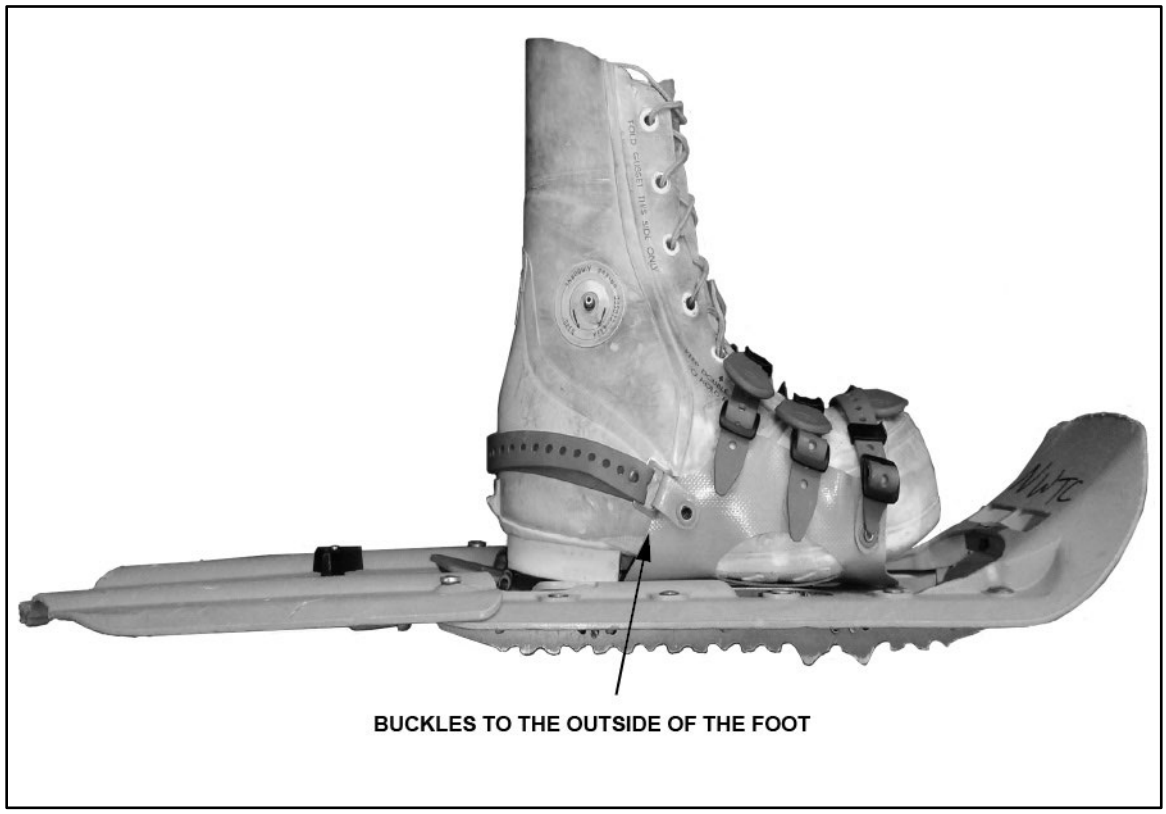


Figure 2-23. Snowshoe binding attached to the boot

SKIS

2-67. Current standard military skis come in three lengths. The appropriate length for each Soldier is determined by individual body weight. Soldiers weighing less than 165 pounds use the 180 cm (5 feet, 9 inch) ski. Those between 165 and 200 pounds (74.6 and 90.7 kilograms) use the 190 cm (6 feet, 2 inch) ski, and Soldiers over 200 pounds use the 200 cm (6 feet, 5 inch) ski. These skis have a hole in the tip for attaching a lanyard to drag behind when in an assaulting a position. Skis can also be used to construct an expedient litter. The metal edges along the sides of the skis help grip the snow when turning.

2-68. A groove in the tail allows climbing skins to be attached. Climbing skins are detachable lengths of cloth with directional plush. They attach to the base of the ski with a loop on the tip and a hook on the tail. The center is held in place with renewable glue. These skins provide traction for ascension up very steep slopes or when pulling heavy loads.

2-69. Ski poles are extremely useful in steep terrain, providing balance and aiding propulsion. They can also be used as a weapon rest when engaging targets. The length of the pole is adjustable. Usually, adjusting the ski pole to the height of the name tape on the shirt is a good length. Ski poles should also be used with snowshoes.

MISCELLANEOUS EQUIPMENT

2-70. Sunglasses and canteens are essential items every Soldier should carry with their cold-weather gear. Sunglasses and goggles prevent serious eye injury, canteens prevent dehydration, and hydration bladders can help warm sleeping bags.

SUNGLASSES

2-71. Polarized ultraviolet-blocking sunglasses are always worn when the ground is covered with snow, especially on bright days. Failure to wear sunglasses, even on overcast days, may result in snow blindness. This is very painful and can cause incapacitation for up to 48 hours.

2-72. Should this situation occur, a fellow Soldier is assigned to help the injured Soldier with the simplest of tasks. Goggles are double paned. The air space between the two lenses prevents fogging. Goggles with mirrored finishes reflect the sun, giving away the position of the Soldier.

CANTEENS

2-73. In cold weather, do not fill the canteen over two-thirds full to allow for expansion if the water freezes. Fill the canteen with hot water, if available, and place it upside down in its carrier so the cap does not freeze shut. This can be comfortably carried inside the insulation layers to keep water potable.

2-74. Hydration bladders also freeze if left outside but can be placed inside insulation layers to keep the water thawed. Any water container placed in the sleeping bag is checked for leaks, tight filler caps, and valves.

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Chapter 3
Weapons and Ammunition

CARE, CLEANING, AND MAINTENANCE

3-1. Cold weather greatly affects the operation of weapons. Be aware of these effects to ensure the weapon is operational even under poor conditions such as snow, freezing rain, and extreme cold.

LUBRICANT USE

3-2. If given proper care, weapons function in extreme cold. Lubricants that are normally used under temperate conditions, such as cleaner lubricant preservative (CLP) thicken in cold weather, resulting in stoppages or sluggish weapon action. CLP freezes at –35°F (–37.2°C). To eliminate this problem, the weapon is completely stripped, thoroughly cleaned, and lubricated with lubricating oil, weapons (LAW).

3-3. Ensure that all the CLP is removed from the weapon before applying LAW. The two substances do not mix well and cause problems. At a minimum, the camming surfaces of the bolt should be lightly oiled with LAW. The rest of the weapon can be left dry.

Note. When firing weapons dry, weapons are cleaned prior to storing.

3-4. Dry firing is not a license to store dirty weapons. LAW is available in one-quart containers (NSN 9150-00-292-9689). If LAW is not available, fire the weapon dry. Graphite is known to be a good cold-weather lubricant but can cause galvanic corrosion over the long term.

STORING WEAPONS

3-5. Condensation forms on weapons when they are moved from cold to warm environments. This is called sweating. If weapons are taken back into the cold without removing the condensation, this sweat can turn into ice, resulting in stoppages. For this reason, it is best to leave weapons outside when temperatures are below freezing. When left outside, firearms should be readily accessible but sheltered so that ice and snow does not enter the working parts (sight and barrel). If necessary, weapons can be taken inside for cleaning. Condensation continues to collect for approximately 1 hour after introducing the weapon into a warm shelter. Wait until the sweating process has concluded before starting the cleaning process. If weapons are to be kept in heated shelters, they should be kept near (but not on) the floor to minimize condensation.

3-6. To keep snow and ice out of a weapon, some type of cover is needed. Request muzzle caps from the unit armorer because they are expendable and efficient (NSN 5340-00-880-7666). If none are available, improvise using plastic bags, tape, or any other suitable covering. Soldiers can shoot through a muzzle cap or a single layer of tape. Ejection port covers are kept closed.

3-7. If weapons become frozen, various products can be used to de-ice them, such as windshield wiper fluid, padlock de-icer, and vehicle antifreeze. Periodic cycling of the weapon also keeps parts from freezing.

FIRING ISSUES AND STRATEGIES

3-8. A visibility problem is possible when weapons are fired in motionless air conditions where temperatures are below –30°F (–34.4°C). As the round leaves the weapon, the hot propellant gases cause the water vapor in the air to condense. These droplets of condensed water vapor then freeze, creating ice particles that produce a cloud of ice fog. This fog hangs over the weapon and follows the path of the projectile, obstructing the gunner’s vision along the line of fire. This fog also reveals the Soldier’s location to the enemy. When faced with this problem, fire at a slower rate or relocate to an alternate firing position.

3-9. Tests have shown that even in warmer temperatures, a fog develops around the gun from hot gases and the breath of the gunner, making it difficult to observe the strike of a round. For crew-served weapons, the assistant gunner may need to take up a position further left or right to help with adjustments. For individual weapons, frequent changes in position may be required.

3-10. When using optics in the cold, care is exercised to keep the breath from condensing on the sight. Even the warmth put out due to the close proximity of the face near the sight can cause cloudiness. Allow a standoff between the eye and the sight. When taken from a cold to warm environment, optics need to slowly adjust to the new temperature to avoid cracking the lens.

BREAKAGE AND MALFUNCTIONS

3-11. Extreme cold causes metal and plastic to become more brittle than it is at warmer temperatures. Breakage generally occurs early when a cold weapon is fired; the metal is warming and rapid, unequal expansion of the parts is occurring. In this situation, begin firing small arms at a slow rate of fire, if the tactical situation permits. This greatly reduces the likelihood of weapon malfunction.

3-12. After a weapon has been fired, the heat generated by firing can cause any snow or ice it comes into contact with to melt. This water then refreezes, potentially causing the weapon to malfunction. Applying a de-icer can help thaw the weapon and keep it working properly. Cycle the weapon periodically. For this reason, unit armorers need to carry extra parts.

CREW-SERVED WEAPONS

3-13. Crew-served weapons require some type of firing base or platform. Emplacement of a weapon on snow, ice, or frozen ground may result in breakage, inaccuracy due to sinking, or the inability to absorb shock. Emplacements relating to particular weapons are discussed later in this chapter.

3-14. As the temperature drops, so does muzzle velocity and the range of projectiles. This is due to a change in internal and external ballistics:

- Internal ballistics occur inside the weapon; the burning rate of propellant decreases, decreasing the rate of gas expansion and speed the projectile moves down the barrel.
- External ballistics occur after the projectile leaves the muzzle:
  - Decreased muzzle velocity reduces the stability of the projectile as it leaves the muzzle, possibly causing the projectile to tumble.
  - At longer ranges, this further reduces velocity and accuracy.
  - Cold air is denser than warm air which can create increased drag on the projectile, further decreasing the range.

AUTOMATIC WEAPONS

3-15. Automatic weapons have a high rate of breakage and malfunction due to cold weather. Especially affected are the sear and bolt parts. Gun crews carry extra parts of this type. One common malfunction is short recoil where the bolt does not recoil fully to the rear. A second malfunction is caused by the freezing and hardening of buffers. This causes great shock and rapid recoil, increasing the cyclic rate and potentially causing parts to break.

3-16. All internal components and friction surfaces of machine guns should be coated with LAW. These small arms should be fired cold and dry if LAW or CLP is not available. Firing should begin slowly at first to allow the weapon to warm; short two-round or three-round bursts at quick intervals are sufficient until the weapon components warm. Machine guns should be test-fired in cold weather prior to combat deployment. Ammunition is transported enclosed in drums or cans to prevent snow fouling. It should be kept at the same temperature as the weapon. All weapons should be re-zeroed in extreme cold.

SPECIFIC WEAPON PROBLEMS

3-17. Although any number of reasons factor into a weapons failure, cold-weather situations can present a higher degree of malfunction. The following information provides specific considerations for the pistol; rifle and carbine; light, heavy, and grenade machine guns; M136 (AT-4); M220-series tube launched, optically tracked wire guided (TOW) tripod launcher; MANPADS (Stinger); FMG-148 Javelin; fragmentation grenades; and C-4 weaponry when used in cold-weather climates.

Pistol

3-18. The pistol is affected by condensation more than other weapon because it is most often carried by personnel whose duties require them to frequently enter and exit heated shelters and vehicles. Freezing generally occurs around the slide and magazine well. Moving parts breakage is rare, but the extractor and firing pin are vulnerable.

Rifle and Carbine

3-19. Little breakage occurs in the individual rifle/carbine if the weapon is fired at a slow rate until it warms. Breakage usually occurs around the extractor, ejector, and firing pin. Condensation in the buffer tube decreases its shock-absorbing ability, which may result in breakage or reduced recoil. This can result in the omission of the cocking step in the cycle of operation. Wipe out the buffer tube frequently to remove condensation and reduce the chance of weapon malfunction. When wearing mittens or bulky hand gear, open the trigger guard for firing. Keep the trigger guard closed but unlatched for safety when not in use.

3-20. Re-zero the rifle/carbine when deploying from temperate to cold environments. Cold temperatures may cause a decrease in the burning rate of propellants, which can significantly change projectile trajectories. In effect, this nullifies the zero of the weapon. Altitude also has an effect on the weapon system. When a significant change in altitude occurs, the weapon should be re-zeroed.

Light Machine Gun

3-21. The light machine gun has a high rate of breakage due to the large number of moving parts. Armorers should carry plenty of spare parts, especially those most prone to failure (firing pins, extractors, feed pawls, and other parts). Other things to consider when using the light machine gun is—

- The safety selector switch is extremely difficult to operate when the weapon is cold.
- Buffer group assemblies are affected in the same manner as the rifle/carbine:
  - A common malfunction is short recoil (the bolt does not recoil fully to the rear) which occurs early in firing.
  - Apply immediate action procedures until the metal warms.
- When changing barrels, do not place a hot barrel in the snow:
  - The rapidly cooling barrel may warp and cause condensation to freeze in the barrel.
  - Use a 30-inch by 30-inch square of doubled heavy cotton canvas to lay spare barrels on.
  - The cotton canvas keeps the barrel from melting into the snow and possibly warping.
  - This cotton canvas should be kept in or attached to the spare barrel bag.
  - Nylon canvas melts when in contact with a hot barrel.
- Ammunition protection is essential:
  - Unprotected belts are a sure way to introduce ice into the weapon when firing.
  - Another square of cotton cloth can serve as a place to lay ammunition for the medium/light machine gun.
  - Another solution is to link two belts together, S-feed into the original steel canister, and set them next to the gun on a packed snow platform.
  - Both cotton cloth and linking belts methods keep snow from being introduced into the weapon.
- Semipermanent platforms may be constructed by attaching ski pole baskets or snowshoes to the bipod.
- A rubber floor tile (similar to tiles in gym weight rooms and can be found in any home improvement store) is a perfectly-sized firing platform for the medium/light machine gun bipod.

3-22. With the light machine gun, emplacement considerations may be more involved. For the bipod, apply the same techniques mentioned for the M249 (ski baskets or snowshoes). Testing has shown that resting the weapon in the bipod firing position on a rucksack does not provide a stable platform and makes it difficult to operate from the kneeling (too low) or the prone (too high) positions.

3-23. If using the tripod firing position, the ahkio or another sled can be used as a platform. On hard ground or ice, each leg needs to be seated in a slot that is chipped out to fit the base of each leg. Ice screws or pitons driven into frozen ground or ice and attached to the tripod legs with parachute cord may increase the stability of the position.

Heavy Machine Gun

3-24. The heavy machine gun is another weapon with the same considerations as the rifle/light machine gun. For the tripod, see the techniques noted for the medium machine gun. Twelve-inch plywood cutouts can be easily made. Sandbags have also been used to provide a stable platform for the tripod on hard ground, but tests show the bags tend to rip after 300 to 400 rounds.

Grenade Machine Gun

3-25. The grenade machine gun uses lubricant, weapon, semifluid or grease, molybdenum disulfide lubricant down to –25°F (–31.6°C). Below that, use LAW.

3-26. Use cloth covers rather than plastic to protect the weapon from the elements; plastic or rubberized covers can become stiff or brittle in the cold. This can result in difficulty removing them (especially when in a hurry) or damage to the cover. Use the same techniques for the tripod as the M2/M240.

3-27. When working with mortars, hand protection is always worn (contact gloves). The gloves are worn close to the skin. When ammunition is dropped into the tube, a vacuum occurs that can suck a loose glove into the tube, creating a hazardous situation.

3-28. Breathing on sights or the mortar ballistic computer (MBC) causes equipment to fog and freeze. When not firing the weapon, muzzle and sight covers should be used to prevent snow and ice from entering the tube.

3-29. The MBC is programmed to accept temperatures down to –50°F (–45.5°C). This automatically compensates for cold-induced slow burning charges when computing firing data. The MBC is not programmed for temperature inputs colder than –50°F (–45.5°C).

3-30. Aiming stakes become loose when placed in snow. Utilize sandbags or an anchoring device to keep them in place once set. Base plates become brittle when exposed to extreme cold. With the decreased ability of frozen ground to absorb shock, base plates are more prone to breakage than normal. Base plates are dug in, if possible, to prevent the base plate from skipping. Shock absorbing materials such as spruce branches, sandbags, even ice chips, or soil should be used for absorbing recoil during firing, but not to an extent that allows the base plate to bounce out of the dug-in hole. Demolitions may be used to prepare a firing position quickly: a 1.25-pound (0.55 kilogram [kg] block of C-4 works well). After emplacement, base plates can be hard to remove.

3-31. Swab bores thoroughly after each mission to remove any excess propellants. Variable time fuzes are not preferred due to the severe dampening effects of snow: airbursts are preferred. Malfunctions occur in direct proportion to the severity of the weather. The rubber tube cover may harden and become extremely difficult to remove as temperatures fall. When firing in drop mode, expect a greater number of misfires. Using the trigger corrects this.

M136 (AT-4)

3-32. As with the other weapons, the M136 (AT-4) is also susceptible to extreme cold where plastic and rubber components become brittle and can crack. Ice fog and vapor trails occur when the weapon is fired. Gunners wear facemasks or scarves when temperatures reach –15°F (–9.4°C) to prevent icing the sight. Icing makes sights more difficult to release from their covers.

M220-Series TOW Tripod Launcher

3-33. The M220-series TOW tripod launcher is effective in temperatures down to –25°F (–31.6°C) and can be stored down to –65°F (–53.8°C). In extreme cold, the heat from the engine can distort the image in the sight. Fire the weapon over the back or side.

MANPADS (Stinger)

3-34. Additional interrogation/tracking time is required for the MANPADS (Stinger) due to temperature-related diminished battery performance. Be sure the nickel-cadmium battery is fully charged. Double the backblast danger/caution area size if the temperature is below 0°F (–17.7°C).

FMG-148 Javelin

3-35. The FMG-148 Javelin has a slight drop when fired in the cold; be cognizant of this when using from defilade or reverse slope positions. It is effectively used in temperatures down to –25°F (–31.6°C) and can be stored down to –65°F (–53.8°C).

Fragmentation Grenades

3-36. Fragmentation grenades suffer a reduced causality-producing radius due to energy dissipation in the snow. Smoke grenades are useless unless placed on a platform to prevent them from sinking into the snow. Taping or wiring a grenade to a stake that can be driven into the snow works well.

DANGER

When using grenades, ensure that gloves or mittens are dry. Failure to do so may result in an armed grenade frozen to a Soldier's hand.

C-4

3-37. With demolitions, C-4 hardens, making it difficult to insert blasting caps. In extremely cold conditions, C-4 has shattered from the blasting cap rather than detonating. The detonation cord, time fuze, and shock tube become brittle, more difficult to tie, and may break. The time fuze tends to retain its curl and breaks when unrolled. Condensation contributes to the occurrence of misfires. Hangfire and misfire waiting times should be doubled.

AMMUNITION

3-38. Small arms ammunition should be kept at the same temperature as the weapon. Ammunition clips and magazines are cleaned of oil and preservative and checked often. All ice, snow, and condensation are removed. Ammunition boxes are kept closed in order to keep out snow and ice.

3-39. Stored ammunition should be kept in packed boxes; raised off the surface by placing them on boughs, cardboard, or other similar material; and covered to protect them from the snow. Ammunition is well marked for easy location and identification in case of later snow cover.

3-40. Ammunition resupply may become restricted. Everyone is aware of the necessity for ammunition economy and fire discipline. Loaded clips, magazines, or single rounds dropped in the snow are quickly lost. Handling ammunition carefully is essential. Never waste ammunition. Make every round count.

SHOOTING POSITIONS

3-41. The general principles of firing a weapon, such as position, breath control, trigger squeeze, grip, sight alignment, and follow through remain the same no matter what type of environment Soldiers find themselves in. Successfully operating in a cold, harsh environment requires a few modifications to these basic shooting principles.

3-42. Paragraphs 3-43 through 3-51 discuss the operation of various firearms and crew-served weapons while wearing skis or snowshoes. Environmental issues such as successfully performing on snow and ice are also briefly addressed. However, the best experience is practicing these added challenges.

CARRY A WEAPON WHILE USING SKIS OR SNOWSHOES

3-43. Attach the sling to the rear sling swivel and the slip ring (where the hand guards attach to the receiver). Hang the weapon over the neck and firing side shoulder with the muzzle down. The weapon can be placed behind the canteen on the firing side hip to keep it out of the way while using ski poles.

3-44. Alternatively, attach the sling at the slip ring and the small of the butt stock and hang in the same manner. A third method is using a three-point sling that is available commercially.

INDIVIDUAL FIRING TECHNIQUES ON SKIS OR SNOWSHOES

3-45. Standing, kneeling, or lying prone while firing a weapon is a choice all Soldiers face in cold-weather operations. Special care is taken in these three situations.

Standing

3-46. Standing on skis and snowshoes is a firing position best applied when fire is returned quickly, such as during an assault. (See figure 3-1.) When cover is available, it should be sought. Make use of the depression around a tree trunk because it lowers the shooter's profile, but do not allow snow to foul the weapon, especially when it is hot. Lowering one's profile is a good technique for long distance and rolling terrain, and is easy to get into. A major disadvantage is that it presents a high silhouette for the enemy. To get into position—

- Assume a suitable standing firing position:
  - Based on the situation, assume the position that best allows observation and target engagement.
  - Be sure to minimize exposure to enemy fire.
- If time permits, place the ski poles in the nonfiring hand in an X pattern and interlace the lanyards; however, this is not absolutely necessary.
- Place the forestock of the weapon in the crotch of the X for support:
  - This requires slightly squatting, so be careful.
  - The barrel can get hot enough to melt the lanyards on the ski poles.
- Place the ski or snowshoe of the firing side leg in a half-herringbone position.
- Maneuver by running on the snowshoes or kick and glide on skis.
- Carry the ski poles in the nonfiring hand and the weapon in the firing hand.

3-47. As an alternative position—

- Place the ski pole vertically in the snow while maintaining a grip on the pole with the nonfiring hand.
- Rest the forestock on the wrist of the nonfiring hand:
  - Position the forestock carefully.
  - The barrel can get hot enough to melt the nylon on gloves/mittens.
- Allow the ski pole on the firing hand to dangle from the lanyard.

CAUTION

Soldiers must be careful not to shoot themselves in the arm when assuming this position.



Figure 3-1. Standing on skis and snowshoes

Kneeling

3-48. While kneeling on skis, assume a suitable firing position. (See figure 3-2.) Based on the situation, assume the position that allows observation and engagement of targets, yet minimizes exposure to enemy fire. To do this—

- Place the ski poles in the nonfiring hand in an X pattern.
- Place the forestock of the weapon in the crotch of the X for support.
- Place the ski or snowshoe of the firing side leg in a half-herringbone position:
  - Take care that the snowshoe shovel does not injure the shin.
  - If using skis, the firing side knee may be placed directly on top of the ski.
- Point the ski or snowshoe of the nonfiring side leg in the direction of the target.
- Maneuver by running on the snowshoes, or kick and glide on skis:
  - Carry the ski poles in the nonfiring hand.
  - Carry the weapon in the firing hand.
- Place the knee on the firing hand side on the ski to maintain stability when the snowpack is deep and unconsolidated.



Figure 3-2. Firing position while kneeling on skis

3-49. Kneeling on snowshoes is a technique similar to kneeling on skis. (See figure 3-3.) However, care is taken to prevent the knee or shin on the firing side from being injured by the shovel of the snowshoe.



Figure 3-3. Kneeling on snowshoes

Prone

3-50. Prone firing on skis and snowshoes (see figure 3-4) is similar to the standard prone position except that the Soldier uses ski poles under the chest for flotation in deep snow as follows:

- Form an X with the poles and drop them on the snow in front of the individual.
- Lay down with the chest at the top of the X.
- Each ski or snowshoe is placed in a half-herringbone position.
- Do not allow the snowshoe tails to stick straight up, as these become markers for the enemy to locate and engage.

3-51. The prone position provides a stable firing platform and a low silhouette, but it can be difficult to get out of, especially in deep snow. Utilize the ski poles X position to push upright, get one foot underneath the body, and then stand. Collect the ski poles before advancing.

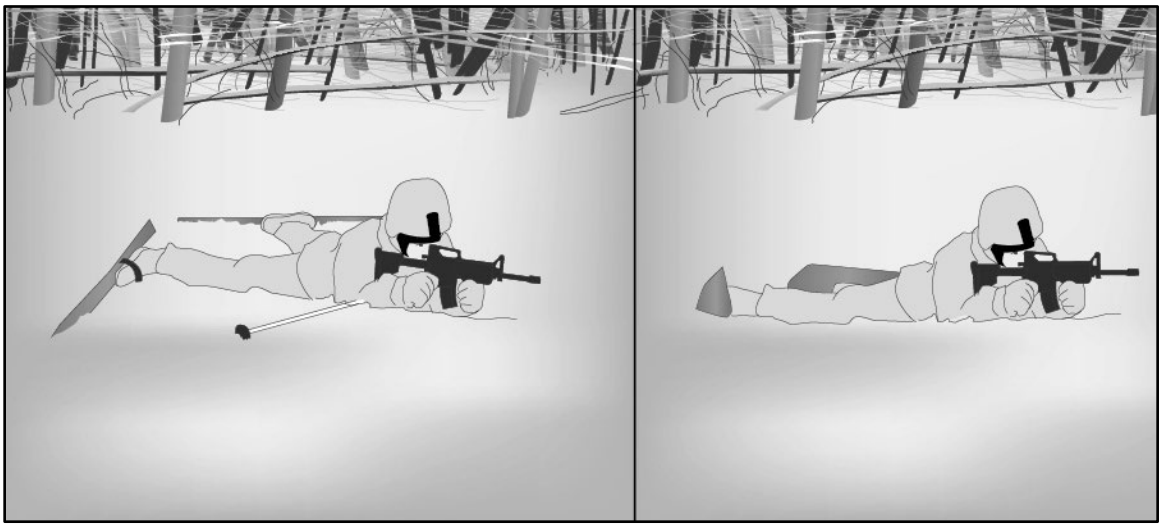


Figure 3-4. Prone position while firing on skis and snowshoes

Select Firing Techniques for Crew-Served Weapons

3-52. Crew-served weapons cause problems due to the additional weight that causes them to sink into the snow. It can also be difficult to establish a stable firing platform on ice or frozen ground. Effectively seating base plates for mortars into frozen ground also causes problems.

3-53. The ahkio can be used as a platform, with the added advantage of keeping ammunition out of the snow. It is useful for the assistant gunner to carry a small bottle of methanol (windshield wiper fluid) to defrost an iced-over weapon.

3-54. After mounting the M-240 machinegun in tripod mode (see figure 3-5), secure it to the ahkio sled using parachute cord or straps connected to the D rings on the bottom of the ahkio so that the whole system can be moved at once if maneuver becomes necessary. Other considerations for securing the machinegun include—

- Chipping away ice or frozen ground for the tripod feet if snow cover is shallow or nonexistent.
- Filling sandbags with snow and use as support for tripods in deeper snow with more static positions.
- Placing skis or snowshoes of the gun crew in a herringbone position.

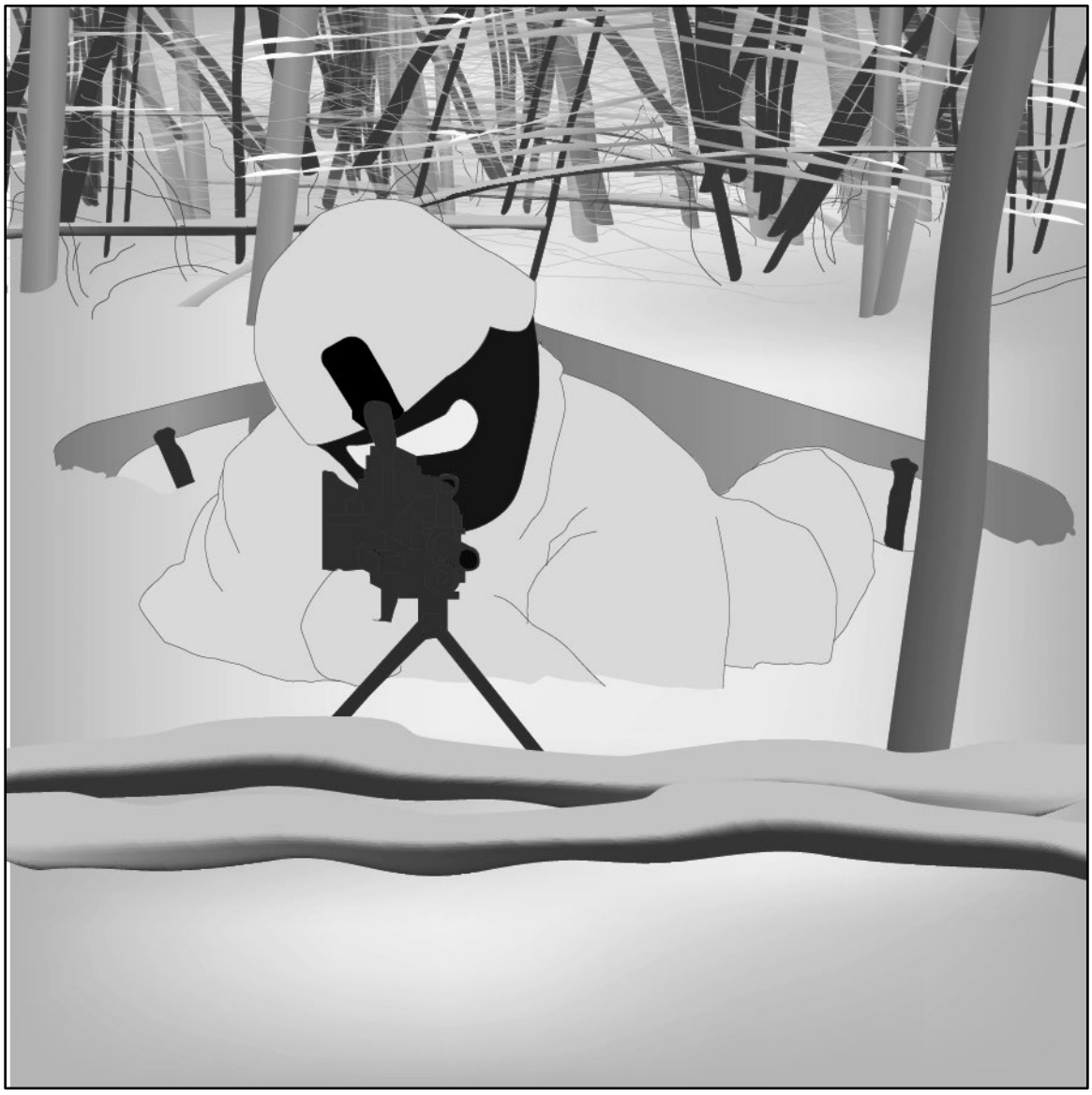


Figure 3-5. M-240 machine gun in tripod mode

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Chapter 4
Optimizing Physical Care

EATING AND DRINKING IN A COLD ENVIRONMENT

4-1. Most of what humans eat and drink is used to maintain body heat, while only a small portion is used to produce energy for physical work. Adequate caloric intake in cold-weather operations is essential. About 4,600 calories per day are necessary for Soldier's performing physically demanding work in this type of environment. Efficiency drops rapidly if this level is not maintained.

4-2. The body loses liquid quickly in extremely cold conditions, regardless of how carefully clothing is adjusted and ventilated. The exertion of moving on foot, preparing bivouac sites and defenses in the snow, and other manual tasks, take a toll with sweat and loss of moisture due to breathing. These liquids are regularly replaced, preferably by hot drinks that provide extra calories when they contain sugar.

RATIONS

4-3. The standard operational ration is the meal, ready to eat (MRE). One ration provides about 1,300 calories. Four MREs per day are needed to meet the required calories. The downside to this ration is that most of its components freeze.

4-4. The meal, cold weather (MCW) has many pocket items that should be readily accessible throughout the day. This ration provides about 1,450 calories per bag. The modular operational ration enhancement contains all pocket items to supplement additional calories throughout the day. Each packet provides 1,100 calories. The unitized group ration series of rations has an Arctic supplement component that provides an additional 914 calories. The MCW is a restricted ration meant for short durations. (More information can be found in AR 40-25.)

LIQUIDS

4-5. Insensible and sensible fluid loss refers to two types of ways the body loses liquid through various bodily functions. Insensible fluid loss cannot be perceived or measured directly. Sensible loss can be perceived and measured.

Insensible and Sensible Fluid Loss

4-6. Insensible fluid loss is evaporation by breathing and perspiration. This is continuous and can account for approximately 1.5 to 2.25 quarts (approximately 1.4 to 2.1 liters) of moisture loss per day. The human body is constantly giving off moisture through the skin. To illustrate this on a small scale, tape a clear plastic bag to the hand. The cloudiness that forms is moisture. That loss happens over the entire skin area.

4-7. Sensible fluid loss is what can be seen leaving the body, such as urine or sweat. This loss varies based on temperature, humidity, and physical exertion. Soldiers need approximately 3.75 to 5.25 quarts (approximately 3.5 to 5 liters) of water per day. This includes the water present in rations.

Maintaining Rations

4-8. One MRE has close to 8 ounces (approximately .25 liters) of liquid per ration. One MCW has close to zero water in it because MCWs are freeze-dried and require a little more than 1 quart (approximately 1 liter) of water to reconstitute the entrée and beverages. Assuming each Soldier consumes four MCWs a day, one squad needs at least 8 gallons (approximately 30.3 liters) of water per day. At the high end, it is almost 12 gallons (approximately 45.5 liters) per squad. To visualize this, a company needs one high mobility multipurpose wheeled vehicle for carrying water cans.

Maintaining Adequate Water Supplies

4-9. While liquid water from a creek is always the best option, gather snow or ice chunks to make water when necessary. Ice produces more water in less time than snow. When melting snow, first put a small amount into the cooking pot and melt it, then more can be added. Continue this process until there is enough water. It is purified by bringing it to a rolling boil. When heating water, use all available stoves since this is a very time-consuming operation. Areas designated for ice or snow that are to be used for water are situated far upwind and uphill of the latrine and garbage disposal sites.

4-10. Before going to bed, ensure that stoves are filled with fuel and enough water is prepared for melting. The fire watch should have the additional duty of continuously melting snow or ice to ensure the squad has water for the next day. After compiling enough snow, ice, or water—

- Place the two big pots from the squad cook sets on the SHA full of snow and ice.
- Allow the snow or ice to melt (or at least become slushy).
- Transfer these pots to the squad stoves to boil while the two small pots are used to produce the initial melt on the SHA.

Note. The two initial pots of boiling water are primarily used to sanitize the pots. The water can be used for hand washing but do not drink it.

- Keep rotating the pots between the SHA and squad stoves until enough water is made.
- Provide everyone with a hot drink and hot food (a major priority) by:
  - Filling canteens on the FLC before filling the 5-gallon water can in the ahkio.
  - This can remain in the tent until it is time to pack and move.
  - If possible, the water should be hot to prevent freezing.

4-11. Keep Soldiers full by continually consuming and replacing water. Pockets are used for storing grazing food that is also eaten continuously throughout the day. In addition to checking for cold-weather injury and overall health, leaders check the full status of their Soldiers. Additional considerations are—

- Hot food is easier to swallow than cold food.
- Hot beverages are morale builders and are used to increase fluid intake.
- Utilize insulated bottles.
- If using MREs, carry the next meal entrée against the body to thaw.
- Calorie intake should be constant:
  - Military rations are designed to be portable.
  - MREs, MCWs, and modular operational ration enhancements are primarily pocket food requiring little preparation.
- Try for unitized group rations, if the mission allows.
- Bulk water should be transported hot and in a heated truck, with the water buffalo ideally kept in a heated shelter.
- Bartering with unwanted consumable items is better than tossing them in the trash.
- Designate a squad urine tree and check it daily.
- Inspect squad trash bags to ensure rations are being consumed.
- Use squad stoves with common fuels such as JP-8 or diesel.

Note. National stock numbers for recommended supplies are: Modular Operational Ration Enhancement, NSN 8970-01-581-2505 (Cold/Altitude) and Arctic Supplement for Unitized Group Ration, NSN 8970-01-470-5075.

CLEANLINESS

4-12. Special attention to hygiene is especially needed in cold climates. Cleanliness in the field is particularly important. It is easy to go for long periods of time without bathing, but to be part of an effective combat force, keep clean.

4-13. Face, hands, armpits, and crotch should be washed daily. Remember that alcohol-based hand sanitizer takes on the ambient air temperature and tends to dry out skin. Shave regularly, daily if water is available, or every 2 to 3 days if water is in short supply. Shaving just before the rest cycle allows maximum recovery time before going out into the cold, reducing the possibility of superficial frostbite. Teeth should be cleaned daily. If a toothbrush is not available, a clean piece of cloth wrapped around a finger, or a chewed twig can be used as a substitute.

4-14. Base layers should be changed at least twice a week. If washing is not possible, crumple it, shake it, and air it for at least 2 hours. Also, ensure that all eating and cooking utensils are cleaned after every use.

TRENCH FOOT OR IMMERSION FOOT

4-15. Trench foot and immersion foot are injuries caused by prolonged exposure of skin in cold or wet conditions. In extreme cases, the skin dies, and amputation of the foot or leg may be necessary. The following helps prevent trench foot or immersion foot:

- Change into dry socks at least twice daily.
- Dry and massage feet regularly with foot powder.
- Wear VB boots.
- Weari dry leather boots whenever possible, if worn.

4-16. In the early stages of trench or immersion foot, feet and toes are cold, numb, and difficult to move. Walking becomes challenging, feet swell and become painful, and skin appears wrinkled (like a prune). In the early stages, keep feet dry, clean, and exposed to the air. In later stages, evacuate the victim to a medical facility.

CONSTIPATION AND DIARRHEA

4-17. At very cold temperatures, people tend to put off the natural urge to have a bowel movement, which can easily result in constipation. Some common symptoms are stomach cramps, dizziness, and headaches. If symptoms persist, get medical help. The following helps prevent constipation:

- Eating regularly, and including fresh or canned fruit.
- Drinking plenty of liquids.

4-18. Diarrhea is another problem that can become serious. If sickness does occur, seek medical attention and redouble efforts to keep it from spreading to others via hand-to-hand contact. Ways of preventing diarrhea include—

- Washing hands frequently.
- Ensuring food and water originate from sanitary sources.

PREVENTIVE HEALTH

4-19. When in the field, access to comprehensive medical care can be quite distant from a Soldier's location. Knowledge of preventive measures is especially helpful.

4-20. Should a medical situation arise, knowing the steps to take for immediate relief is important for the well-being of Soldiers. Potential physical problems prevalent to a cold-weather environment include snow blindness, sunburn, tent eye, heat cramps and heat exhaustion, hypothermia, frostbite, dehydration, and carbon monoxide poisoning. These subjects are addressed in the following paragraphs.

SNOW BLINDNESS

4-21. Snow blindness is caused by the ultraviolet and ultra blue rays of the sun reflecting from a snow-covered surface into the eyes. This condition occurs even in cloudy conditions. Oddly, it is more likely to occur in hazy, cloudy conditions than in sunny conditions.

4-22. Sun blindness prevention is easy: wear the issued sunglasses. (See figure 4-1 on page 50.) If sunglasses are not available, make glasses with slits from cardboard, thin wood, tree bark, or similar materials. Common symptoms of snow blindness include—

- A scratchy, sandy feeling under the eyelids.

- Red and watering eyes.
- Headache.



Figure 4-1. Snow blindness prevention

4-23. Adhere to the following for proper treatment:
- Blindfold the Soldier using a dark cloth.
- Reassure the patient.
- Evacuate the casualty to a medical treatment facility.

SUNBURN AND TENT EYE

4-24. Sunburn is a serious hazard due to the reflective qualities of snow, especially at higher elevations. Require Soldiers to use sunscreen and lip balm to prevent sunburn.

4-25. A major symptom of sunburn is skin redness with slight swelling. Prolonged exposure to the sun may cause pain and blistering. In severe cases, chills, fever, and headaches occur. Soothing skin creams may be helpful if the swelling is not severe.

4-26. Tent eye is an eye inflammation caused by fumes from stoves and lanterns used in a poorly ventilated shelter. It is prevented by providing proper ventilation, and the treatment is fresh air.

HEAT CRAMPS AND HEAT EXHAUSTION

4-27. During cold-weather training, it is possible to experience heat cramps or other injuries typically associated with hot climates. Heat cramps and heat exhaustion are two medical issues that can occur due to sustained hard physical exertion such as breaking a trail.

Heat Cramps

4-28. Heat cramps are caused by an excessive loss of salt in the body. The loss of salt does not allow the muscles to relax, causing spasms. After prolonged physical activity in a wet-cold environment, the following signs and symptoms of heat cramps could appear in the arms, legs, or stomach:
- Painful muscle cramps and spasms, usually in the legs and abdomen.
- Heavy sweating.

4-29. To treat heat cramps, do the following:

- First, have the Soldier drink one-quarter of a canteen filled with water.
- Second, have the Soldier drink a canteen of water mixed with one packet of salt over a 30-minute period.
- Third, if muscle cramping continues, evacuate the Soldier to the nearest medical treatment facility.
- Apply firm pressure on cramping muscles or gently massage to relieve the spasm.

Note. Do not give saltwater to a Soldier who has an upset stomach. In this situation, only provide a canteen of fresh water.

Heat Exhaustion

4-30. It is also possible to experience heat exhaustion in a wet-cold-weather environment when undergoing extreme physical exertion. Dehydration leads to heat exhaustion. Heat exhaustion is caused by not consuming enough water. Symptoms include—

- Increased heart rate.
- Increased respiratory rate.
- Headache.
- Dizziness.
- Nausea and vomiting.
- Thirst.
- Fatigue.
- Profuse sweating with cool, clammy skin.

4-31. The following is a recommended treatment for heat exhaustion when in a cold-weather environment:

- Have the Soldier drink one canteen of water over the course of 30 to 45 minutes.
- If cramps occur, give the Soldier a canteen of water with one packet of salt mixed in and instructions to drink the salt solution over a 30-minute period.
- Ventilate excess heat but do not allow the Soldier to become chilled.
- Loosen all tight-fitting clothes.
- Elevate feet above the level of the heart.
- Intravenous fluids may be necessary and should be administered in a warm shelter.
- If the Soldier is unable to drink water due to an upset stomach or if the symptoms have not improved within 20 minutes, evacuate the Soldier to the nearest medical treatment facility.

THE EFFECTS OF WIND CHILL

4-32. Wind chill is the combination of wind and low temperatures creating a condition known as wind chill. For example, with calm wind and a temperature of –20°F (–28.8°C) there is little danger of wind chill. If the temperature is –20°F (–28.8°C) and wind is blowing at 20 miles per hour (mph) (32.1 kilometers per hour [kph]), the equivalent chill temperature is –63°F (–52.7°C). Under these conditions there is increased danger. Exposed skin can freeze within 6 minutes. Wind is also created when walking, running, or skiing. Walking creates a wind speed of about 5 mph (8 kph) and running 10 mph (16 kph). Wind is also created by moving vehicles, aircraft propellers, and rotors.

4-33. The wind-chill chart (see table 4-1 on page 52) shows how wind and temperature combine to create wind chill. Cold injury can disable a Soldier like an enemy bullet. To use the wind chill chart, get the ambient air temperature, estimate the wind speed, and then multiply by 1.5. This is necessary to make the true wind speed at 33 feet (10 meters), the world meteorological standard for measuring wind speed. Find these numbers on the chart, and where they intersect is the wind chill.

Table 4-1. Wind chill chart

WIND SPEED	AIR TEMPERATURE (DEGREES FAHRENHEIT)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	27	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

WIND SPEED BASED ON MEASURES AT 33 FEET HEIGHT. IF WIND SPEED MEASURED AT GROUND LEVEL MULTIPLY BY 1.5 TO OBTAIN WIND SPEED 33 FEET AND THEN UTILIZE CHART.

RISK OF FROSTBITE

GREEN	YELLOW	RED
SLIGHT DANGER (FROSTBITE OCCURS IN LESS THAN TWO HOURS IN DRY, EXPOSED SKIN)	INCREASED DANGER (FROSTBITE OCCURS IN 45 MINUTES OR LESS IN DRY, EXPOSED SKIN)	GREAT DANGER (FROSTBITE MAY OCCUR IN 5 MINUTES OR LESS IN DRY, EXPOSED SKIN)

WET SKIN COULD SIGNIFICANTLY DECREASE THE TIME FOR FROSTBITE TO OCCUR

HYPOTHERMIA

4-34. Hypothermia occurs when the core body temperature falls below 95ºF (35ºC). Hypothermia is characterized as mild, moderate, or severe. Mild hypothermia occurs when the core body temperature is between 90° (32.2ºC) and 95ºF (35ºC). Moderate hypothermia occurs at a core body temperature of 80° to 89ºF (26.6° to 31.6ºC). Severe hypothermia exists when the core body temperature falls below 80ºF (26.6°C). Rectal temperature measurement is the only way to determine an accurate core body temperature. As it is unlikely this method can safely be used in the field, obvious signs and symptoms are used to make a diagnosis. All levels of hypothermia are potentially life-threatening health emergencies requiring immediate care in a medical facility.

Levels of Hypothermia

4-35. As the core body temperature begins to fall, shivering becomes the most noticeable symptom. Shivering alone is not a sign of hypothermia, but it does indicate that the body is having a problem with the cold. Mild hypothermia symptoms include—

- Shivering.
- Lack of sound judgment; confusion, apathy, and mild stupidity.
- Pale, cool skin.
- Increased heart and respiratory rates.
- The *umbles:* fumbles, stumbles, tumbles, grumbles, mumbles:
  - Fine motor skills decrease (fumbling with tasks that require manual dexterity such as manipulating a rifle).
  - Next, the gross motor skills start slipping (stumbling when just walking).
  - Finally, intellectual and personality changes occur, including grumbling and incoherent mumbling.

4-36. Moderate hypothermia symptoms include—

- Uncontrollable shivering.
- Worsening the *umbles.*
- Increased confusion.
- Increased heart and respiratory rates.
- Cold and pale skin.

4-37. Severe hypothermia symptoms include—

- Cessation of shivering.
- Muscle rigidity.
- Stupor progressing to unconsciousness.
- Slow or nonpalpable pulse and respiration.
- Cold, bluish skin.

Notes. Perform first aid for mild and moderate hypothermia.

All cases of hypothermia are evacuated to a medical facility for treatment.

Treating Hypothermia Victims Prior to Evacuation

4-38. If available, use the Hypothermia Prevention & Management Kit (NSN 6515-01-532-8056). If not, a hypothermia wrap can be made with commonly available items. Follow these procedures:

- Change the environment the casualty is in from cold and wet to warm and dry.
- Replace damp clothing with dry clothing.
- Add a windproof or waterproof layer and/or place the Soldier in a shelter.
- Add extra insulation under and around the casualty.
- Provide food and warm liquids.
- Exercise mildly hypothermic patients.
- In the following order, package a moderately hypothermic casualty in a hypothermia wrap:
  - Place a poncho flat on the ground.
  - Lay an insulating pad on top of the poncho.
  - Place a closed sleeping bag on top of the insulating pad.
  - Add an open sleeping bag on top of the first one.
  - Put the patient inside with a hot water bottle to the chest area (do not place it directly against the skin) and zip the sleeping bag closed.
  - Place a third, open sleeping bag on top of the second.
  - Fold the poncho around the patient (like a burrito).
- Perform first aid for severe hypothermia:
  - Handle with care because rough treatment can cause the casualty's heart to stop.
  - Contact medical personnel immediately.
  - Use supplemental oxygen (if available) or begin rescue breathing if breathing has stopped or is barely detectable.
  - Breathe for the patient for 3 to15 minutes before moving or beginning evacuation.
  - Change the environment the Soldier is in from cold and wet to warm and dry.
  - Carefully remove damp and wet clothing.
  - Package in a hypothermia wrap.
  - Evacuate using the gentlest means available.

FROSTBITE SYMPTOMS AND TREATMENT

4-39. Frostbite results when tissues freeze from exposure to temperatures below 32°F (5.68°C). The severity of frostbite injury depends upon the wind-chill factor, length of exposure time, and proper protection. Soldiers with a history of cold injury are more prone to frostbite. There may be a tingling, stinging, aching sensation, or a cramping pain. The skin first turns red and then becomes pale gray or waxy white. Frostbite classification ranges from superficial to deep.

Preventing Frostbite

4-40. When each Soldier takes care of themselves, it is possible to prevent frostbite. It seldom occurs to people maintaining proper body heat and is commonly associated with overall body heat loss. This is the result of poor equipment, reduced food intake, dehydration (water loss), overtiring, injury, or a combination of factors. Feet, hands, ears, and exposed areas of the face are the most easily hurt by frostbite and need constant care. The following rules help prevent frostbite:

- Do not wear tight boots and socks.
- Use the buddy system to check exposed areas, especially when the wind is blowing.
- Carry extra socks and mitten liners.
- Do not stay still for long periods of time.
- Use caution when cold and wind are combined.
- Check feet during halts.
- Consume good food and hot drinks as often as possible.

Levels of Frostbite

4-41. Superficial frostbite appears as white, waxy, and pale in lighter skin types: red and pale in darker skin types. There is numbness with the skin moving over the underlying tissue. When dented, the skin rebounds.

4-42. Deep frostbite skin discoloration presents in much the same manner as superficial frostbite. There is no tactile sensation at all. The Soldier might describe it as feeling wooden. Skin does not move over the underlying tissue and when dented, does not rebound. Skin can also feel hard to the touch. After rewarming, a layer of dark-colored skin may form over the affected area.

Recommended Treatment for Frostbite

4-43. If the exposure time in the cold is short, the frostbite is probably superficial. If the exposure time is long, the frostbite is probably deep. The following is a recommended treatment for frostbite:

- Move the casualty to a warm and sheltered area.
- Do not rub the frostbitten area with snow or apply cold water soaks.
- Do not rewarm the affected area by massaging or exposing it to open fire.
- Rewarm the face, nose, or ears by placing hands on the frozen area.
- Rewarm frostbitten hands by placing them under clothing and against the body.
- Close the clothing to prevent further loss of body heat.
- Rewarm feet by removing boots and socks, then:
  - Place bare feet under clothing and against the abdomen of a buddy.
  - Once the feet are warmed, put on dry socks and boots, if available.
  - If the victim must wear wet socks and boots, exercise the feet by wiggling the toes.
- Loosen tight clothing and remove jewelry.
- Improve circulation by exercising.
- Do not allow the victim to use alcohol or tobacco:
  - Alcohol increases the loss of body heat.
  - Tobacco causes blood vessels to narrow in the arms and legs.
- Reassure the victim.
- Protect frozen tissue from further cold or trauma.
- Evacuate the casualty to the nearest medical treatment facility.

4-44. Deep frostbite is most common and harmful to the feet and less common to the hands and ears. When deep frostbite does occur, the Soldier should be moved to a sheltered area and evacuated to a medical treatment facility immediately. If possible, do not allow the victim to walk if the feet are frozen, and avoid treating or thawing the affected area. Thawing deep frostbite in the field increases pain and invites infection, greater damage, and possibly gangrene. Do not try to thaw deep frostbite; let the physician do it.

DEHYDRATION

4-45. Dehydration can cause serious physical problems and make Soldiers more susceptible to other difficulties such as frostbite and hypothermia. The following are suggestions to prevent dehydration:

- The minimum daily liquid requirement for Soldiers performing demanding physical work in the cold is approximately 3.75 quarts (3.5 liters) per day.
- By the time a Soldier feels thirsty, they are already dehydrated and should drink water whenever possible, particularly during halts.
- Ensure that canteens are full before any type of movement and fill with hot water, if possible.
- During periods when water is scarce, do not eat snow as it can lower body temperature and the air it contains can cause stomach aches:
  - Diuretics such as coffee should be avoided because it passes through the body very quickly.
  - Water should be the first choice.
- Check urine in the snow for dark yellow or brown spots that indicate dehydration.

4-46. Common symptoms of dehydration are—

- Red skin indicating a severe condition needing immediate medical evacuation to the nearest medical treatment facility.
- Lack of appetite.
- The mouth, tongue, and throat are dry.
- Stomach cramps and/or vomiting.
- Headaches.

4-47. Recommended treatment for dehydration is—

- Keeping the victim warm.
- Giving plenty of liquids.
- Making the Soldier rest.

CARBON MONOXIDE POISONING

4-48. Whenever a squad stove fire, fuel-fired heater, or internal combustion engine is used indoors, there is danger of carbon monoxide poisoning. Fresh air in living and working quarters is vital. Carbon monoxide is a deadly, odorless gas that displaces oxygen in the blood stream. To prevent carbon monoxide poisoning—

- Ensure that stoves and lanterns are functioning properly.
- Do not let Soldiers warm themselves by engine exhaust.
- Always crack the windows in vehicles when a heater is in use, and do not allow anyone to sleep in a running vehicle.
- Use a tent guard or shut the stove off when sleeping.

4-49. If a Soldier is found unconscious in an enclosed shelter, carbon monoxide poisoning should be suspected. Common symptoms of carbon monoxide poisoning are—

- Headache, dizziness, confusion, yawning, weariness, nausea, and ringing in the ears.
- Bright red color on lips and skin.
- Drowsiness and sudden collapse.

4-50. Adhere to the following for proper treatment of carbon monoxide poisoning:

- Move the Soldier to open air.
- Keep the victim still and warm.
- If the Soldier is not breathing, administer mouth-to-mouth resuscitation.
- Administer cardiopulmonary resuscitation, if necessary.
- Immediately evacuate the Soldier to the nearest medical treatment facility.
- Immediately administer oxygen, if available.

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Chapter 5
Occupy a Patrol Base

ACCOMPLISHING THE MISSION

5-1. The essential requirements for survival and mission accomplishment in cold regions are warmth, food, water, and shelter. Soldiers are provided with tents that can be erected quickly. However, in the confusion of combat, tents can be lost or destroyed, and Soldiers can become separated from their ahkio groups.

5-2. When this occurs, timber and snow, which are usually available, are used to make shelter. Additionally, a detailed explanation of the bivouac routine should be contained in the unit SOP.

BIVOUAC SITES

5-3. Bivouac sites, other than those that are more permanent in nature in the rear areas, are tactical or designated to provide living accommodations within a defended position. The tactical bivouac (patrol base) is usually not occupied for more than one night, is established at or after last light, and needs little preparation. It is organized for a rapid and disciplined response to enemy action.

5-4. The defensive position is likely to be occupied for longer periods and is established accordingly. The layout and placement of tents and shelters is coordinated within the defense, and according to the unit SOP.

5-5. The selection of bivouac areas is important and needs careful consideration. The challenge of area selection varies with the tactical situation, weather conditions, and terrain. The bivouac area is strategically located according to the principles of security and defense. There is concealment from air and ground observation, and shelter from the wind.

Forests

5-6. Forested areas pose few challenges in comparison to areas that are located above the tree line. In selecting areas, ensure that local camouflage materials are available for use with the snow camouflage nets. Forests, especially those where the vegetation is spruce or pine, provide excellent patrol bases. Material for camouflage, firewood, and construction of shelters and fighting positions is abundant.

5-7. Spruce and pine forests are preferable for a variety of reasons; one being that these types of trees generally grow on well-drained soil. Another reason is they retain their needles year-round, offering better concealment and protection from wind and inclement weather than deciduous trees that lose their leaves during the winter months. The thick canopy helps disperse smoke from heater stacks and dissipate any ice fog that may form in the extreme cold.

Frozen Swamps and Open Country (Tundra)

5-8. Firmly frozen swampy areas (muskeg), especially those that are covered with trees and brush, may also offer a good location to establish a patrol base. Muskeg areas often have very spindly spruce trees that provide virtually no cover, concealment, or protection from the wind.

5-9. Thickly iced streams and rivers located nearby can offer excellent routes for resupply, as well as routes for mounted and dismounted movement. It is generally difficult to construct dug-in fighting positions, forcing above-ground positions in these areas. Additionally, leaders should remember that a sudden thaw could leave everyone wallowing in a pool of mud.

5-10. Open country (tundra) presents difficulties such as poor cover and concealment, exposure to high winds, and drifting snow. (See figure 5-1 on page 59.) If establishing a patrol base in open areas, tents should be pitched (or shelters constructed) in the lee of natural windbreaks such as depressions or the downwind side of eskers, ridges, and hills. Where no natural windbreaks exist, dig tents into the snow as deeply as possible or construct windbreaks with snow or blocks of snow. (See figure 5-2 on page 59.)

Streams and Areas Above the Tree Line

5-11. Look for streams in order to lower the silhouette of tents and provide a fighting cover. Sometimes small streams are present that have mature trees on the banks. A skilled enemy understands the value of these areas and has them under observation.

5-12. Above the tree line, mountainous terrain provides little shelter from observation or the elements. During high winds, lee slopes may offer shelter. However, they can also increase exposure to avalanche hazards if wind-driven snow is deposited on lee slopes. If the slope is steep enough, the snow eventually slides. In snow-covered mountains or when snowfall is imminent, always examine a slope's potential for an avalanche prior to establishing a bivouac upon it.

Valleys and Lakes

5-13. Areas lying in the bottom of deep valleys and large lakes should be avoided due to masses of cold air settling on low ground (also known as a temperature inversion). During windless conditions, temperature inversions can result in a low-lying patrol base producing its own cloud of ice fog due to tent heating. This can potentially reveal the location of the site to enemy observers, especially if the enemy is located at a higher vantage point than the patrol base.

5-14. If low-lying areas are used, look for large mature spruce trees to help mask tent heating signatures. Temperature inversions can usually be overcome by ascending to local high ground. Also, large rivers tend to be funnels for wind. Anchoring tents can be accomplished by using ice screws. Additionally, lakes can be useful for helicopter landing zones.

Other Terrain and Weather Considerations

5-15. Select terrain that is of little tactical value to the enemy and off the main lines of drift, such as major ridges, creeks, valleys, and couloirs, as they are all likely avenues of approach. Be mindful of other factors:

- If the unit has the proper equipment, water resupply is probably not an issue when melting snow and ice for the main water source, but fuel resupply can become an issue if it is needed for melting snow and ice and/or providing heat.
- Consider dominant terrain features where an attack could develop.
- Look for the prevailing wind direction by observing the drift patterns around trees or rocks (see figures 5-1 and 5-2):
  - The downwind side is longer than the upwind side.
  - Try to select a site that is downwind from suspected enemy positions and avenues of approach.
  - Wind can carry sound and smell to the enemy, depending upon its direction.
  - High winds tend to disperse noise and smell.
  - Extremely cold and still air carries even the smallest sounds for a long distance.
  - While clearing space for the tent, use the bowsaw because it is much quieter than the axe or machete.
  - Be selective about positioning the tent to avoid a massive clearing project.
- Consider escape routes that facilitate rapid withdrawal.
- Consider the availability of camouflage and construction material:
  - Construction materials may have to be gathered and brought to the patrol base from another location.
  - This creates a trail leading straight to the bivouac location, so a good deception plan is enforced.
- Check illumination and weather conditions with the battalion or brigade intelligence staff officer:
  - In good weather or bright moonlight, try to select a shadowed area such as a north-facing slope or the middle of a wooded area.
  - Snow cover amplifies ambient light.

- Check the thermal detection capabilities (also with the intelligence staff officer) of enemy forces.
- Determine the feasibility of leaving ahkio groups and *cold bagging* or using improvised shelters.
- By leaving heat and shelter behind, the risk to the unit goes up as the temperature goes down.

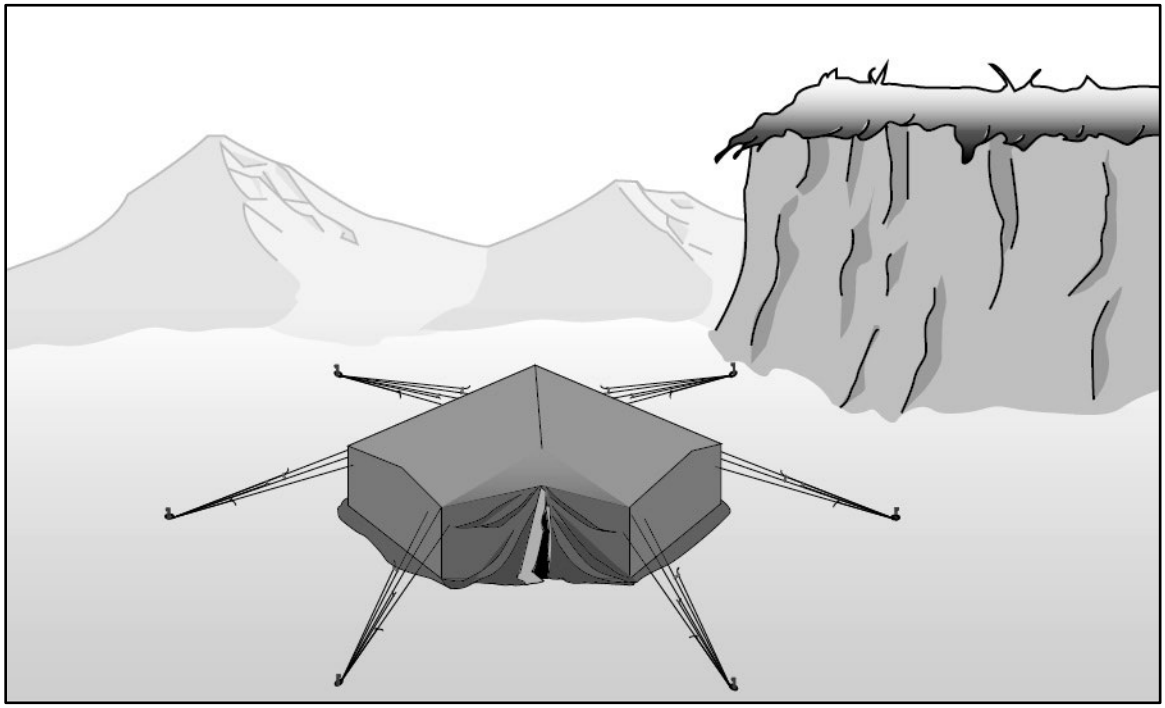


Figure 5-1. Location of tent (1)

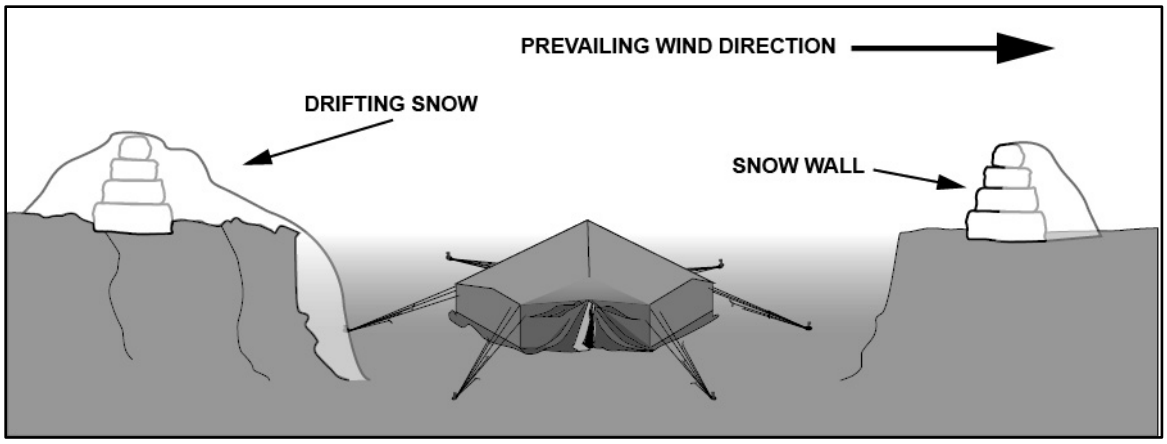


Figure 5-2. Location of tent (2)

5-16. When contact with the enemy is likely, the unit SOP identifies specific considerations when selecting the site for a tactical bivouac. Examples include—

- Location of the enemy.
- Enemy patrol habits.
- Air threat.
- Dominating features that identify enemy avenues of approach.
- Wind direction that can carry the sounds of movement (the bivouac site should be downwind of likely enemy avenues of approach, especially when wind speeds are low).
- Availability of natural camouflage.

- Amount of moonlight and weather conditions:
  - In good weather or bright moonlight, the site needs to be in an area of deep shadow.
  - Locating the site in the middle of the woods or on the northern slope of a ridge helps to prevent silhouetting the tents.

RECONNAISSANCE OF THE BIVOUAC SITE

5-17. Before occupying a patrol base, a reconnaissance and surveillance (R&S) team pushes forward to ensure the suitability of the tentative patrol base. One thing that consistently gets overlooked is the posture of Soldiers waiting in a security halt for the R&S team to find and establish the site.

5-18. Leaders left with the main body ensure all Soldiers remain warm while maintaining security. The Level VII parka is stowed directly under the flap of the rucksack for this purpose. If the tactical situation allows exercising, Soldiers use buddy teams. In extreme cases it may be wise to move the entire element into the patrol base by force, although this should never be the norm.

5-19. For platoon-sized elements, usually the platoon leader, compass Soldier, and one member of each squad move forward to conduct a reconnaissance of the patrol base. Squad members are positioned at the 10 o'clock, 2 o'clock, and 6 o'clock positions and act as guides for the main body. Leaders that are on the reconnaissance move quickly and return as soon as possible to get the main body moving again. It is up to the unit to decide the method to use for conducting the reconnaissance while maintaining trail discipline.

Tasks Accomplished by the R&S Team

5-20. All of the factors mentioned earlier in this chapter should be taken into consideration when choosing the exact location of a patrol base or assembly area. Initially, security may be established and maintained until arrival of the main body by positioning the squad members at the 10 o'clock, 2 o'clock, and 6 o'clock positions. (See figure 5-3.)

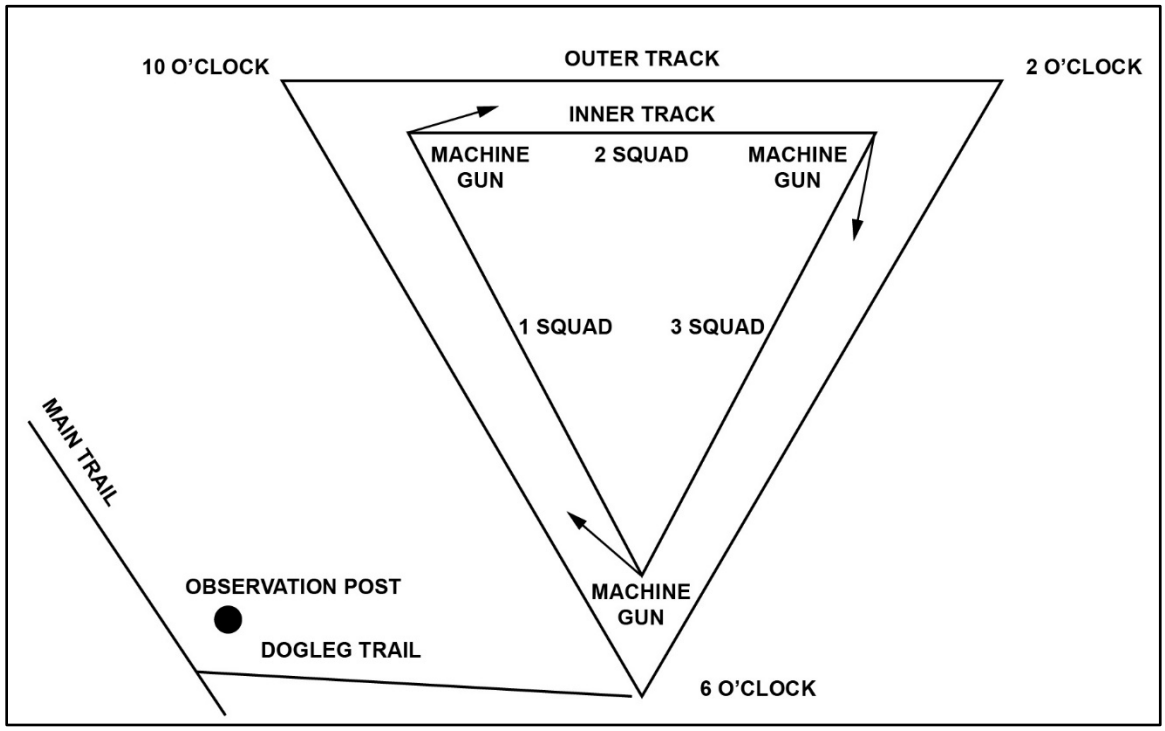


Figure 5-3. Track plan

5-21. If enough Soldiers are present, an observation post can be established at the dogleg track. The reconnaissance party maintains security of the patrol base until relieved by personnel from the main body. Other tasks include:

- Track plans should be established before anyone enters the site:
  - Normally, the main trail is extended well beyond the point where it enters the patrol base and may lead to a dummy patrol base established at a later time.
  - Branching off from the main trail, preferably at an acute angle to the direction of the enemy, is the patrol base track or Main Street.
  - Main Street is the single track that enters the actual patrol base perimeter.
  - Minor tracks are established leading off the Main Street to subunit areas where the tents are located.
  - The inner and outer perimeter tracks are also established.
- Defensive positions are established along the outer edge of the inner perimeter track:
  - The outer perimeter track should parallel the inner perimeter track but be outside of hand grenade range to the positions along the inner track.
  - Observation posts (OPs) can be established along the outer edge of the outer track, with extensive use of early warning devices or mechanical ambushes made there as well.
- The reconnaissance party designates the defensive sectors of responsibility for each subunit of the main body, with the boundary between each subunit sector marked:
  - At a minimum, this is accomplished by the reconnaissance party
  - Soldiers also take into consideration the time that the main body has been stationary.
- The tasks listed below can also be accomplished by the reconnaissance party:
  - The location for each tent to be set up is marked and a single trail is established to that point.
  - subunit integrity is maintained to the greatest extent possible, and subunit tent sites are designated with ease of access to that element's defensive sector in mind.
  - Provide guides for the main body.

Speed is Essential

5-22. Once the main body arrives, it is imperative that they are able to rapidly occupy the patrol base or assembly area without compromising the track plan, or noise and light discipline. Speed is essential.

5-23. Soldiers just completing a long, over-snow movement are most likely to be perspiring and tired. If they are left standing in the cold while the chain of command is determining where they belong, the unit is at risk of suffering cold-weather injuries.

TRAIL PLANS AND OCCUPATION

5-24. Trail plans are established before entering the bivouac site. Leading off the incoming trail, usually at an extreme angle to entry, another trail is established. This trail network leading to each subordinate unit area follows the inside of the tree line, preventing enemy observation of trails from the air or ground.

5-25. After linkup between the guides and the main body, the guides (at least one for the commander and for each subunit) explain the site layout and track plan before actually leading their assigned element into the patrol base.

5-26. Immediately upon arrival, the leader confirms decisions made by the reconnaissance or quartering party and issues the following orders:

- Confirms or modifies the track plan.
- Designates temporary location(s) for weapons and equipment under their direct control to prevent loss in the snow
- Confirms or modifies tent or improvised shelter locations.
- Decides the necessity and type of fighting positions (built up or dug in) to be used and the locations.
- Creates the squad or platoon sector sketches that are delivered to the leader within 20 minutes of the main body occupying the patrol base.
- Establishes priorities of work based on weather conditions.

5-27. As the main body moves into the patrol base, care is taken to ensure that track discipline (strict observance of the track plan) is enforced. In addition, noise and light discipline is rigidly enforced. Although it is virtually impossible to occupy a site in total silence (especially when pounding tent pins or cutting wood for positions and shelters), Soldiers are trained so that they do not need lanterns or flashlights to accomplish their tasks.

5-28. Once the main body is in place, the security elements provided by the reconnaissance party should be relieved as quickly as possible. As temperatures decrease, the need for speed in conducting this relief is increasingly important. Soldiers designated to relieve the reconnaissance party security forces are allowed to change out of clothing that may have become perspiration-soaked during movement to the bivouac, and to adjust their clothing to ensure adequate protection while performing relatively sedentary duties in OPs.

5-29. In temperate regions, the priority of work is usually rigidly adhered to but in extremely cold weather, the necessity of getting Soldiers fed or warm may take precedence over other tasks (such as maintenance). This is not a license to be lax toward alert and security requirements, as these always take priority.

5-30. Once the patrol base is established, communicate with higher headquarters and the supporting fire support element. Also, confirm location.

WITHDRAWAL PLAN

5-31. The withdrawal plan is usually an azimuth and distance from the patrol base and is disseminated to all Soldiers. In extreme temperatures, the unit faces tough choices on the equipment they bring with them.

5-32. Trying to repack an ahkio group under pressure is probably not going to happen. Soldiers keep an orderly calm with minimal equipment in the tents. Weapons, FLCs, skis, or snowshoes are stored in a manner that can be reached in a hurry. The unit should rehearse Battle Drill 1: React to Direct Fire Contact While Dismounted—Platoon (07-PLT-D9501). (See appendix B.)

ALERT PLAN

5-33. Thirty-three percent of the unit is on alert at the perimeter, usually positioned at the apexes. When tents are heating, there is an additional requirement to have fire guards. These Soldiers should not be counted as part of the alert posture as they are inside the tents performing other duties.

5-34. In very cold conditions, sentries can remain alert only for relatively short periods of time. They cannot remain motionless or look into the wind for long, and their hearing is impaired by the additional headwear required in cold temperatures. Leaders use their judgment on how long Soldiers can remain outside and still be able to perform their duties at peak efficiency without increased risk of cold-weather injury. The time a Soldier can spend outside a heated shelter performing relatively sedentary tasks varies with the temperature, degree of wind chill, visibility, and the cold-weather training and experience level of the Soldier.

SECURITY PLAN

5-35. The apexes are where the security elements normally go, but another option is to have a security patrol walking the outer track. The Soldiers performing security duties are fully dressed and equipped. The squad's fire guard is not a security element. They have their own duties inside the squad tents.

5-36. The following are some techniques that can be used for maintaining security in cold weather. If using one, ensure that the technique best suits the tactical situation:

- Combined living and fighting positions may be established on the inner track:
  - Improvised shelters or fighting positions can be built and used.
  - Ensure that warning systems are established on the outer edge of the outer track.
- One complete subunit may be used to perform security duties at any given time, allowing the remainder of the unit an extended period of time to rest in heated shelters.

- Double the number of personnel on guard:
  - Allow one Soldier to act as a fire guard inside the shelter or tent while another performs sentry duty.
  - After waking up their relief, the fire guard leaves the tent to relieve the sentry or sentries, who return to the tent for rest and warmth.
- When establishing OPs or emplacing mechanical ambushes and early warning devices, always approach the location from a flank without leaving a trail in the snow that points or leads the enemy directly into the patrol base.
- Keep lanterns inside tents turned as low as possible because—
  - This minimizes loss of night vision for personnel inside the tent.
  - The patrol base signature created from light showing through tent openings is reduced.
- Balance the need to provide a heated shelter against the necessity to reduce the thermal signature of the patrol base by using natural terrain features and snow constructions that can be used to mask the thermal signatures.

Weapon and Mess Kit Planning

5-37. Special care is taken with weapons and mess kits. Weapons sweat when brought into heated shelters for cleaning. Count on them not to be mission capable for a long period of time. Crew-served weapons should not all be down at the same time.

5-38. Additional maintenance requirements include the SHA and squad stoves. (See TM 10-4520-261-12&P for more information.) JP-8 is an exceptionally dirty fuel, so these items need to be maintained in order to keep them functioning. Maintenance is more than maintaining weapons.

5-39. Mess kits need to be sanitized before each use and individual Soldier equipment needs to be maintained. This includes skis and snowshoes. VB boots and sleeping bags also need to be dried out. Pay attention to the ahkio components and repair covers, tow lines, and traces. Remove dirt and snow, sharpen axes and bowsaws, and perform any other needed equipment care.

Personal Hygiene Plan

5-40. If necessary, Soldiers should shave in a heated shelter just before the rest cycle. This allows natural facial oils that are stripped off by shaving, time to replenish before once again becoming exposed to the cold. Facial oils provide natural protection against cold-weather injury.

5-41. Soldiers should brush teeth daily. If a toothbrush is unavailable, the chewed end of a twig can help. If a twig is not available, salt on a fingertip can be used to gently scrub the teeth. Additionally, hand washing is enforced, especially as Soldiers make water or prepare food.

5-42. Base layers should be changed as often as is practical but at least twice weekly. Socks should be changed as often as necessary to keep feet dry.

5-43. A central latrine should be established if dispersion within the patrol base is not too great. One latrine usually serves the needs of a platoon-sized unit. The following should be taken into consideration when establishing latrines:

- The preferred type of latrine for field use is a straddle trench: due to environmental restrictions during training or solidly frozen soil, it may not be permissible or possible to construct this latrine.
- Another recommended type of latrine is the cross-tree latrine (see figure 5-4 on page 64), especially when used in conjunction with a ration case lined with trash bags:
  - Once filled, the bags can be sealed, closed into the case, and burned or hauled to the rear for proper disposal.
  - If the ration box method is not practical, the waste alleviation and gelling bag (WAGBAG) can be used.
  - Ensure WAGBAGs are disposed of according to local policy and reordered using NSN 4510-01-485-0760.

- Latrines are sited on the downwind side of the patrol base:
  - Place them close to shelters so that Soldiers are encouraged to enforce sanitation discipline.
  - They should also be downwind, well away from snow gathering areas within the patrol base, and wind-proofed with branches, ponchos, snow blocks, or other available materials.
- Camouflage the latrines:
  - The site should be in-between the inner and outer track to maintain security for Soldiers using the facility.
  - Chemical lights can be used to mark the path when it is dark.
  - Make it directional by placing the lights on the friendly side of a tree.

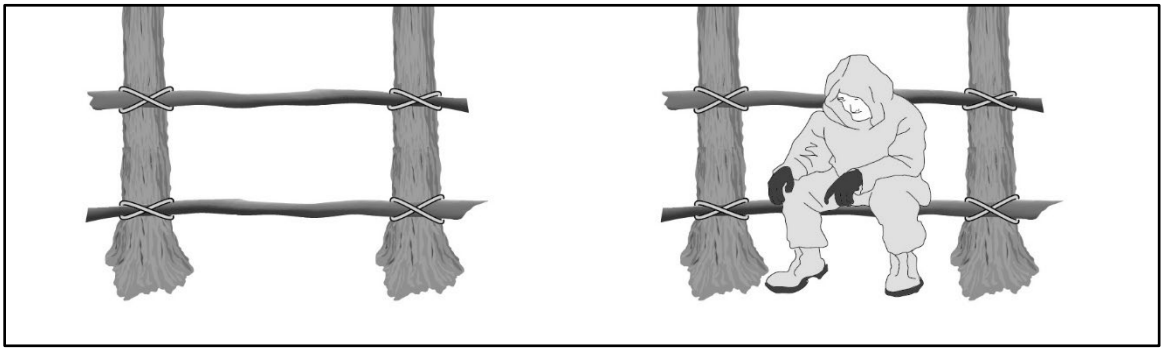


Figure 5-4. Cross-tree latrine

- Soldiers should urinate in a designated spot on the ground, with fresh snow covering this spot daily:
  - The spot should not be covered after each use because the color of the snow at this location gives leaders valuable feedback on whether Soldiers are properly hydrated.
  - If the spot is bright yellow or a darker color, it is time to start melting more snow and forcing hydration.
- Placing an empty ammunition can on the SHA may be used to have warm water available for hand washing:
  - Using the ammunition can in conjunction with soap on a rope is a very effective method of hand washing.
  - Soap on a rope is made by placing an ordinary bar of soap in an old sock and hanging it on a tree adjacent to the latrine area.
  - Hand sanitizer may be considered convenient but is unreliable for removing ground-in dirt.

MESS PLAN

5-44. A mess plan includes water procurement. Water from central sources is often hard to transport due to freezing. Every effort should be made to ensure Soldiers have clean water. The following should be considered for water procurement:

- If water is to be transported to the unit in bulk, fill the 5-gallon cans with hot water:
  - This helps cut down on freezing enroute to the field.
  - Transport the water in a heated cargo compartment.
- Fire guards should continuously make water.
- Mess kits are cleaned and sanitized prior to use:
  - The first pot of boiling water is used as the sanitizer for the pots.
  - It can also serve as the hand wash for the Soldier making the water.
- The procedure for melting snow and ice into useable water is discussed in chapter 4.

5-45. Other considerations should be adhered to when creating a mess plan:

- When using MCWs and MREs:
  - MCWs can be stored frozen.
  - MREs can be frozen but must be consumed hot.
  - Multiple freeze and thaw cycles cause spoilage and damage.
  - Store any bulk food away from latrine sites and petroleum, oils, and lubricants.
  - Food preparation can be done as an assembly line by the Soldier on fire guard prior to other Soldiers getting up or returning from duties.
  - Proper sanitation practice is enforced.
- Plan for waste disposal: poor waste disposal practices—
  - Can provide the enemy with a great deal of information.
  - May constitute violations of environmental regulations and proper field sanitation procedures.
- Follow these guidelines for proper waste disposal:
  - Back haul all trash to the fullest extent possible to deny the enemy a valuable intelligence resource.
  - Burial and burning are the last options.
  - If temporary storage is needed, store away from the ahkio, food and water storage, and snow gathering areas.
  - Guard against animal scavenging.

REST PLAN

5-46. Sleep is very important. It keeps morale up and aids in sound decision making. Leaders ensure that all Soldiers are getting enough sleep. Normal wear and tear of constant operations in the cold wears on the body. Fatigue can set in very quickly just by trying to stay warm.

5-47. In extreme cases of tactical necessity, the leader may elect to have the unit sleep fully clothed on top of their mats. The leader may also elect to have more Soldiers on the line, increase R&S patrols, or a combination of the two. The alert posture of 33 percent should not be violated.

ORGANIZING THE TENT

5-48. The tent group leader is responsible for allocating personal space within the tent. When doing so, the leader takes into consideration the duty roster and the need for an orderly exit in the event of an emergency.

5-49. The tent group leader, usually the squad leader or senior occupant of the tent, is responsible for ensuring that the tent group is properly set up, maintained, struck, and packed. (See figure 5-5 on page 66.) The leader is also responsible for everything that occurs inside the tent. While bivouacking, the leader ensures—

- Sleeping space is properly allocated.
- Weapons and equipment are stored outside the tent according to the SOP.
- Track, camouflage, noise, and light disciplines are strictly enforced.
- Guard/sentry rotations are established and disseminated.
- Guards/sentries know who their relief is and where that Soldier sleeps.
- Blackout is maintained when personnel enter and exit the tent.
- The tent is de-iced and brushed off, with drift snow removed regularly.
- Fire precautions are observed.
- Squad stoves and lanterns are refueled outside.
- Weapons, equipment, stoves, and lanterns are regularly maintained.
- Soldiers brush snow off clothing and equipment before entering the tent.
- Soldiers dry their clothes at every opportunity.
- Water is made continuously, and proper hydration is enforced.
- Each Soldier receives adequate rations and all rations are consumed.
- Cooking utensils are clean.
- Lanterns are hung by a chain at minimum of 18 inches below the apex of the tent; hanging a lantern any closer to the tent is a fire hazard.
- Fuel usage is monitored.

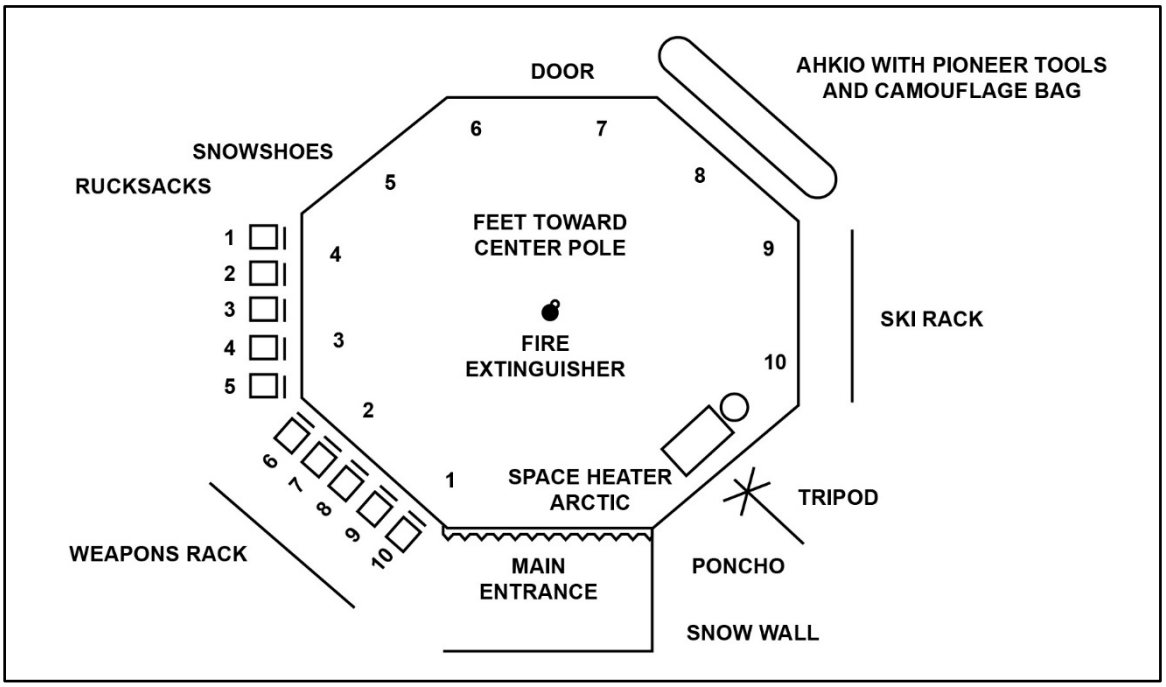


Figure 5-5. Ten-Soldier layout

ORGANIZATION OF THE TENT INTERIOR

5-50. Tents are just large enough to provide adequate sleeping space for Soldiers, along with a small area for cooking, washing, and performing the duties of the fire guard. Orderly and disciplined arrangements are a necessity in such cramped circumstances. The following procedures are established to enhance the comfort, safety, and operational effectiveness of personnel required to live in tents. Many of these procedures are also readily adaptable to life in improvised shelters.

5-51. Only the minimum required individual clothing, equipment, and rations are allowed inside the tent. Generally, Soldiers bring their canteens, daily rations, insulated sleeping mat, sleeping bag, a small sharp knife, and the clothing required when leaving the tent are the items needed. Damp clothing and equipment may be brought inside to be hung up to dry but once dry, these items should be placed in the rucksack outside the tent. Prior to every stand-to, all items are packed into the rucksack so that essential equipment for survival is available if the unit is forced to execute a rapid withdrawal under pressure.

Storage Safety Inside the Tent

5-52. All Soldiers living in a heated tent should have a knife on hand at all times, especially while sleeping. If a tent fire occurs, it can take as little as 10 seconds for the fire to completely engulf the shelter, and less than a minute to destroy it. If Soldiers are asleep with the zipper of their sleeping bag closed, they may not have enough time to unzip the bag. If they cannot do this due to lack of time or a jammed zipper, they attempt to roll out from under the wall of the tent while still in their bag. This can be difficult, especially for someone disoriented and shocked into wakefulness. With a small, sharp knife immediately at hand, the Soldier can cut their way out of the sleeping bag and through the wall of the tent. This single item of equipment may end up being the difference between life and death.

5-53. As stated above, the tent group leader is responsible for allocating personal space within the tent. When doing so, the leader takes into consideration the duty roster and the need for an orderly exit in the event of an emergency.

5-54. Spare batteries for equipment such as night vision goggles (NVG) or radios should be kept in the tent but away from sources of direct heat such as stoves and lanterns. Battery power output is diminished when batteries become cold or frozen. Small, battery-powered items such as flashlights or electric razors may also be kept in the tent and are ideally stored in the owner's sleeping bag.

Weapon and Gear Placement

5-55. Weapons racks should be constructed outside the tent as close as possible to the main entrance. A poncho should be used to keep sights, barrels, and moving parts on weapons from becoming clogged with snow. Soldiers should always remember exactly where on the rack their individual weapon is located. If a situation arises resulting in a mad rush to arms, they can grab the correct weapon. The weapons rack is constructed in a manner identical to the cross-tree latrine but without the wind break that a latrine requires.

5-56. Rucksacks should be lined up on the ground outside the main door of the tent where they do not interfere with Soldiers entering or exiting. Establishing a specific order for Soldiers to line up their rucksack in relation to the others makes it easy for everyone to identify their gear during conditions of limited visibility. Other personal equipment such as helmets and body armor can be draped over or placed inside the rucksack.

5-57. In a cold-dry environment, it is not necessary to cover rucksacks and other gear (except weapons, ammunition, NVG, personal equipment, and communications equipment) with a poncho or other type of waterproof cover; the temperature is too cold for the equipment to become wet. Simply brush off any snow before using the item.

CRITICAL CONSIDERATIONS WHEN IN CAMP

5-58. A plastic trash bag filled with snow taken from the snow collection area should be kept inside the tent. One of the duties of the fireguard is to melt snow for drinking water and have hot drinks ready for Soldiers coming in from sentry duty. The 5-gallon water can, which the fireguard can use as a seat, should be kept inside the tent and topped off whenever it is less than full.

5-59. The amount of clothing worn by Soldiers while resting inside the tent is dictated by the tactical situation and whether or not the shelter is heated. For example, if there is an increased chance of enemy contact, it may be best that Soldiers rest on top of their sleeping mat fully dressed. When a scenario such as this occurs, tent group leaders ensure that the temperature of the stove is regulated so that it is warm enough to keep the Soldiers comfortable, but not so warm that they begin to sweat.

5-60. When living in a close environment such as a tent or improvised shelter, the highest possible standards of sanitation and personal hygiene are maintained. Failure to enforce or practice good sanitation and hygiene can expose everyone to sickness and disease. The conditions that Soldiers live in during cold weather creates an exceptionally good opportunity for sickness to run rampant through the unit. Soldiers are more susceptible to becoming a cold-weather casualty if they do not keep everything clean. Remember the *C* in the mnemonic *C-O-L-D*. Keep it clean!

HEATING AT NIGHT

5-61. The tactical situation, weather, and Soldiers' level of training and experience is considered when determining whether or not to operate heaters throughout the night. The major disadvantage of heating shelters all night long (other than increased fuel requirements) is the obvious thermal signature of a heated shelter in the middle of a cold environment and the necessity for additional Soldiers losing sleep to perform duty as a fire guard.

5-62. Some advantages of keeping the stove burning are that Soldiers lose less body heat and conserve more energy while sleeping, improving performance the following day. Also, troops can be more ready to react to a threat by sleeping fully clothed on top of their sleeping bag (or just their insulating pad).

5-63. Soldiers sleeping in heated shelters have the opportunity to dry wet clothing in the tent while they sleep. Wet clothes should not be dried in sleeping bags when resting. However, slightly damp clothing can dry in the bag.

5-64. In addition to melting snow and providing hot drinks, fire guard duties include topping off the squads' water, keeping the heater at a constant temperature, and moving clothing on the dry lines. Fire guards are also tasked with weapons maintenance, monitoring communications, or conducting personal hygiene.

BREAKING CAMP

5-65. When a unit departs a patrol base, the commander determines what time the unit begins movement. Using a backwards planning process, the commander also determines the *drop-tent* time. The time interval commanders allow their Soldiers between *drop-tent* and departure is kept as short as possible. Dropping tents should be done in the same order in which movement is conducted. The goal is to prevent Soldiers from unnecessarily standing around in the cold. Remember that the alert and security posture requirements reduce the number of Soldiers available to take down the tents or fulfill fighting positions.

5-66. The length of time needed is a direct reflection on the amount (and quality) of individual and collective training that is conducted preparing for cold-weather operations. A well-trained squad should require 45 minutes to pack all their personal and tent group equipment and be ready to move. It is the tent group leader's responsibility to ensure that their tent is ready to strike at the designated time.

5-67. Before departing a patrol base, all latrines and garbage pits should be covered with at least two feet of earth or packed snow. Finally, leaders ensure that security precautions are not relaxed, and that track, camouflage, noise, or light discipline is not forgotten.

5-68. If a tent is slowly or improperly set up, only the occupants of that tent suffer. However, if a squad is slow in striking their tent, more efficient squads have to stand in the cold and wait for them. Ensuring that breaking camp and striking tents becomes a battle drill for Soldiers is extremely important.

WOOD CUTTING AREAS

5-69. Wood cutting areas for fighting positions, improvised shelters, or wood burning heaters (if liquid fuel in not available) should be known by all Soldiers in the unit to prevent many areas from being cut down. These are places where activity is not likely and well behind the unit's defensive area, or in a decoy bivouac site. Dead spruce, pine, or the small limbs and branches under a live canopy of trees make the best firewood. Standing deadwood burns best but hardwood burns longest.

5-70. In an Arctic and subarctic environment, true hardwood is rare. Of the trees available, birch, tamarack, and spruce are the hardest woods. Burn the upper parts of dead trees during daylight because they give off lighter colored smoke. The lower parts of the trees contain resin and tar which burn well but make more and darker smoke. In daylight, this allows Soldiers positions to be easily identified by air and ground observation. Be aware that burning wood for heat produces a smell signature that can be detected at great distances. For fighting positions, use live trees 6 to 8 inches in diameter to provide the best resistance to enemy fire.

5-71. In some areas, animals scavenge garbage. Polar bears are known to boldly come into human habitations to scavenge. Ravens open trash bags and can even peck their way into ration cases in a short period of time.

WINTER STORAGE

5-72. Storage problems in the winter are increased by snow, low temperatures, thaws, and limited storage space. As space in any shelter is limited, store only those items inside the tent that are affected by the cold or are needed immediately. The remaining equipment should be centralized, marked clearly, and covered.

5-73. Store ammunition and fuel separately. Place wood or metal containers on boughs or poles to keep the containers from freezing to the ground. The unit SOP specifies what equipment is placed inside or outside of the tent, and where.

Chapter 6

Individual Movement

MOVING OVER SNOW

6-1. Snow affects movement in many different ways. Heavy snow cover slows movement, either cross-country or on roads. Snow cover also blankets many terrain features and hides obstacles. The effect of snow on movement varies greatly with its depth and physical characteristics.

6-2. Soldiers on foot cannot travel well over flat terrain or roads when snow is deeper than approximately 1 foot (30 cm). However, when snow cover is deeper, using skis or snowshoes improves movement. (See table 6-1.) Flotation on snow is equally as important as the weapon. Do not allow Soldiers to become separated from their flotation. Arriving at the destination soaked in sweat is a failure. Set a pace that generates just enough heat to be comfortable.

Table 6-1. Comparison of skis and snowshoes

SKIS	*SNOWSHOES*
Faster	Slower
Less work	More work
Harder to learn	Easier to learn

SKIS AND SNOWSHOES

6-3. Skis provide greater moving speed, particularly over cleared trails. When troops are mounted on skis and towed behind small unit support vehicles or similar vehicles, it is known as skijoring. This is an effective means for rapid cross-country movement. In heavy vegetation, skiing is always more physically taxing than snowshoeing.

6-4. Utilizing snowshoes is the minimum that Soldiers in cold regions should learn. This skill is quickly learned but some technical points need to be addressed. The military snowshoe is light, durable, and provides flotation in snow. (See figure 6-1 on page 70.)

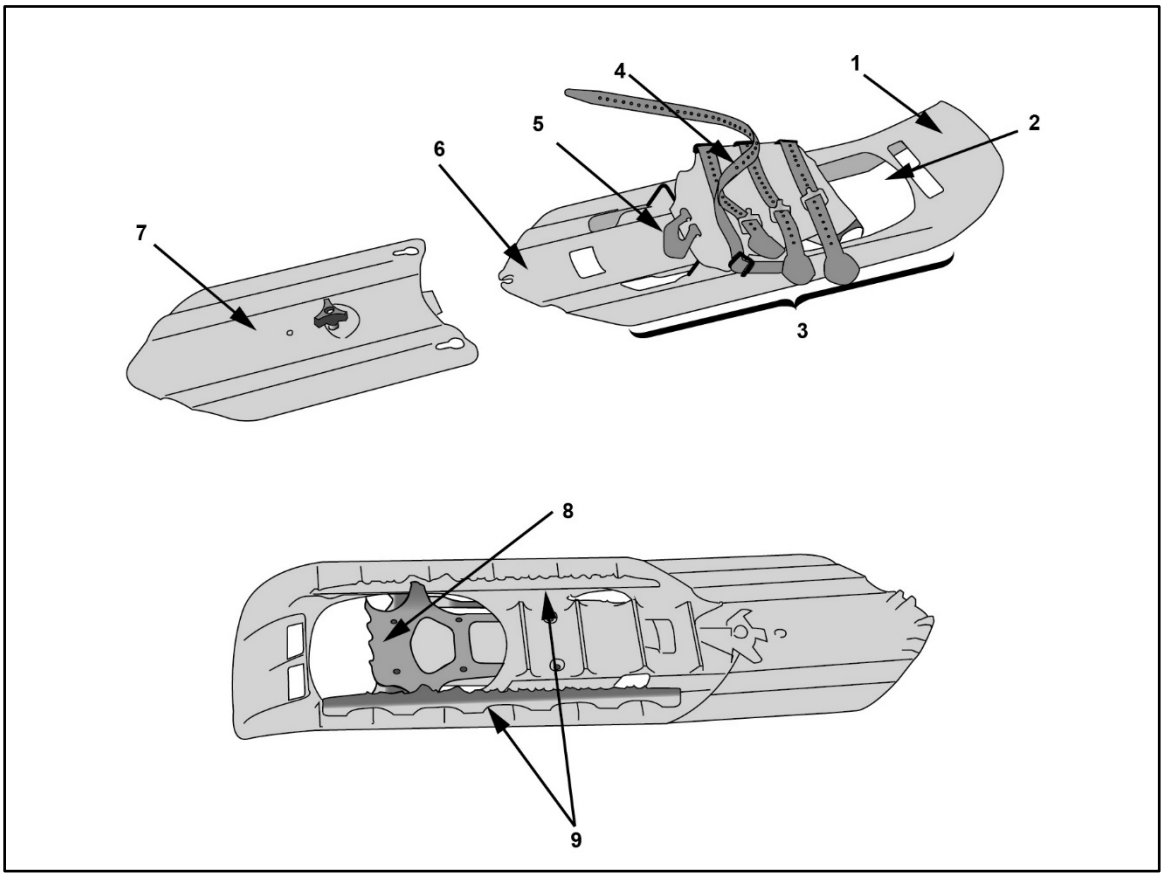


Figure 6-1. Snowshoes

6-5. Army snowshoes consist of a hard plastic deck with steel crampons and bars to aid with traction. They are approximately 22 inches long and 8 inches wide (approximately 56-cm long and 20.3-cm wide) without flotation tails, and weigh less than 4 pounds (1.8 kg). Other characteristics of this snowshoe include the—

- Shovels (1): the upturned front portion of the snowshoe is designed to help it ride toward the surface of the snow.
- Windows (2): the opening of the snowshoe that allows the toe of the boot to pivot for added traction, giving a natural foot movement while walking.
- Decks (3): this is the middle, flat portion of the snowshoe.
- Bindings (4): secure the snowshoe to the boot.
- Elevator bars (5): are metal bars that raise a Soldier's heel in order to decrease the angle of the wearer's foot when climbing steep terrain.
- Tails (6): this is the elongated rear of the snowshoe designed so the snowshoe tracks in a straight line while walking.
- Flotation tail(s) (7): are detachable additional decking at the rear of the snowshoe to provide greater flotation in powder snow.
- Crampons (8): are the metal structure under the deck, directly under the boot, that aids in traction on ice and hard-packed snow (as seen from the underside of the snowshoe.)
- Steel bars (9): are the serrated edges along both sides of the shoe that aids with traction on ice and hard-packed snow (as seen from the underside of the snowshoe).

6-6. To properly fit the military snowshoe:

- Lay the snowshoes on the ground with the running end of the heel strap to the outside of each foot.
- Kneel down and place one boot underneath the toe straps until the front of the boot is one-half to two-thirds of the way into the window.
- Starting with the front toe strap, tighten each strap until it is snug against the boot, but take care not to cut off circulation or overtighten to the point of breaking the strap.
- Secure the heel strap to the boot just above the heel lug so that the running end of the heel strap is on the outside of the boot to prevent tripping.
- Repeat with the other snowshoe.

6-7. To move on snowshoes:

- On flat or rolling terrain—
  - Walk with feet apart slightly wider than normal to prevent stepping on or catching the other snowshoe.
  - Raise the toe of the snowshoe just high enough with each step to clear the snow as the tail slides over it.
- On gentle slopes, climb straight uphill or descend directly downhill.
- On steep terrain—
  - Ascend by traversing and packing a level trail while going up the slope.
  - Descend using the same traversing technique.

6-8. To change directions on snowshoes, make a step turn or kick turn:

- To make a step turn—
  - Move the outside snowshoe a few inches toward the desired direction of travel.
  - Move the other snowshoe until it is parallel to the first one.
  - Continue the process until facing the desired direction of travel.
- A kick turn is used to change direction in tight or steep terrain and is done by:
  - Lifting one foot and placing the tail vertically on the ground next to the window of the stationary shoe.
  - Maintaining balance and allowing the snowshoe to fall backwards so the feet are pointing in opposite directions.
  - Not placing snowshoes on top of each other.
  - Bring the other snowshoe around and place it next to the first one.

6-9. Additional considerations when wearing snowshoes include:

- Using ski poles as a balancing aid, especially when carrying heavy loads or moving uphill:
  - Size the ski poles so that the length is approximately up to the name tape.
  - Poles are angled slightly rearward, providing an added boost when moving forward.
  - Hands are low without squeezing the pole grips: the wrists rest on the lanyards.
- When stepping over obstacles, place snowshoes parallel to the obstacle and straddle it one leg at a time.
- If a large obstacle cannot be avoided, step directly on it with as much contact as possible.
- Try not to bridge depressions with snowshoes since this places undue stress on the frames and can possibly cause breakage.
- The lead Soldier breaks the trail and works harder than those that follow, so periodically rotate trail breakers.
- When carrying a weapon, attach the sling to the rear sling swivel and the slip ring where the handguards attach to the receiver:
  - Hang the weapon over the neck and fire side shoulder with the muzzle down.
  - The weapon can be placed behind the canteen on the firing side hip to keep it out of the way while using ski poles.
  - Alternatively, attach the sling at the slip ring and the small of the butt stock and hang in the same manner.
  - Another method is to use a commercially available three-point sling.

- While donning snowshoes or adjusting bindings, kneel down to be closer to the ground to avoid bending at the waist:
  - Kneeling brings the Soldier closer to the bindings.
  - If possible, do not wear the pack as it causes imbalance and ratchets up frustration levels.
  - Should a fall occur while wearing the rucksack, get out of the pack before trying to stand up again.

6-10. In a survival situation when skiing is not recommended and snow is loose and deep (see table 6-2), improvise equipment for travel if. Make snowshoes of willow or other springy wood using a wood separator and thong, wire, or cord.

Table 6-2. When to use skis or snowshoes

SKIS	*SNOWSHOES*
Speed is essential	Movement through heavy brush
Traveling long distance	Speed is not essential
Stealth is necessary	Troops are inexperienced on skis
Conditions are favorable	

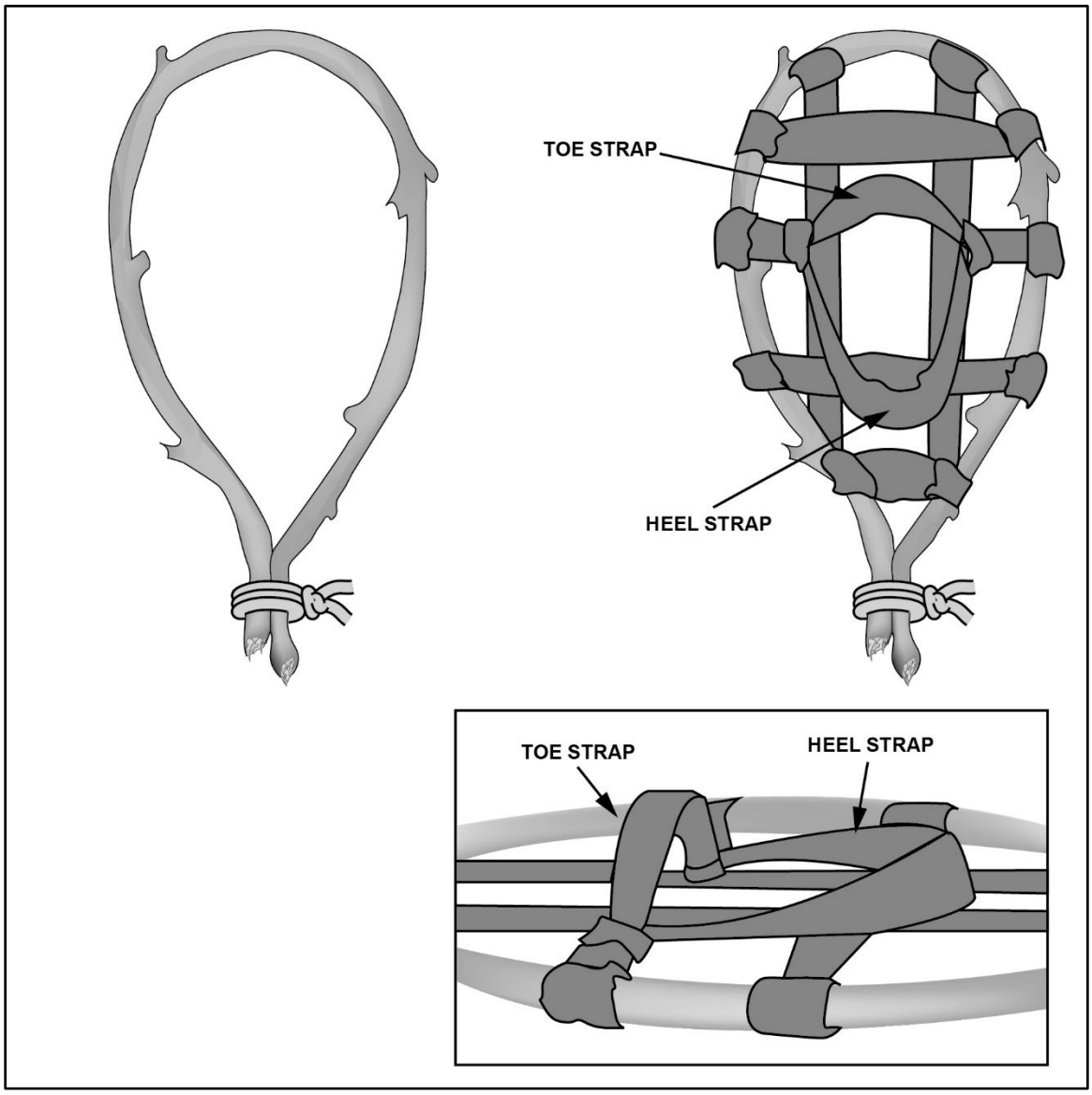


Figure 6-2. Improvised snowshoes

MOVING THE AHKIO

6-11. It is easiest to pull an ahkio with snowshoes. However, if using skis, wax the bottom runners to provide more grip than glide on the snow. Climbing skins should also be utilized. Secure the following equipment:

- Eighteen-foot tow rope consisting of two sections:
  - One is 6 feet (approximately 1.83 meters) and the other 12 feet (3.65 meters).
  - There is a snap hook or carabiner at each end of the rope and a metal attachment ring in the middle.
- Three 6-foot (1.83 meters) traces with each trace having a snap hook or carabiner at each end.
- One 50 to 60 meter (approximately 4.5 to 5.5 yards) climbing rope.
- Four harnesses.

6-12. If wearing a rucksack, put it on now. Drape the harness over the head and fasten the metal buckle in front. The D-shaped ring at the rear of the harness is the connection point for pulling, and the ring in front is for braking. If the rucksack rides below the connection point, remove the harness and make attachments directly to the rucksack. Additional considerations include:

- Movements of the ahkio pulling team are coordinated by one team member.
- Ahkio pulling teams are rotated frequently to avoid exhaustion.
- The trail should be broken by a trail breaking team prior to pulling sleds, but consider that—
  - Heavy brush and forests can make pulling a sled almost impossible.
  - The trail-breaking squad can drag their own ahkio in less difficult snow conditions, but the platoon leader may elect to shift their ahkio to the trail squad.
  - The company commander may elect to have the company reserve pull the ahkios for the lead platoon.
- Pullers should stay close to the 18-foot (5.49 meter) tow rope:
  - This helps pack the snow allowing the sled to slide easily without digging in.
  - One technique is to keep one hand on the main line.

HAULING A SCOW SLED (AHKIO)

6-13. There are several different ways to haul a scow sled (ahkio). From the basic configuration, the ahkio can be pulled using specific formations for sustained downhill movement, sustained uphill movement, traversing a hill, and during traveling and overwatch movements.

6-14. To create the basic hauling configuration—

- Hook the 18-foot (approximately 5.5 meters) tow rope to the front of the sled with the 6-foot (1.8 meter) section closest to the sled and the end is in the No. 1 position.
- Hook one of the 6-foot (1.8 meter) traces to the ring on the tow rope for the No. 2 position.
- Hook one of the 6-foot (1.8 meter) traces directly to the sled for the No. 3 position (see figure 6-3).

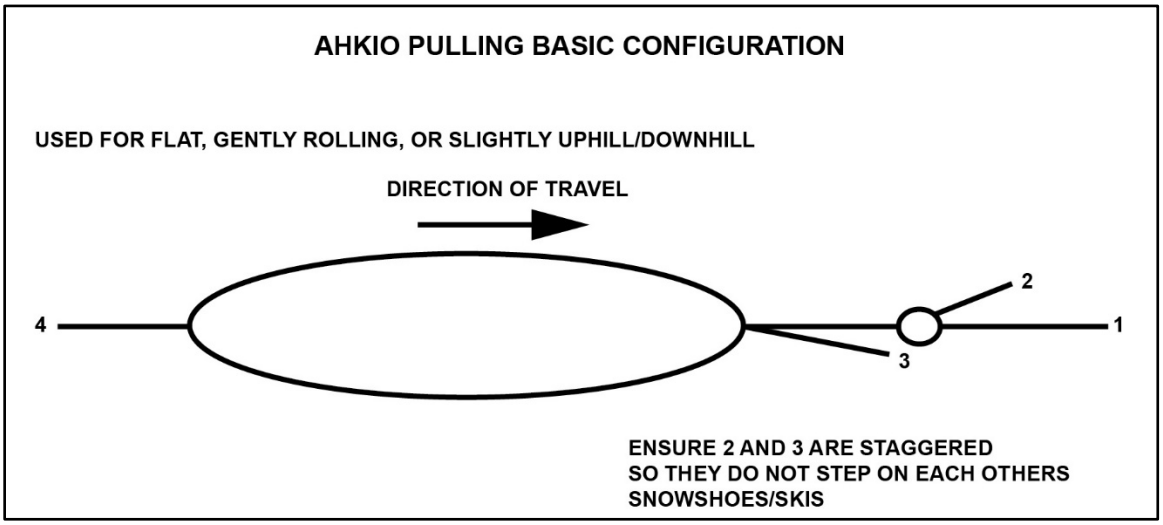


Figure 6-3. Basic configuration for hauling a scow sled

- The No. 2 and No. 3 positions should be on opposite sides of the rope, so they do not step on each other's snowshoes or skis, as the No. 3 position provides the most power in the pulling effort.
- Hook the remaining trace to the rear of the sled in the No. 4 position:
  - The No. 4 position provides braking power to keep the ahkio from running into the pullers if a slight downhill is encountered.
  - The No. 1 through No. 3 positions ensure they slow their movement on the downhill so the No. 4 position is not yanked off their feet.
- Pull in unison.

6-15. For more sustained downhill (steep) scow sled movement, allow gravity to move the sled by controlling the speed of the sled from the rear. (See figure 6-4.) To achieve this—

- The No. 4 position can hook directly to the ahkio or the rear of the No. 1 harness.
- If a Soldier hooks to the sled, care is taken not to step on the Soldier in the No. 3 position.

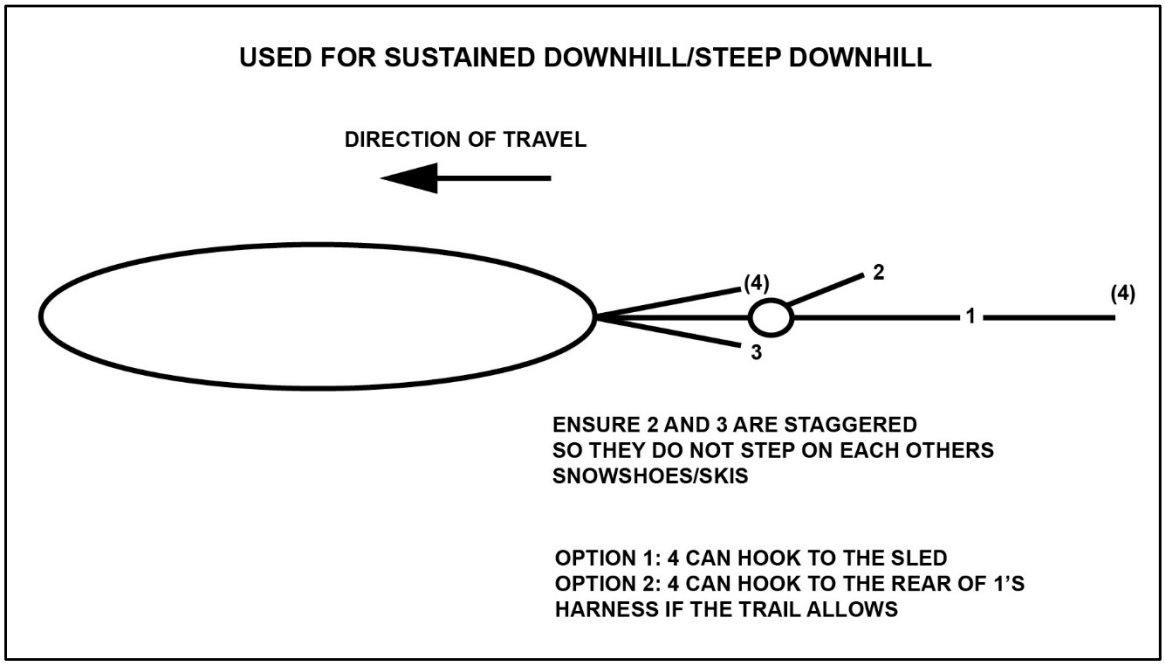


Figure 6-4. Sustained downhill (steep) configuration for hauling a scow sled

6-16. When terrain gets so steep that Soldiers cannot brake effectively, a short rope can be tied to the two D-rings on the side walls by passing the rope under the sled. The sled can also be belayed using the 200-foot (60.9 meter) rope.

6-17. When travelling on a sustained/steep uphill, the Soldier at the No. 4 position can hook directly to the ahkio or the front of the No. 1 position harness. Keep in mind—

- If hooking to the sled, care is taken not to step on the Soldier in the No. 3 position.
- If hooking to the harness in front, the trail must be straight to accommodate the additional length (see figure 6-5).

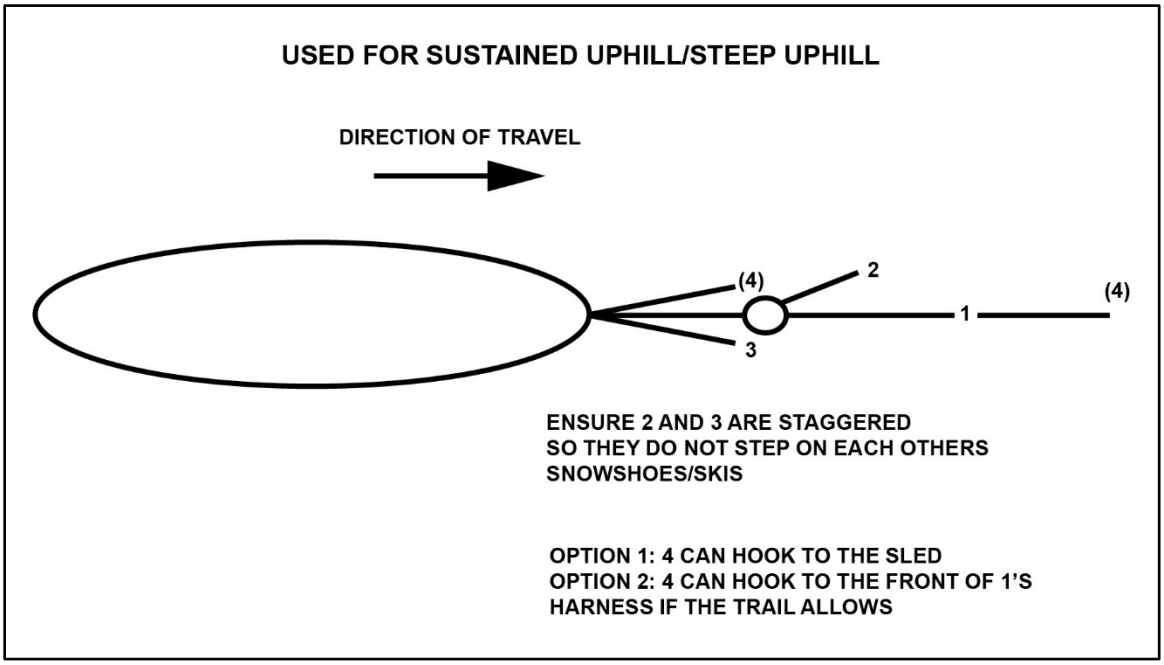


Figure 6-5. Sustained uphill (steep) configuration for hauling a scow sled

6-18. To traverse , a hill with a scow sled—

- Move the No. 2 Soldier from the ring position to the uphill D-ring on the ahkio.
- Soldier No. 3 remains hooked to the sled but moves to the uphill side of the tow rope.
- Soldier No. 2 can hook the trace to the opposite D-ring to keep the ahkio from rolling down the fall line, if needed (see figure 6-6).

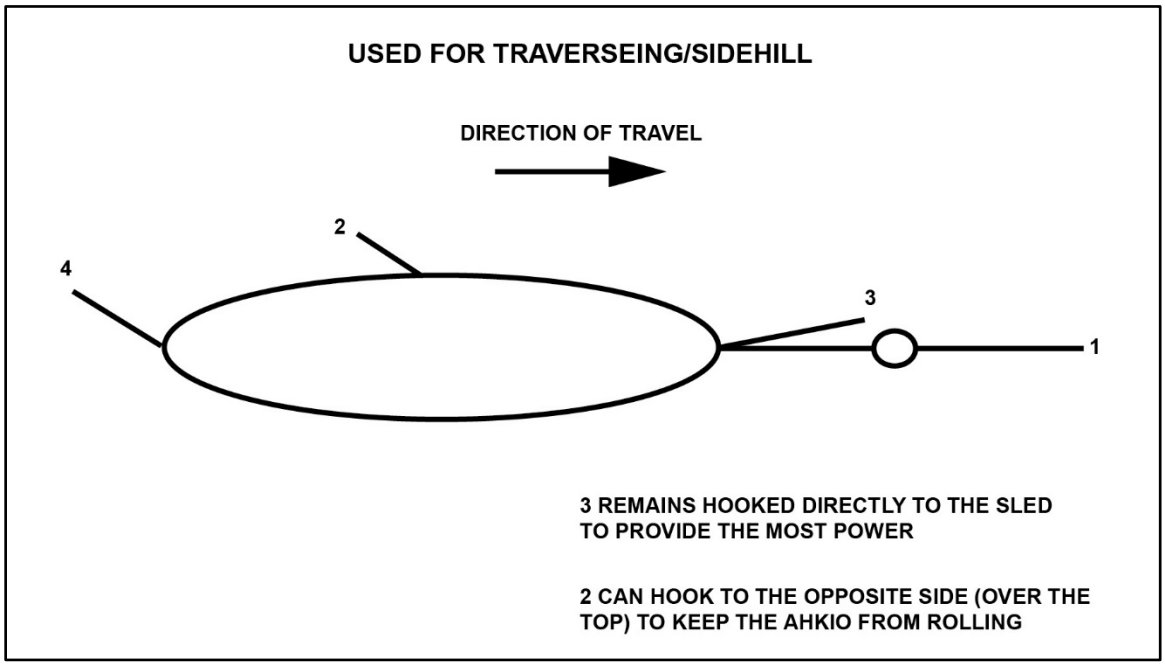


Figure 6-6. Traverse a hill with a scow sled

6-19. The rifle squad, maintains the standard movement techniques of traveling, traveling overwatch, and bounding overwatch while towing an ahkio group. The lead fire team breaks a trail wide enough for the ahkio group to easily traverse the snow. (See figure 6-7.)

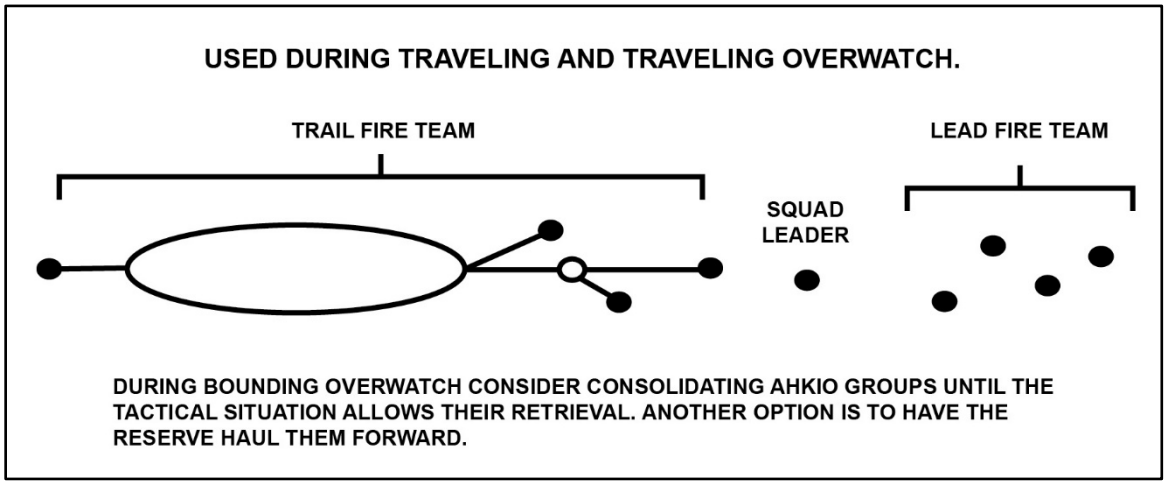


Figure 6-7. Basic configuration for movement of the rifle squad

6-20. The lead fire team is responsible for—

- Providing security.
- Breaking the trail.
- Removing bigger impediments to movement.
- Navigation.
- Rotating into the hauling team.

6-21. Responsibilities of the trail fire team (hauling team) include:
- Maintaining noise and light discipline.
- Ensuring the sled moves without damage or loss.
- The brakeman provides rear security.

6-22. The squad leader is responsible for—
- Noise and light discipline.
- Navigation.
- Ensuring the fire teams are rotated into hauling positions
- Other tactical considerations.

6-23. If the squad is to operate independently, consider not hauling the ahkio. This allows the squad to move quietly and faster while accomplishing their mission. Careful analysis is given before attempting to operate in extreme cold without heat and shelter.

6-24. If the platoon is moving in bounding overwatch, consider having the company reserve bring the ahkios forward or consolidating them until the tactical situation allows for their retrieval. The ahkio is useful in transporting—
- Casualties.
- Crew-served weapons.
- Resupplies.

6-25. The ten-person tent is very useful as a casualty collection point. Casualties can be stabilized in a warm area before evacuation to a higher level of care.

THE CHALLENGE OF LAND NAVIGATION

6-26. In some cold-weather environments, accurate up-to-date maps may not be available, and landmarks can be few or nonexistent. When the terrain is snow-covered, one piece of ground looks like the other. Whatever the circumstances, find a way—if not by map reading, then by some other means of navigation.

6-27. Only poor roads may exist in some areas. These are of little use in cross-country navigation. If large-scale maps exist, they may be unreliable. Long nights, falling or blowing snow, and fog limits visibility in winter. Tracks and landmarks may be erased by heavy snowfall. Accurately identify landmarks via ground and air observation to prevent mistakes. Conditions of daylight are different from those found in more temperate regions. In winter, there are long nights and short days. The low angle of the sun can temporarily hinder visibility.

6-28. Magnetic disturbances may be common, making compass readings unreliable. Use several compasses at the same time during movements. Magnetic declinations can be extreme and vary considerably at close points. Many small lakes, ponds, and creeks are found that are not on the map. The size and location of waterways can vary from year to year and from season to season. They cannot be relied on to pinpoint a position. However, large lakes and rivers can be used as important aids to navigation and movement. The Global Positioning System (GPS) may be unreliable as batteries are quickly drained due to the extreme cold and high latitudes. (See TC 3-25.26 for more information.)

Note. Do not rely on one form of navigation when moving in extremely cold weather.

DISTANCE AND DIRECTION

6-29. When traveling from one point to another, it is necessary to know the distance between the two locations before starting out, then plot the journey accordingly. In temperate zones, pacing is the simplest method of measuring distance. In cold-weather areas, snow cover and the use of skis and snowshoes make pacing a challenge. Repeatedly practice this type of pacing. Assign several Soldiers within the unit the job of tracking their pace count, which is then averaged.

6-30. The best method for accurate ground measurement is for two Soldiers to use a piece of salvage field wire or 50-meter (approximately 54.5-yard) long parachute cord. The lead Soldier marches off in the desired direction, trailing the wire behind. The second Soldier signals the first by jerking the wire when the first has

reached 50 meters (approximately 54.5-yards) and then moves forward to the lead Soldier's position. The first Soldier marks the spot and continues forward for another 50 meters (approximately 54.5-yards). This is repeated until the desired distance is reached. Although very slow, this method is accurate in flat tundra areas.

6-31. If no other method of measurement is available, the length of time spent in steady progress along a route may be used to estimate the distance traveled. The accuracy of this method depends on how well the marching speed over all types of terrain on foot, skis, or snowshoes is known.

DETERMINING DIRECTION

6-32. Using the compass is the most common way to determine direction. However, the magnetic field becomes weaker when the magnetic pole becomes closer.

6-33. Compasses can easily be affected by other objects. It is important to make sure that the compass is not compromised by iron fragments in the ground, vehicles, or metal objects on the Soldier. As in the pace count, several Soldiers within the unit should have their compass out, monitoring the direction.

Navigation with the Sun and Stars

6-34. During daylight hours, there are two ways to determine direction by the sun. At noon in the northern hemisphere, shadows fall to the north of objects. In the southern hemisphere, shadows fall to the south of objects. Estimate direction by using a watch and the sun.

6-35. In northern latitudes, the hour hand is pointed toward the sun. An imaginary line halfway between the hour hand and 1200 points to the south. In southern latitudes, the procedure is different. Point the 1200 toward the sun. An imaginary line halfway between the hour hand and 1200 points to the north.

6-36. The North Star can be used to determine true north. (See figure 6-8.) This star is easily found by its position relative to the Big Dipper. In latitudes under 70 degrees when traveling north, the North Star makes a good steering mark since its bearing is usually only 1 degree from true north and is never more than 2 1/2 degrees away. In higher latitudes above 70 degrees, the North Star is too high in the sky to indicate good direction.

Note. Do not use the moon or stars as guides because they travel in a circle through the night.

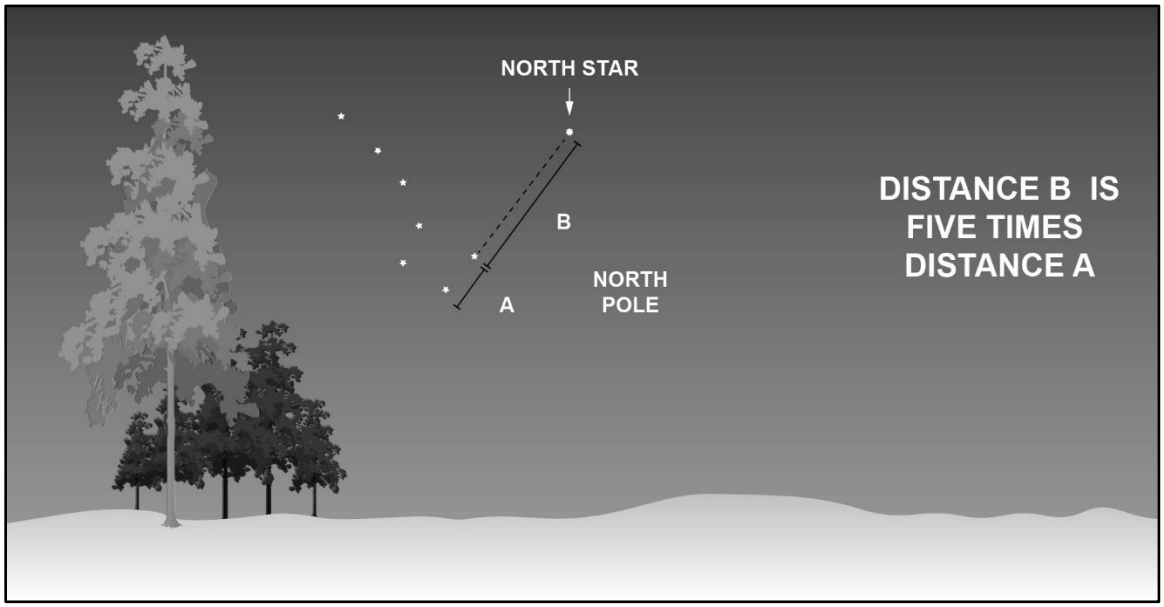


Figure 6-8. Determining direction with the North Star

6-37. South of the equator, locating the Southern Cross constellation helps find the general direction South and any other direction. This group of four bright stars is shaped like a cross that is tilted to one side. The two stars forming the long axis, or stem, of the cross are called pointers. From the foot of the cross, extend the stem five times its length to an imaginary point. This point is the general direction of South. From this point, look straight down to the horizon and select a steering point. (See figure 6-9.)

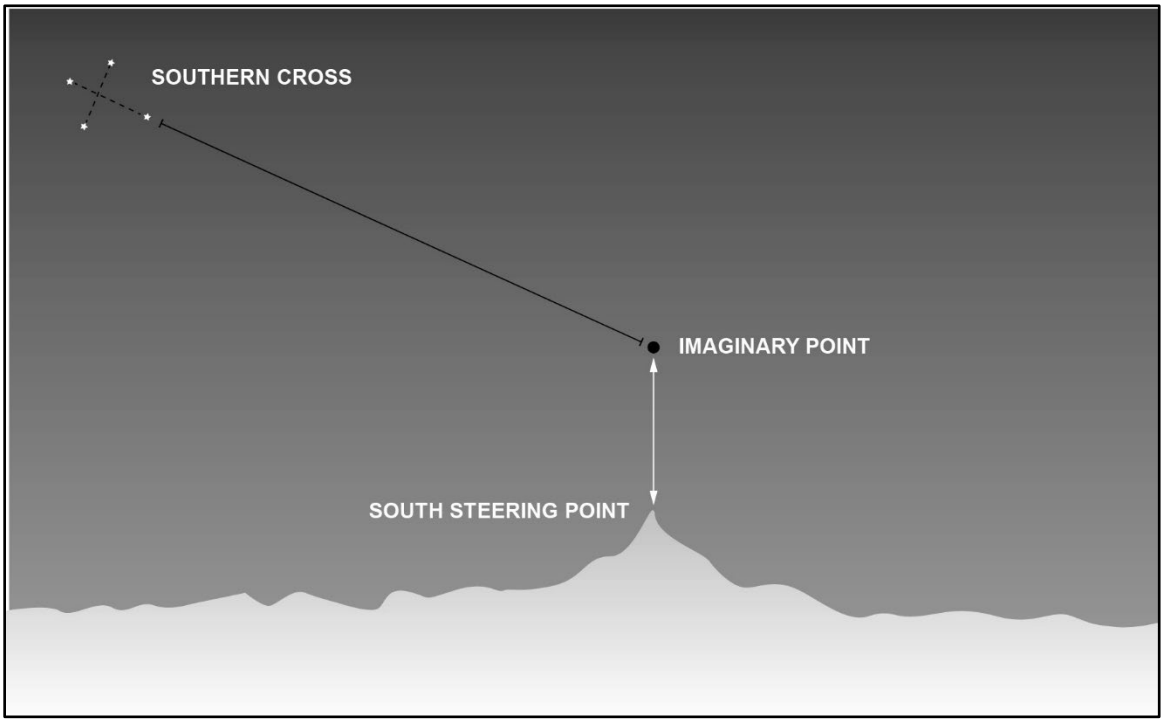


Figure 6-9. Determining direction with the Southern Cross

Navigation by Dead Reckoning

6-38. Dead reckoning consists of plotting and recording a series of courses from a known point, each measured for distance and direction. These courses lead from the starting point to the destination. This lets the navigator determine their position at any time by following the plot or by comparing the actual position on the ground to the plotted course. All the details are estimated and recorded.

6-39. Various items of equipment can be used when dead reckoning. They are:

- Maps are used for choosing and plotting the route taken as the march progresses.
- Aerial photographs are usually used, in addition to maps that are vertical photos taken during the same season in which they are being used.
- The compass is used as the main direction-finding instrument.
- The protractor is necessary in dead reckoning for plotting direction and distance on the map, aerial photo, or chart: remember to convert magnetic azimuth to grid azimuth.
- The purpose of a route card is to outline the plan of the proposed march by—
  - Keeping a mandatory log.
  - Recording the start of the mission.
  - Recording the distance and direction.
- The log documents are the traveling position at any time in relation to the—
  - Planned route.
  - Destination.
  - Starting point.

6-40. Knowing the starting and destination points, and after examining the map or aerial photo for the best route, prepare an unofficial route card. (See table 6-3.) This describes the distance and direction of each leg of the proposed route.

6-41. As the march continues, keep a careful record of every bearing taken, the distance travelled, and record this in the log. There may be a change to the planned route due to terrain or enemy action. All necessary changes are made using the map or aerial photo as a guide and recorded in the log.

Table 6-3. Format of a makeshift route card

DAY_____ FROM GRID_____ ALTITUDE____ TO GRID_____ ALTITUDE____								
START POINT	DEGREE GRID	DEGREES MAGNETIC	TERRAIN	DISTANCE	END LEG GRID	END LEG ALTITUDE	CHANGE	END LEG TERRAIN
TOTAL DISTANCE_____ TOTAL ELEVATION CHANGE_____								

Navigation Tips

6-42. The navigator keeps the compass warm to speed up recording the position. A steering mark is an object or terrain feature on the line of azimuth the navigator can get a bearing on. If no steering mark exists, another Soldier can be used instead. The team using the pace count cord (as previously described) can be used. The navigator sends the other Soldier out on a bearing for a distance. This Soldier then stops and faces about. The lead navigator directs them left or right by hand and arm signal, or via radio. The unit then moves to that location. This is used in conjunction with the pace count cord in conditions of diminished visibility, wide open flat areas, and very dense forested areas where terrain features cannot be seen. These methods slow the unit to a crawl and can result in cold injuries if precautions are not taken.

6-43. When visibility is poor, only close-in steering marks are available. Under these conditions, try to pick up steering marks along the correct azimuth. This can be done accurately only when the route to each steering mark follows a straight line. Take compass checks often to ensure that the correct azimuth is being followed. Set the compass for a night course. Depending on the area of the world, other signs can be used. For example, in the barren and semi-barren lands of eastern Canada, snowdrifts point to the northwest and windblown trees to the southeast due to prevailing winds. In Scandinavia, scratches on rocks and cliffs caused by the glacial period (ice age) run northwest to southeast.

ROUTE PLANNING

6-44. In addition to the normal considerations regarding the tactical situation, leaders can use a map or imagery reconnaissance when selecting a route across cold, snow-covered terrain. The following should be considered:

- Going around terrain features may be faster than going over them:
  - Check the contours and select a route.
  - Choose a route with the minimum amount of ascent and descent time.
- Pay attention to the contour intervals on maps:
  - A 20-meter (approximately 22 yard) interval can hide a lot of very significant relief.
  - Large intervals tend to soften the terrain.
  - A sharp *arrowhead* reveals that a ridge is very narrow across the top, but a large contour interval can soften the appearance.

- Note the time of day, month, and year the imagery is taken, along with:
  - The time of year and time of flight on visual imagery that affects the way shadows highlight the lay of the land.
  - The season of the year, such as if it is the height of summer or middle of winter.
  - A photo taken in the winter may have significant features covered in snow.
  - Shadows that can be different in summer and winter, and at different times of the day.
- Old trail networks are more prevalent than expected:
  - They can be nothing more than a footpath through the woods or a single lane vehicle path.
  - Areas around population centers usually have trails for many miles in the surrounding countryside.
  - These may not be on any map but can show up on readily available imagery.
  - Control of trails has proven to be decisive in the past.
- Check the marginal information with particular attention to the data and drawing dates:
  - It is important that the data on the map matches the data entered into the GPS unit.
  - Most GPS default to WGS84, but many of the more remote regions of the world have not been updated to this new data.
  - The date of the map affects its accuracy, especially regarding built-up areas.
- GPS is affected by terrain masking in deeper valleys or draws. Latitude also affects the GPS due to fewer available satellites or being close to the horizon.
- Old river channels can also be used:
  - Vegetation may be less dense or easier to move through.
  - Keep in mind that rivers in cold regions tend to meander a lot, adding more distance.
- Vegetation can be estimated by color.
  - Dark green areas tend to be mature trees such as white spruce, pine, birch, and cottonwood.
  - These are commonly found immediately adjacent to river channels.
  - They may have an understory of dense brush.
  - Light green areas tend to be lower brush such as black spruce, alder, willow, and smaller birch.
- Wide open areas with little or no relief are addressed, as navigation can get difficult without landmarks.
- Consider where the sun is and how the shadows fall:
  - The south side of open areas have longer shadows.
  - These shadows help to conceal tracks.
- Consider whether Soldiers are on skis or snowshoes:
  - How proficient are they?
  - Are they more capable of negotiating the terrain along the route with one or the other?
  - Will Soldiers be carrying heavy rucksacks or pulling sleds?
  - What is the temperature expected to be during movement?
- If any vehicles are attached to the unit, what type of terrain and snow depth are they capable of negotiating?
  - How are the tracks going to be camouflaged and does this need to be done in barren areas, or areas above the tree line since tracks may be difficult, if not impossible to conceal.
  - Is the route feasible during conditions of limited visibility?
  - Does the route cross any potential avalanche areas?
- What obstacles can be anticipated?
  - Will streams and other bodies of water be sufficiently frozen to support troops and vehicles?
  - Do snowplowed roads perpendicular to the route have high banks of plowed snow?
  - Is the water level in streams so low that Soldiers have to negotiate high banks?

Open Terrain

6-45. In open terrain, it is best to break only one set of tracks. Aircraft or elevated OPs can spot several tracks more easily than a single set of tracks. Follow the tree line as much as possible as this aids in concealment from the ground and helps hide tracks from the air. The sun stays in the southern sky for most of the winter. The very long shadows on the southern side of open areas can be used to conceal tracks.

Tundra

6-46. In tundra areas of the far north there are very few forested areas. Walking through areas with knee-high brush conceals trails. Areas where large herds of moving caribou can also conceal tracks. River corridors may have some mature trees to help with concealment, but further north these dwindle. Assume that the enemy knows the locations of these tree lines and has them under observation. Relying on low ground such as creek beds to mask movements can help conceal movement.

Hills and Mountains

6-47. When negotiating hills or mountains, use gentle traverses to ascend or descend. This makes it less fatiguing on Soldiers so they can fight after reaching the objective. As far as avalanche prone slopes are concerned, avoid them at all costs. Very specialized training is required to even come close to negotiating them safely. Some warning signs to be aware of in snow-covered mountainous terrain are taught in the stationery avalanche awareness class.

Water Routes

6-48. Water routes are generally excellent for navigation. They can be superb avenues for movement after freeze-up. Very detailed reconnaissance is required before attempting to move on water routes. When on water routes, treat them as an open area and stay close to the shore. This helps to conceal Soldiers and tracks. Overflow is a condition common to most bodies of water where the water flows onto the ice. General rules for selecting routes on ice include—

- The outside bends of rivers generally have thinner ice due to the faster current.
- Edges of lakes generally have thicker ice as water freezes from outside to inside and top to bottom.
- Inlets, outlets, converging channels, and tributaries are high flow areas prone to thin ice.
- The ice in the middle of lakes and rivers tends to be thinner and the downwind side of lakes tend to have thicker ice.

DANGER

Failure to conduct a very thorough reconnaissance of a route over ice can lead to loss of life and equipment.

- Steam coming off the surface of the snow indicates that there is open water:
  - Isolated patches of frost form on the trees adjacent to water ways.
  - This indicates that there was open water there and the ice around that area may be thin.
- *Frost flowers* form due to water vapor condensing on ice or snow:
  - This comes from exposed water.
  - When an open lead freezes over, these flowers form on the ice.
  - This ice is quite thin but may be strong enough to support a load of snow, concealing its presence.
  - Avoid any depression in the snow while on a water route.
- As the winter progresses, water levels under the ice begin to drop:
  - This sometimes leaves an air space where the ice is no longer supported by water and may collapse.
  - Check for hollow sounds and the sound of flowing water.

6-49. Ice can bear different amounts of weight depending on the thickness and types of transportation. Table 6-4 on page 84 illustrates the ice depth thickness required for different modes of travel.

Table 6-4. Minimum thickness for transportation on ice

MINIMUM ICE THICKNESS (WATERBORNE)			
Load	**Minimum One-Time Only**	**Normal Repeated Use**	**Distance Between Use**
Soldier on skis	1.5 inches	2 inches	5 m (5.46 yards)
Soldier on foot	3 inches	4 inches	5 m (5.46 yards)
HMMWV	10 inches	13 inches	27 m (29.52 yards)
SUSV	10 inches	13 inches	27 m (29.52 yards)
UH-60, CH-47	15 inches	18 inches	80 m (87.48 yards)
Legend HMMWV—high mobility multipurpose wheeled vehicle; m—meter(s); SUSV—small unit support vehicle			

Notes. A rule of thumb for armored vehicles: 16 inches (0.4 meters) of waterborne ice supports 16 tons, and each additional inch supports one additional ton. This does not apply to ice thicknesses under 16 inches. For example, 3 inches (7.6 cm) of ice does not support 3 tons (approximately 6,614 pounds) of weight.

If ice is not supported by water (waterborne) because the water level has dropped, it is too weak to support heavy loads. If temperatures are above 14ºF (approximately –10 ºC), add 25 percent to all required ice thicknesses.

Water Route Reconnaissance

6-50. After a tentative route is selected, an ice check is necessary. At least two Soldiers should do this. Equipment consists of a 25-meter (approximately 27 yard) rope, an auger or heavy ice chipper, and a measuring stick with an angled end. Both Soldiers wear personal flotation devices. If the tactical situation permits, fighting loads should be dropped or at least lightened to just a weapon. Gas-powered augers are faster but are loud and require two-stroke fuel. Tactically, hand-powered augers are best. Chippers and axes are excruciatingly slow. To reconnaissance in cold weather—

- The lead Soldier ties off to the end of the rope with a bowline just under the armpits:
  - If the rope is around the waist there is the possibility of being folded in half by a current and having the head submerged.
  - The other Soldier keeps the rope fairly taut.
- The lead carefully moves onto the ice no more than 10 meters (approximately 11 yards) from the shore, 1 to 2 meters (3.28 to 6.56 feet) downstream from the route (to prevent weakening the route for heavier loads) and drills the first hole:
  - Take note of the amount of resistance against the auger.
  - The water should flow up out of the hole and be approximately 1 to 2 inches (2.5 to 5 cm) below the surface of the ice.
  - This shows that the ice is waterborne.
  - Measure the thickness of the ice by inserting the stick and hooking the angled portion under the ice shelf.
  - It helps if the shaft has inch or centimeter marks on it.
- Both Soldiers move to the next area not more than 10 meters (1.1 yards) away: repeat the process.
- The last hole is no closer than 10 meters (1.1 yards) from the shore.
- Mark the lane.
- A speed limit of 10 mph (approximately 16 kph) is enforced if vehicles are to use the lane, especially when close to the shore landing:
  - Vehicles set up a pressure wave and can blow out the landing.
  - The heavier and faster the vehicle, the higher the risk.

Night Movements

6-51. Leaders manage movements during periods of limited visibility to minimize the likelihood of breaks in contact and reduce the amount of time required to regain contact. In temperate regions, this is usually an annoyance that slows movement. In the cold-weather environment, long halts can produce cold-weather injuries. For this reason, the route should follow the easiest terrain possible.

6-52. The route should also be well marked, and guides placed where appropriate. Maximize the use of reconnaissance teams, well-defined travel lanes, and checkpoints. Reconnaissance teams may also be tasked to put up heated shelters along longer routes.

TRAIL BREAKING PROCEDURES

6-53. Roads and trails depicted on maps or imagery may be completely obscured by heavy snowfall or drifting. A unit can completely miss these features if not careful. Mitigate by—

- Knowing the exact location at all times.
- Plotting azimuths to cross or join roads and trails at easy to identify points.
- Maintaining an accurate log of distance travelled to know when there should be crossing, or a joining of roads or trails.
- Looking at the tops of the trees in forested areas: there may be a definite open space in the canopy.
- Looking at the sides of the trees as well.

6-54. Dismounted consumes a considerable amount of time, effort, and energy. The first Soldier in line quickly becomes fatigued depending on the load carried and depth of snow. One-third of the unit is allocated to this task. The trail breaking party departs 1 hour earlier for each kilometer to be traveled. The leader is responsible for—

- Setting a course that maintains tactical security to the larger unit while maintaining ease of movement:
  - The general trace should be set using a map and aerial imagery.
  - Every effort should be made to stay in mature forests and avoid areas that are choked with brush.
  - These areas make movement excruciatingly slow, and the noise generated by clearing a route or just moving through it can easily alert the enemy.
- Ensuring the trail marking SOP is adhered to and side trails or back-tracking trails are cordoned off to prevent units from taking a wrong turn.
- Providing guides, if necessary.
- Ensuring pioneer tools are available:
  - The tools in an ahkio group are enough for a squad to cut a trail.
  - If water routes are to be used, additional tools such as augers and depth sticks are brought along.

6-55. The following is the procedure for the lead squad:

- The squad leader designates the direction, and the lead Soldier begins moving, establishing the initial track.
- The second in line does not step into the firsts' tracks but steps opposite and flattens the tracks.
- The third and fourth Soldiers offset their steps left and right by at least one snowshoe width:
  - This widens the trail to allow the ahkios to be brought along.
  - Should it become necessary, these Soldiers are also the *cutters*.
  - Each one carries a machete to clear brush on the sides of the trail.
  - Care is taken to lop branches close to the main trunk, so they do not become spears.
- The squad leader's primary focus is navigation:
  - A march table should be kept for tracking the unit location.
  - GPS should not be solely relied upon, as batteries are easily drained in the cold.
  - The squad leader ensures the two teams are rotated, as necessary.
- Trail team fills low spots with snow, straightens the trail if necessary, and provides security for the lead team.

- Lead squad in the platoon generally should not be dragging their own ahkio group if a trail is to be broken or cut in very thick brush or deep snow:
  - If the lead squad is dragging their own ahkio, breakers and pullers must rotate more frequently in deep snow.
  - Security can lapse very quickly when labor becomes difficult.
- Lead team rotation is a big consideration:
  - The lead fire team or squad moves forward for a certain amount of time or a certain distance, then rotates to the rear of their team or squad.
  - The same applies to squads within a platoon.
  - Trail breaking is a demanding physical and mental activity.

6-56. The M973 small unit support vehicle is quite capable of cross-country travel under most snow conditions. The planning procedures are much the same for mounted travel as they are for dismounted. The leader ensures—

- There are at least two vehicles travelling together and the crews are well-versed in recovery.
- That fuel is topped off and additional cans are carried.
- Basic issue items are present and serviceable:
  - Recovery equipment such as winches, tow cables, and snatch blocks are essential.
  - Wheeled vehicles are required to have tire chains.
- The route, number of personnel, and time of departure are understood and logged with the command center.
- That passengers have adequate equipment for sustainment overnight.
- The leader has navigational equipment, maps, compasses, GPS, overlays, and imagery. The procedure for breaking trail in a vehicle is as follows:
  - The lead vehicle sets the initial track, staying concealed as much as possible.
  - The second vehicle offsets their track to flatten out the trail, which keeps a hard ridge from forming in the center of the trail that can high center other vehicles.
  - Following vehicles also offset as much as practicable to widen the trail, harden the snow, and ease the passage for other vehicles.

6-57. A series of tripods can be set up quickly to mark the trace of a trail through open areas. They should be spaced so that from one tripod, the next tripod in line is easily seen.

6-58. Trail maintenance becomes a task repeated often to maintain lines of communication and supply. A significant snowfall or wind event can totally obliterate any trace of a trail. A well maintained and marked trail is far easier to re-open than breaking a new one.

PLANNING RATES OF MOVEMENT

6-59. The normal planning rate for dismounted troops on hard packed, gently rolling terrain is 2.5 mph (4 kph). When factoring in snow or hilly terrain, there is a table to help judge the rate of march. (See table 6-5.)

6-60. The movement rate on foot with less than 1 foot of snow in this table is the same as Soldiers on snowshoes traveling over more than a foot of snow. Skis are shown to be faster than snowshoes because they require less work to use. Finally, skijoring does not show a time for an unbroken trail in this table because Soldiers are behind a vehicle breaking the trail. The table assumes there is no work required to clear a trail.

Table 6-5. Planning rates of movement

MOVEMENT MODE	*UNBROKEN TRAIL*	*BROKEN TRAIL*
On foot or less than 1 ft of snow (approximately .3 meters)	Approximately 1 to 1.75 mph (1.5 to 3 kph)	Approximately 125 to 1.75 mph (2 to 3 kph)
On foot or more than 1 ft of snow (approximately .3 meters)	Approximately .3 to 1 mph (5 to 1 kph)	Approximately 125 to 1.75 mph (2 to 3 kph)
Snow shoeing	Approximately 1 to 1.75 mph (1.5 to 3 kph)	Approximately 175 to 2.5 mph (3 to 4 kph)
Skiing	Approximately 1 to 3 mph (1.5 to 5 kph)	Approximately 3 to 3.75 mph (5 to 6 kph)
Skijoring	N/A	Approximately 5 to 15 mph (8 to 24 kph)
Legend: ft—foot; kph—kilometers per hour; mph—miles per hour; N/A—not applicable		

6-61. When gaining elevation, add 1 hour for every 1,000 feet (approximately 305 meters) of upward movement. This takes into consideration the extra time required for traversing and the more frequent halts that are to be expected. When descending, add 1 hour for every 1,600 feet (approximately .5 km) of downhill movement. While this is generally accepted for foot or snowshoe movement, proficient skiers take significantly less time to move downhill. However, more injuries occur when descending than ascending, usually affecting the lower leg.

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Chapter 7
Survival

GENERAL EMERGENCY SOLUTIONS

7-1. Missions typically occur in Arctic or subarctic regions where all personal equipment and Soldiers of the unit remain together. However, it is possible to find oneself alone in a remote area with little or no personal gear.

7-2. Part of mission orders is the route taken to the objective. Memorize details, if possible. Mission orders should contain isolated Soldier guidance. This is detailed instructions for what to do if separated from the unit. A Soldier can be separated from the main troop body, especially when fighting in action. This applies mainly to night battle or bad weather but can also happen if a Soldier is careless or march discipline is poor.

7-3. If all is quiet and there are no battle sounds or aircraft for guidance to friendly lines, go back to the last known position. If that is not possible, carefully consider the journey already made and the distance and direction from the starting point.

7-4. If with others, information should be gathered from the group. Send search parties out to find the next known steering mark. Carefully mark trails so the search party can return to guide the main group forward, or to rejoin the group should their search be unproductive. Meanwhile, the rest of the group should seek shelter. If the search party fails to find any known location, perform the steps below but remember to think clearly and keep calm:

- Stay together:
  - Meet the emergency as a group.
  - Do not wander off as individuals, and never allow Soldiers to straggle.
- Take shelter:
  - If a tent is available, set it up and get in.
  - If there is no tent, build an improvised shelter.
  - The type of shelter is not important if there is protection from the weather.
- Keep warm:
  - If lost in a forest, light a fire (depending upon the enemy situation).
  - If lost in an area where there are no trees, do not use the gasoline stove to heat the shelter.
  - The stove is used only to prepare hot food and drinks.
  - Conserve the fuel supply and get into the sleeping bag to stay warm.
- Check the food supply:
  - All food and water in the group is collected and rationed systematically.
  - Supplement the food supply by shooting large animals and trapping or snaring small ones.
- Check communications:
  - If there is a radio set, use it to contact the parent unit for help.
  - If in a forest, prepare fires to attract search planes.
  - Smoke is better by day and flame is better at night.
  - Mirrors and ground signals are helpful in attracting search parties.
  - Isolated Soldier guidance has ground and air signals for search planes.
- Rest:
  - Less energy is expended.
  - Food is eaten when resting.
- Create an arctic necklace:
  - This is a 30-inch (76 cm) piece of parachute cord tied in a loop with a lighter and lip balm taped to it.
  - A small pocketknife is secured at the knot.
  - This is worn around the neck.

- Carry candles:
  - Candles are easy to light, provide heat and light, and help start fires.
  - If there are no matches, fire can be produced by striking the flint on the waterproof match box with the blade of a knife and collecting sparks in dry tinder.
  - Dry moss and bark make good tinder for starting fires.
- Build fires in layers, with sticks laid out like the spokes of a wheel.
- Create signals with fires since ground and air signals can be made with small fires to form the identification characters.
- Carry tactical, chemical, and strobe lights:
  - A small tactical flashlight or chemical light can be seen from the air or on the ground as far as line-of-sight permits.
  - Strobe lights (infrared or plain) can be seen for miles by aircraft.
  - Every squad should carry a mix of these lights, as well as a VS-17 panel to signal friendly forces.
  - Remember the enemy situation before deploying any signal.
- Survival depends upon clear thinking and resourcefulness:
  - Keep calm.
  - Think.
  - Try to help each other.
  - Stay together.
  - Keep warm.

Note. Emergency visual communication depicting ground-to-air terrain markings, hand-and-arm movements, and ground-to-air signals can be found in appendix C.

IMPROVISED SHELTERS

7-5. Sometimes tents or other regular shelters are not available. In summer, if the weather is mild, it may mean protection only from insects. In the winter, however, it is not possible to stay in the open for long periods of time unless Soldiers are moving. In case of emergency, Soldiers need to know how to protect themselves from the effects of weather. Use natural shelters such as caves or rock ledges if available. If they are not, build a temporary improvised shelter.

7-6. Building a shelter depends on the equipment and materials available. Some sort of shelter can be built during any season of the year. In open terrain, a shelter can be built with ponchos, canvas, snow blocks, or other materials. Snow caves, snow trenches, snow houses, or snow holes can be built in the winter. When in the woods, a lean-to is usually preferred to other types of shelter. Nature provides the means to prepare shelters. However, comfort depends on initiative and improvisational skills.

PONCHO SHELTER

7-7. The simplest type of shelter is made by pulling a poncho over a sleeping bag. For additional comfort, various types of shelters and lean-tos can be made by attaching a poncho to trees, tree branches, or poles. To build a one-person shelter from one poncho, spread the poncho on the ground, hood side up. The hood opening is tightly closed by adjusting and tying the drawstrings. The poncho is raised in the middle of its short dimension to form a ridge with the stakes out at the corners and sides. Snow, sod, or branches are used to seal the side and one end of the shelter for heat retention and additional protection from the wind. (See figure 7-1.)

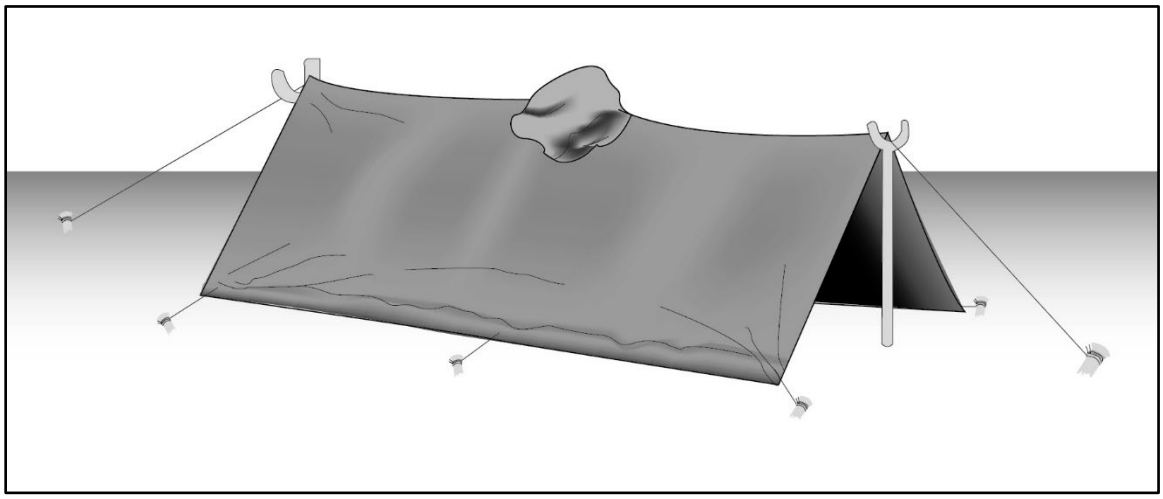


Figure 7-1. One-person shelter

7-8. A two-person shelter is made from two ponchos. Spread the ponchos on the ground with the hood side up and the long sides together so that the snap fastener studs of one poncho can be snapped into the other poncho. Raise the ponchos where they are joined to form a ridge. The shelter is then staked out at the sides and corners. A third poncho can be snapped into the other ponchos to form a ground cloth. (See figure 7-2.)

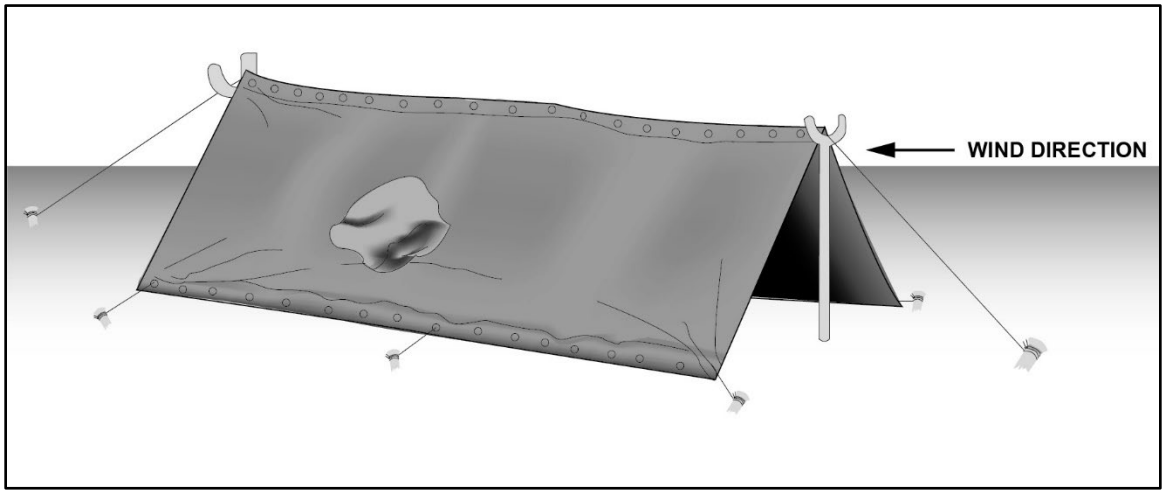


Figure 7-2. Two-person shelter

LEAN-TO SHELTER

7-9. The lean-to shelter made of trees and tree limbs is built in forested areas. A poncho, a piece of canvas or a parachute, plus boughs, can be used for covering. Depending on the number of people needing shelter, two types of lean-tos (single and double) are built. Boughs should be laid in the shelter like overlapping shingles. (See figure 7-3.)

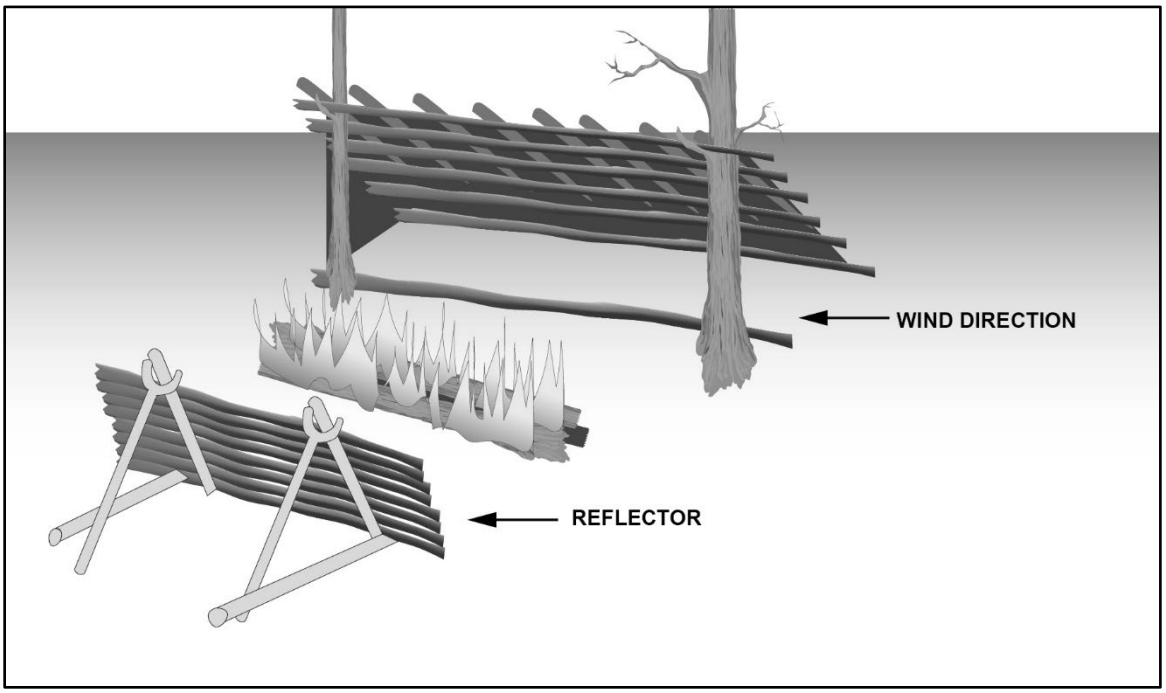


Figure 7-3. Single lean-to

7-10. To save time and energy, use two trees the right distance apart and sturdy enough to support the crosspiece. If suitable trees are not available, use two forked poles or build two A-frames to hold the crosspiece. A large log is laid at the back for added height. Stringers approximately 11 feet long and 4 inches in diameter (about 3 meters long and 10 cm in diameter) are then placed approximately 1.5 feet (45 cm) apart from the crosspiece over the top of the log at the rear. Available coverings, ponchos, boughs, and other building material are then placed on top of the stringers.

7-11. A double lean-to is made by building two single lean-tos facing each other with the fire in between. Any kind of an open fire can be used to heat the lean-to. The best kind for a large lean-to is the log fire. Precautions are taken to prevent the fire from burning too hot or burning down the shelter. A fire reflector can be built of green logs or poles to reflect the heat into the shelter. A fire reflector also serves as a windbreak to keep the fire burning steadily.

TREE SHELTERS AND WIGWAMS

7-12. In wooded areas, the tree-pit shelter furnishes temporary protection. Select a large tree with thick lower branches surrounded by deep snow. Enlarge the natural pit around the tree. The walls and floor are lined with branches and boughs. Try not to disturb the snow that may be on the branches. (See figure 7-4.)

7-13. An emergency shelter for one man can be built by cutting down a coniferous tree at a point approximately 3 feet (about 1 meter) from the ground. After the tree falls, the branches on the underside are trimmed away and the cut material used for insulation on the ground.

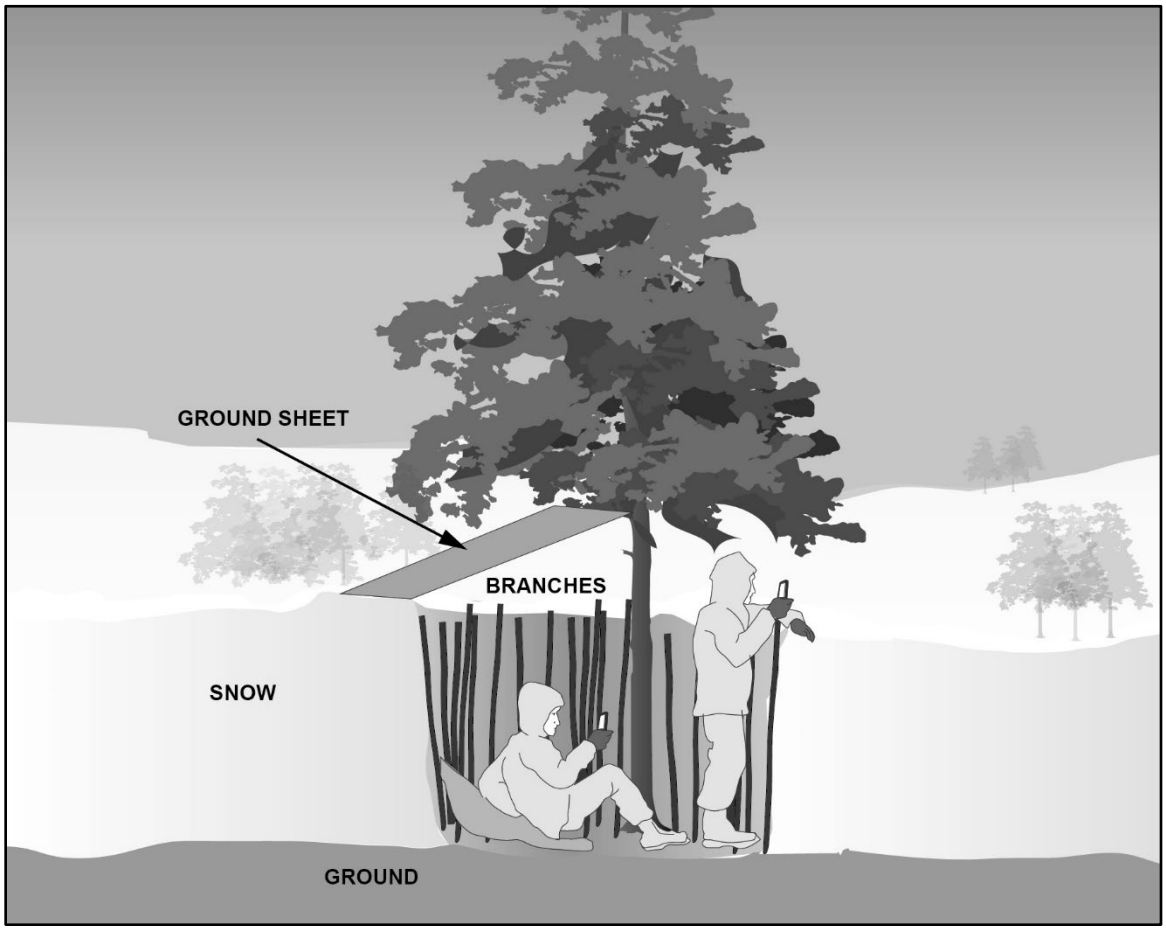


Figure 7-4. Tree pit shelter

7-14. A wigwam or tepee can be built in wooded areas by tying several poles near the top and spreading them at the bottom to form a large circle. Cover this framework with ponchos, a parachute, or any other suitable material.

SNOW WALLS, TRENCHES, AND CAVES

7-15. In open terrain with snow and ice, a snow wall can be built for protection from strong winds. Blocks of compact snow and ice are used to build a windbreak. Be careful not to get covered up by drifting snow, which may accumulate on the lee side of the wall. (See figure 7-5.)

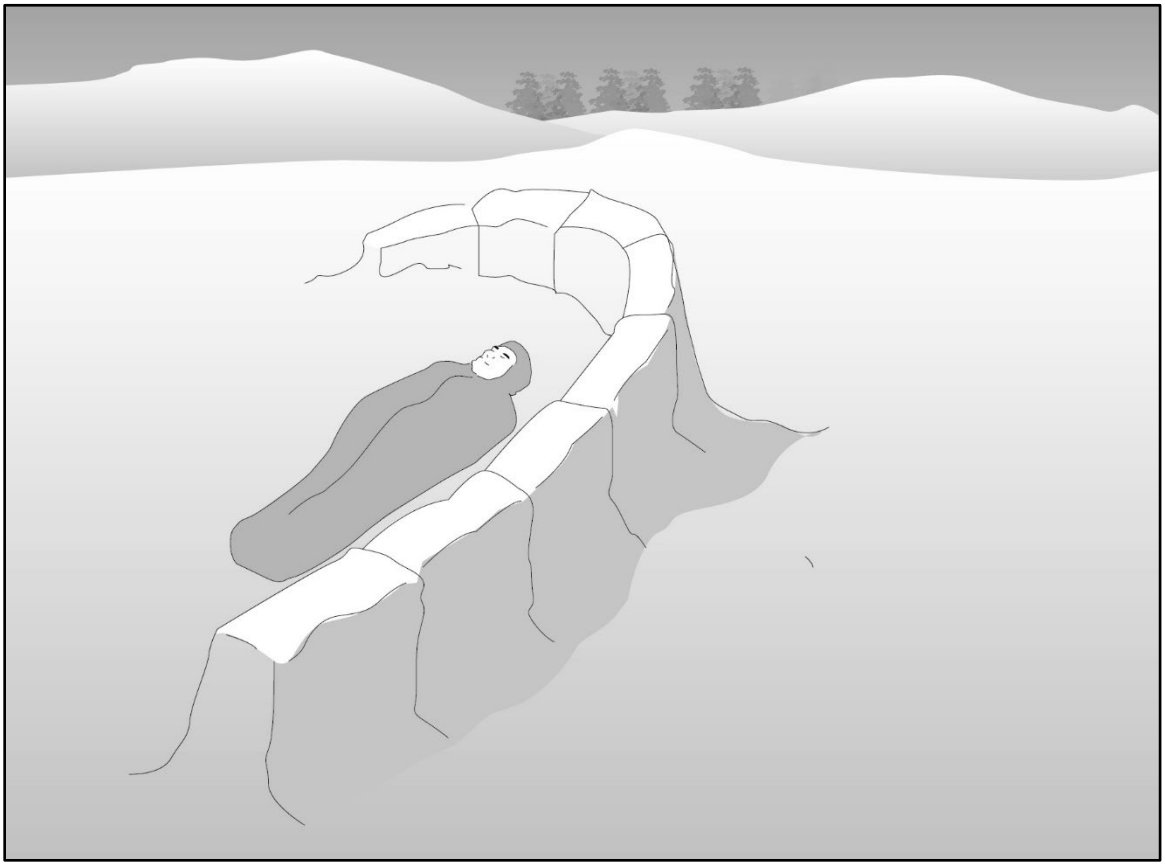


Figure 7-5. Snow wall

7-16. A snow trench provides shelter quickly. It is built by burrowing into a snowdrift or digging a trench in the snow and making a roof of ponchos. Ice and snow blocks supported by skis, ski poles, or snowshoes can also be constructed as a roof. Boughs can be used for covering the roof and lining the bed. Leaning snow blocks against each other is another method. (See figure 7-6.)

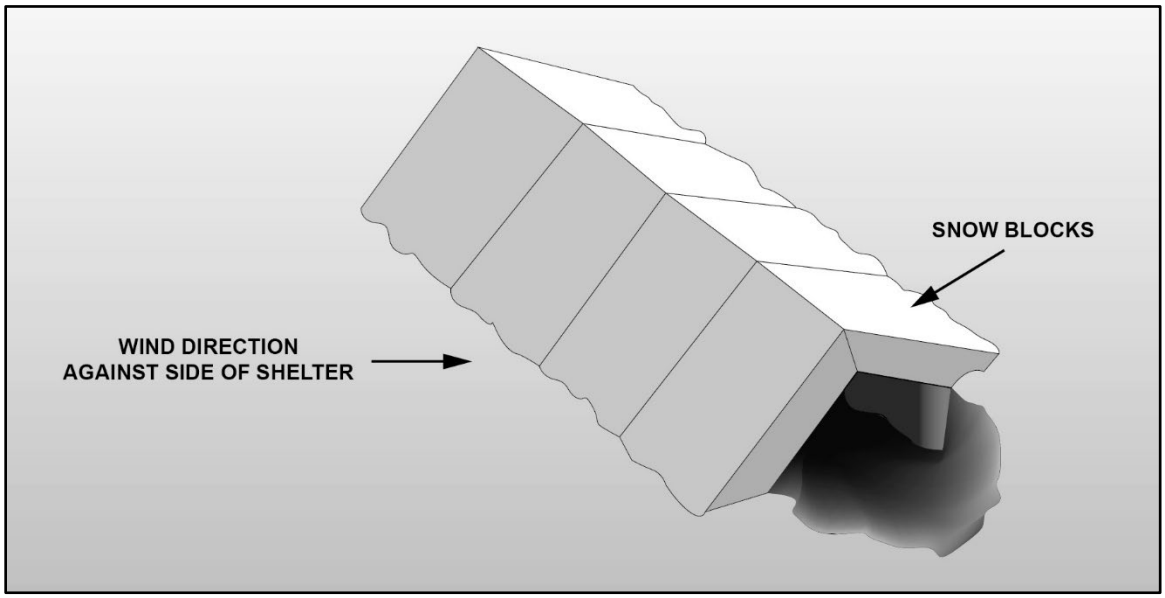


Figure 7-6. Snow trench

7-17. A snow cave can be used as an improvised shelter in open areas where deep and compacted snow is available. Normally, a suitable site is located on the lee side of a steep ridge or riverbank where drifted snow collects and becomes wind packed. The tunnel entrance gives access to the lowest level of the chamber. This is the bottom of the pit where equipment is stored.

7-18. Make the snow cave high enough to provide a comfortable sitting space. The sleeping area is on a higher level than the highest point of the tunnel entrance, where there is warmer air. The roof is arched for strength and so that drops of water forming on the inside do not fall on the floor. This water follows along the curvature of the roof and sides, causing the walls to glaze over when frozen. The roof is about a foot (30 cm) thick. The size of the snow cave depends upon the number of men occupying it. A large cave is usually warmer and more practical to build and maintain than several small caves. The shape of the snow cave can vary to suit conditions. When the main cave is built, short side tunnels are dug to make sleeping rooms for one or two Soldiers, storage space, a latrine, or kitchen space.

7-19. When building the snow cave, locate a snowdrift at least 10 feet (approximately 3 meters) deep. Newly fallen, powdery, or loose snow should not be used. The depth of a snowdrift can be tested with a sharpened branch or young tree about 13 feet (approximately 4 meters) long, or with a ski or shorter ski pole. The entrance is chosen carefully so that wind does not blow into the cave or block the entrance with drifting snow. The entrance should be built so that it is about 45 degrees from the downwind side. A small tunnel is burrowed directly into the side of the snowdrift for 3 feet (approximately 1 meter). A chamber is excavated from this tunnel. Excavation is done to the right and left, so that the length of the chamber is at right angles to the tunnel entrance. (See figure 7-7 on page 96.)

7-20. Personnel doing the digging become wet from perspiration and the snow inside the cave. They should wear a minimum amount of clothing to ensure they have a change of dry clothes when finished. To ensure that the cave is warm, the entrance should be blocked with a rucksack, poncho, or snow block when not in use. All available materials such as ponchos, cardboard from ration boxes, brush, and boughs should be used for ground insulation. Walking on the roof can cause it to collapse. At least two ventilator holes are used, one in the roof and one in the door. A ski pole can be stuck through the roof ventilator to clear it from the inside. The ventilation holes are inspected every 2 or 3 hours to ensure they have not become clogged with snow or ice. Extra care is taken to keep the air in the cave fresh when cooking or heating. The entrance should be marked by placing a pair of skis, or other equipment, upright on each side of the entryway.

7-21. Building a snow cave requires practice. Large shelters are usually more efficient for squad-size and larger units. The most critical decision is when and where to stop and build the shelter.

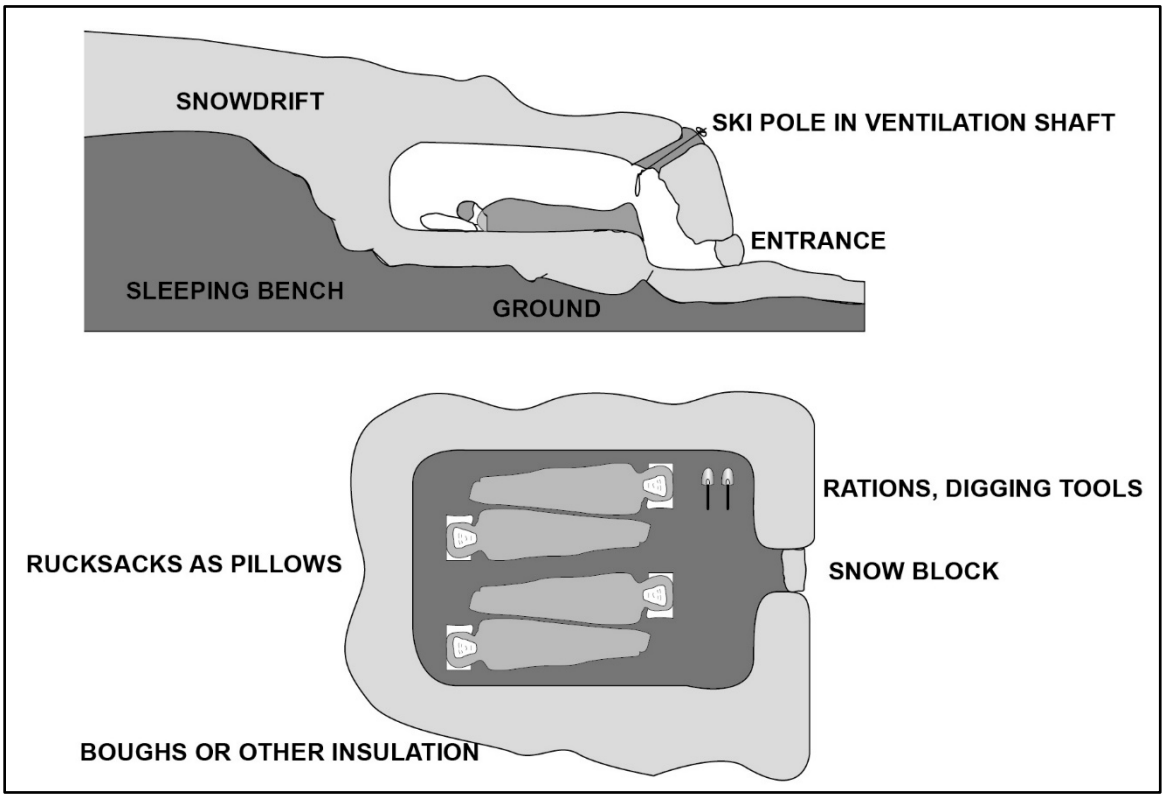


Figure 7-7. Snow cave

QUINZHEE SHELTERS AND IGLOOS

7-22. In alpine regions and other barren locations, shelter can be constructed by piling up a large mound of snow and then digging into it. Even light powder snow solidifies enough once it is disturbed and shoveled into a mound. This is similar in appearance to a snow cave and referred to as a molded-dome shelter or quinzhee shelter.

7-23. Although the quinzhee shelter may look like a snow cave, this molded dome should not have a sleeping bench. Soldiers dig the entire living area down to ground level (or as close to the ground as possible) and seal the entrance as they would for a thermal shelter. For best results, follow these guidelines:

- When constructing a quinzhee shelter for two Soldiers, clear an area down to the ground:
  - The area should be at least 2 feet (approximately 61 cm) wider and 2 feet longer than a pair of sleeping mats placed side by side.
  - Place a ski pole upright, in the center.
  - Place a second pole along the ground towards one of the long ends.
- Begin to pile snow back into the area.
- After piling up 2 to 3 feet (approximately 61 to 91.5 cm) of snow, walk on the area to pack the snow down.
- Continue to pile snow, periodically stopping to pack the snow down into a dome at least 5 feet (approximately 1.5 meters) tall.

- Let the snow set for about 3 to 4 hours:
  - After this time, check that the snow has sufficiently hardened.
  - If it has not, wait until it does, possibly repacking the area.
- If the snow has hardened, begin to tunnel in from one of the long ends of the dome along the ski pole, at or just above ground level.
  - Remove snow until reaching the center pole.
  - Begin to widen the sleeping area until two Soldiers can fit inside.
  - The ceiling should be arched and smooth to prevent dripping.
  - Ceilings melt with time, increasing the internal dimensions of the shelter.
  - Make the walls at least 8 to 10 inches (approximately 20 to 25.5 cm) thick.

7-24. Survival manuals tout the igloo as a shelter in snow-covered areas. These shelters require a lot of skill, patience, and practice to get right and can result in lots of frustration and wasted effort if not done properly. If not well-practiced in igloo making, eliminate the aggravation and build an easy shelter using less energy, time, and equipment resources.

FOOD

7-25. The chances of finding a variety of food in cold-weather areas depends on the time of year and location. Shorelines are usually scraped clean of all animals and plants by winter ice. Food can still be found north of the timberline, even when mice, fish, and grubs are not available.

7-26. If a large animal is killed or a large number of small game is found, store or preserve some of the meat for future use. Freezing is the best way to preserve fresh meat or fish. It may be necessary to protect supplies from small animals. Hang these supplies about 6.5 feet (approximately 2 meters) from the ground.

FISH AND SHELLFISH

7-27. There are few poisonous fish in cold-weather areas, but some fish, like the sculpin, lay poisonous eggs. Black mussels should be avoided in any season because it is impossible to distinguish toxic from nontoxic varieties in the field. Some black mussels can be as deadly as strychnine.

7-28. In cold regions, shark meat is poisonous. Salmon moving upstream to spawn in coastal streams and rivers may be plentiful, but their flesh deteriorates as they travel away from the ocean, making them unfit to eat (except in an emergency). A salmon that has been in fresh water long enough to turn a brilliant red is decaying.

7-29. Coastal waters are rich in all types of seafood. Grayling, trout, white fish, burbot, and pike are common to the lakes, ponds, and Arctic coastal plains of North America and Asia. River snails or freshwater periwinkles are also plentiful in the rivers, streams, and lakes.

7-30. Fish can be speared, shot, netted, hooked, caught by hand, or stunned with a rock or club. Fish hooks can be improvised from pins, pieces of wire, or any other metal object that can be bent into a hook. Pieces of meat, insects, or minnows can be used for bait. Some fish nibble at any small object that hits the water. Cod swim up to investigate strips of cloth or bits of metal or bone, making them easy to catch. A net can be made from stout twine or the inner strands of parachute suspension lines. These strands can also serve as fishing lines.

LAND ANIMALS

7-31. Deer, caribou, reindeer, muskoxen, moose, elk, mountain sheep, goats, bears, and other animals are found in most cold-weather areas. Tundra animals include rabbits, mice, lemmings, ground squirrels, wolves, and foxes. Where there are trees, the porcupine is often encountered. Porcupine can easily be clubbed or shaken out of trees. Pick up a porcupine only after it is dead.

7-32. Hunting is better during the early morning or late evening when the animals are moving to and from feeding, bedding grounds, and water. Large game such as moose and caribou should be shot just to the back of the front shoulder. If the range is short and the Soldier is sure of the shot, shoot them in the neck. (See figure 7-8.)

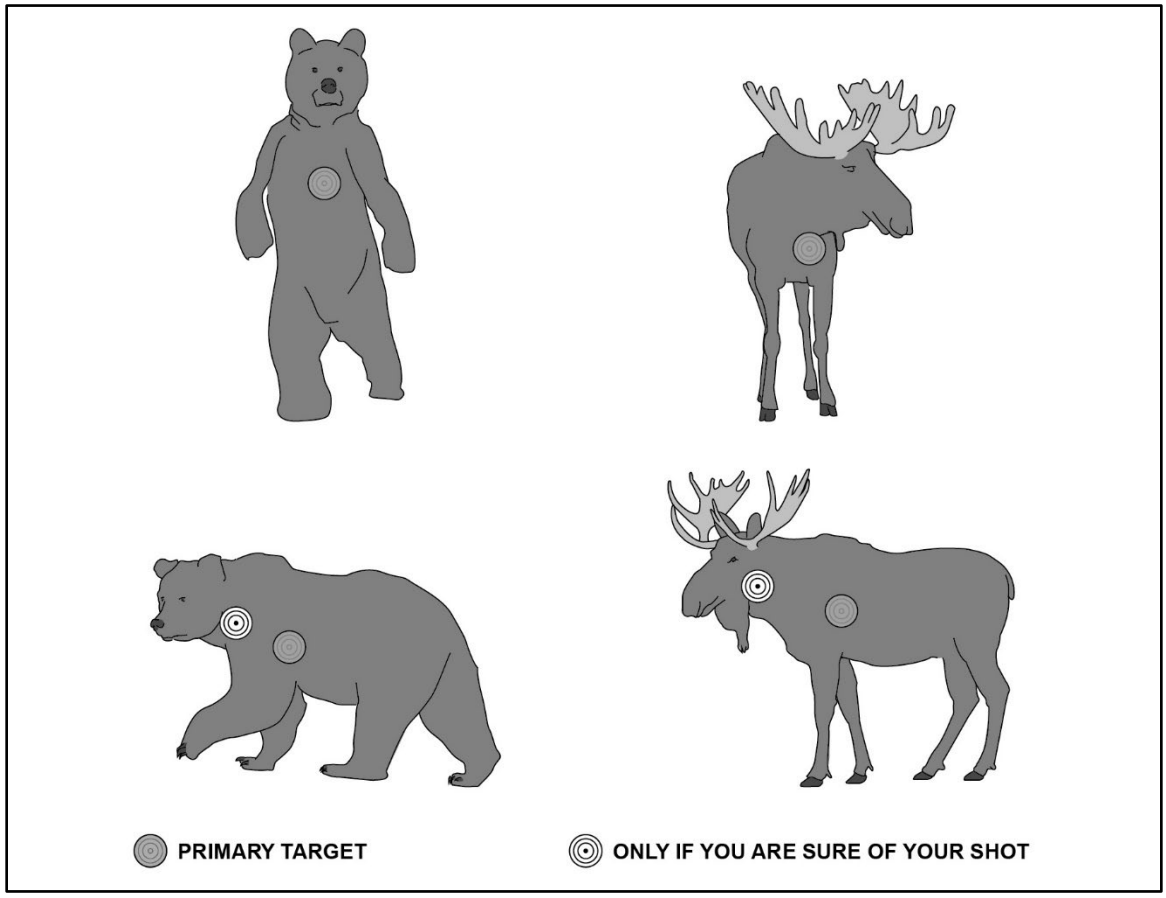


Figure 7-8. Hunting land animals

7-33. Large animals are fairly easy to stalk and kill, and their skins are useful for survival. Bears should be shot just forward of the front shoulder to stop them, or if the Soldier is sure of the shot, in the neck. To successfully hunt these land animals, Soldiers should know something of their characteristics:

- Caribou or reindeer are usually very curious:
  - It is possible to attract them near enough for a shot by waving a cloth.
  - Move slowly toward them on hands and knees.
- The technique of imitating a four-legged animal may also cause a wolf to come closer to a hunter.
- Moose can be found in heavy brush or around the shoreline of lakes.
- Mountain goats and sheep are cautious and hard to approach:
  - They can be surprised by moving quietly downwind while they are feeding.
  - Stay on higher ground than they are on, if possible.

- Musk oxen leave cattle-like tracks and droppings and when alarmed they—
  - Group together in a circle with their heads facing out.
  - Remain in that position unless approached, then a bull (or bulls) may charge.
- Bears are always dangerous:
  - A wounded bear is most dangerous and should not be followed into cover.
  - The polar bear is a tireless, clever hunter with good sight and an extraordinary sense of smell.
  - Be careful not to become the hunted instead of the hunter.
- Rabbits often run in circles and return to the same place when they are frightened:
  - A running rabbit can sometimes be stopped by whistling.
  - Snares made of wire and placed on small game trails, arranged so that the animal places its head through the loop, are an excellent means of catching rabbits.
  - Snares are efficient and several snares can be placed with little energy cost to the Soldier.
  - Check snares every few hours so that another animal does not take the catch.
  - A snared animal that is still alive becomes quite aggressive when approached.
  - A pole with a noose fixed to the end can be looped over its head and tightened to choke it. (See figure 7-9.)

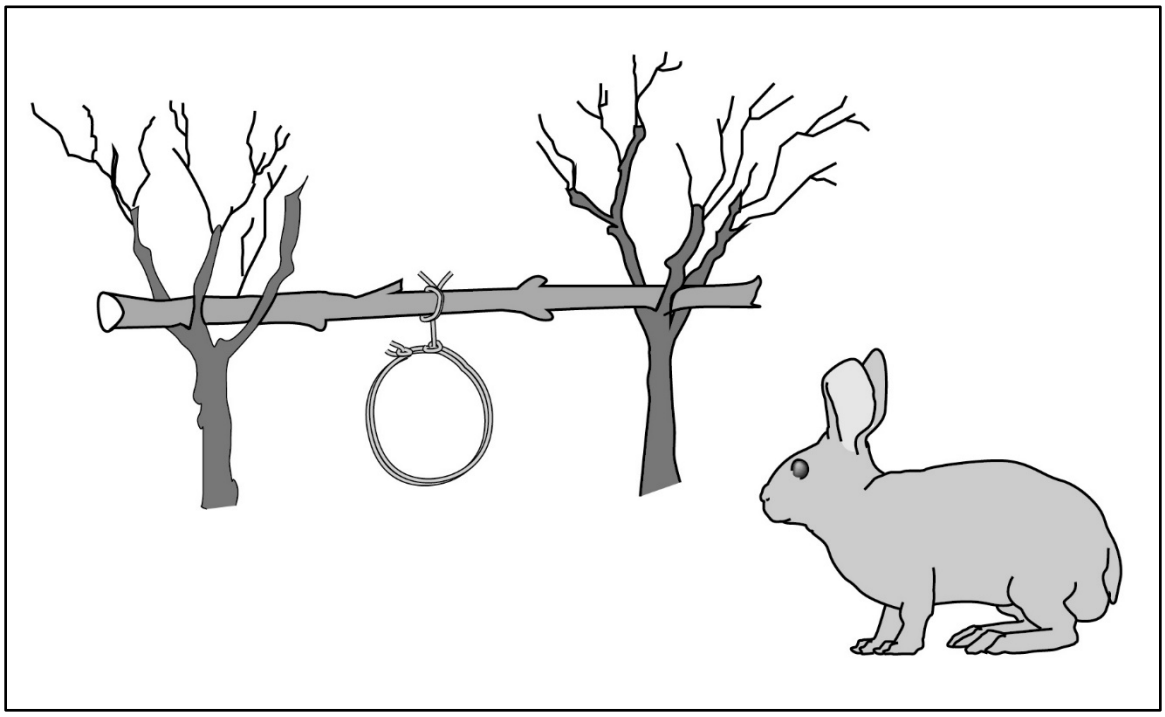


Figure 7-9. Snaring a rabbit

SEA MAMMALS

7-34. During winter and spring, sea mammals—seals, walruses, and polar bears—are found on frozen pack ice and floes in open water.

7-35. Seals are hard to approach but can be stalked. Keep downwind and avoid sudden moves. A white camouflage suit helps. Advance only when the animal is sleeping. Do not eat the liver of the bearded seal. Its high vitamin A content can cause sickness. Walruses are found on pack ice and are approached by boat. Due to its large size and boldness, the walrus is one of the most dangerous animals in the Arctic.

7-36. Polar bears are found in almost all Arctic regions but rarely appear on land. Avoid them if possible. If it is necessary to kill one for food, do not eat the liver. This liver is extremely high in vitamin A, which is poisonous to humans. Never eat any bear meat unless it is thoroughly cooked; it is always diseased.

BIRDS AND SNAKES

7-37. The Arctic is the breeding ground for many birds. Ducks and geese build their nests near ponds on the coastal plains during the summer, providing an important source of food. Grouse and ptarmigan live in mountainous terrain and brush-covered areas in Arctic and subarctic areas. Sea birds can be found on cliffs or small islands on the coast. Sea birds, ravens, and owls are useful for food.

7-38. In winter, owls, ravens, grouse, and ptarmigans are the only birds available. Ptarmigans and grouse are very tame and easily approached. Although they are hard to locate because of their protective coloring, they are a good source of food because they can be killed with a stone or a club.

7-39. The extreme northern reaches of the world have very few snakes. The only venomous snake is the European adder found in Europe and Russia. (See figure 7-10.) It is found up to the latitudinal tree line (approximately –32°North latitude). Alaska and Greenland are free of venomous snakes, and Canada only has them in the southern third of the country.

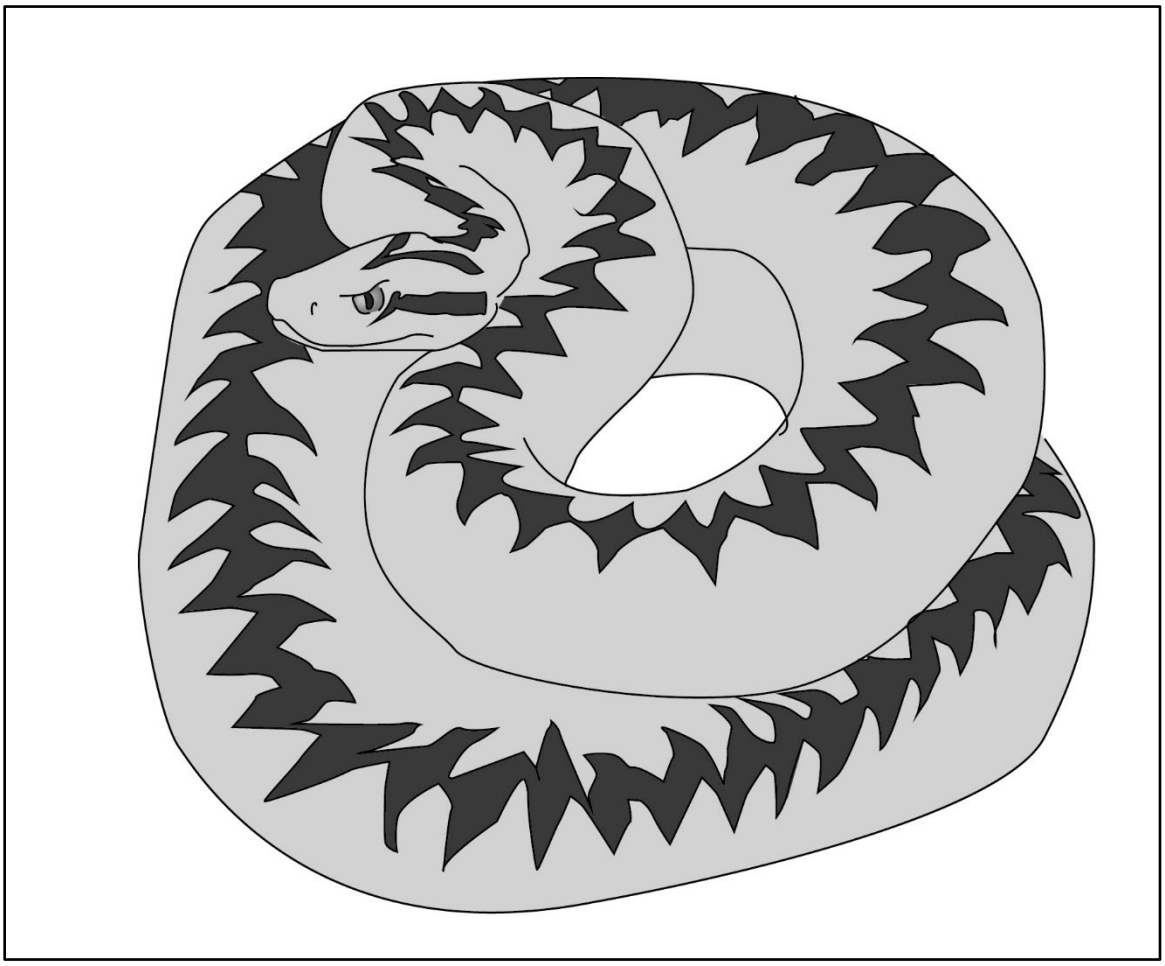


Figure 7-10. European adder

PLANTS

7-40. Most plants that grow in cold regions can be eaten. The water hemlock and the baneberry are the only poisonous plants. Water hemlock is one of the world's most poisonous plants and can be recognized by where it grows (always in wet ground) and by the following characteristics: a hollow, partitioned bulb at the base of a hollow stem, spindle-shaped roots, and a foul odor that is very noticeable in the root and bulb. The water hemlock is abundant in marshes near southern beaches and around marshy lakes in interior river valleys. It is never found on hillsides or dry ground. (See figure 7-11.)

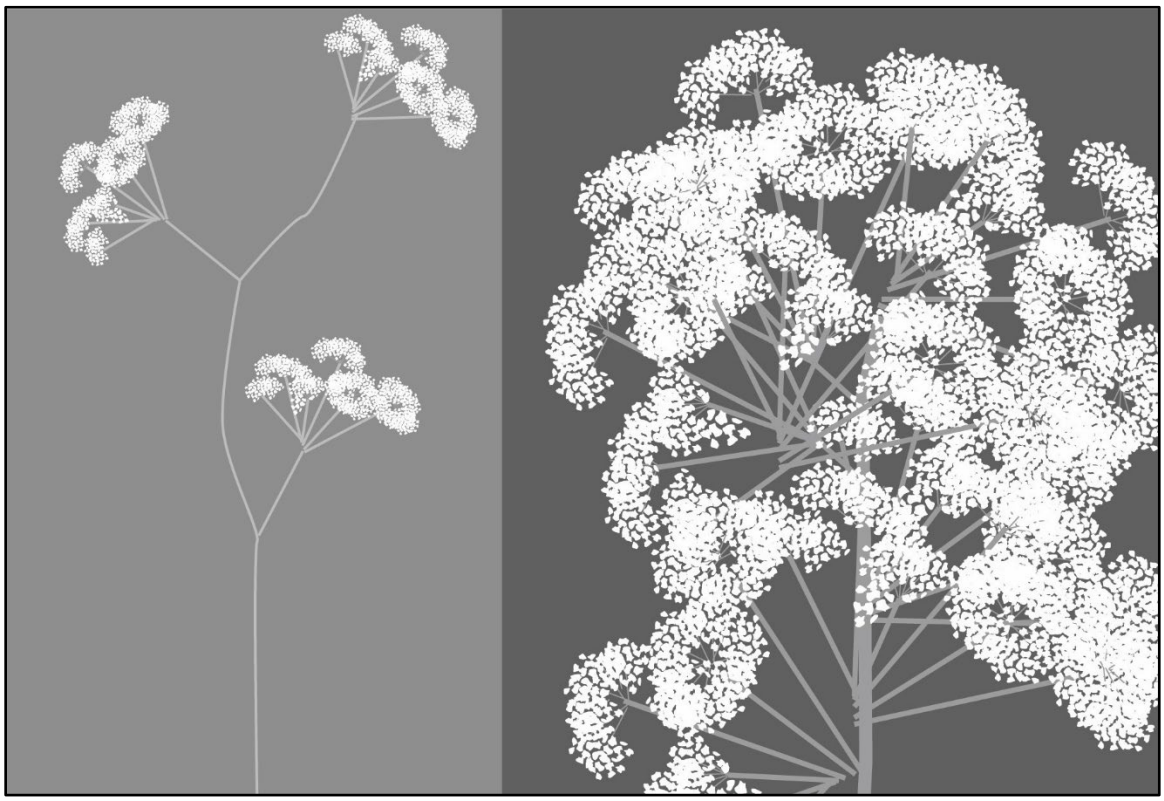


Figure 7-11. Water hemlock

7-41. Baneberries are normally found on hillsides or in forested bog areas. The white or red berries with a black dot at the bottom opposite the stem are clustered on a central stalk. (See figure 7-12.) The flesh is white. They are sometimes confused with cranberries, but cranberries are individual berries on several stalks. Cranberry flesh is red with clear juice.

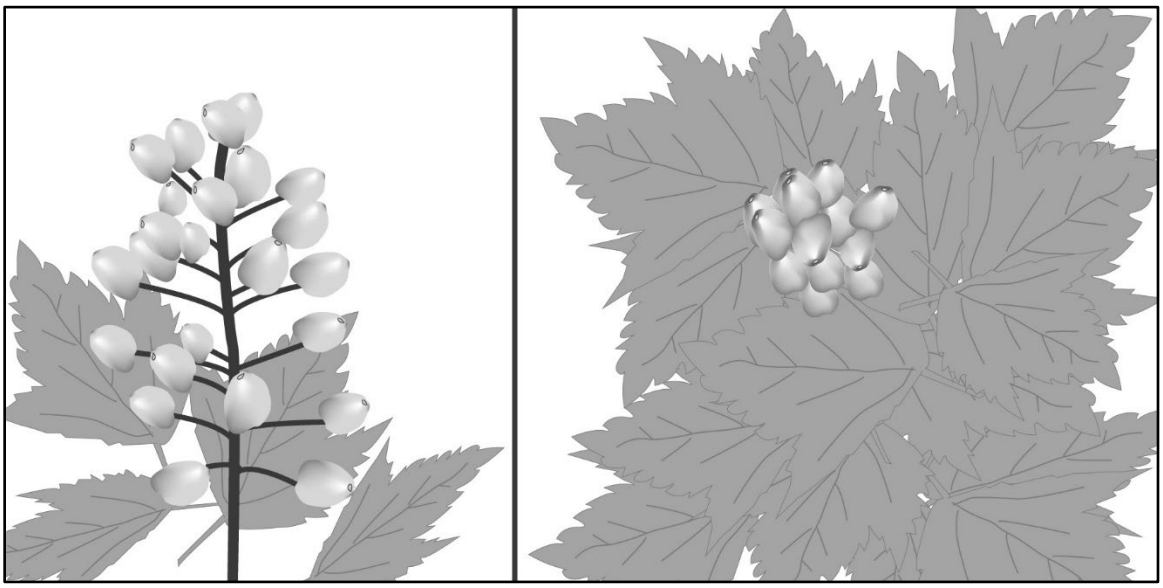


Figure 7-12. White and red baneberry

7-42. Some mushrooms are poisonous and should not be eaten. Cold-region areas have many kinds of berries that are edible and can linger under snow for most of the winter. Rosehips and high bush cranberries can remain above the snow for most of the winter.

KNOTS

7-43. Knot is a generic term that also includes bends and hitches. A rope is only a limp coil of hemp or nylon. It is useful only when the Soldier can attach it to itself (knot), another rope (bend), or a rope or other object (hitch). (See TC 3-97.61 for more information.) There are six basic knots that are most useful for tying rope together, onto equipment, or personnel:

- Half hitch.
- Overhand knot.
- Square knot.
- Clove hitch.
- Double sheet bend.
- Bowline.

7-44. The half hitch is used to secure the end of a rope to some other object or to secure other knots. (See figure 7-13.)

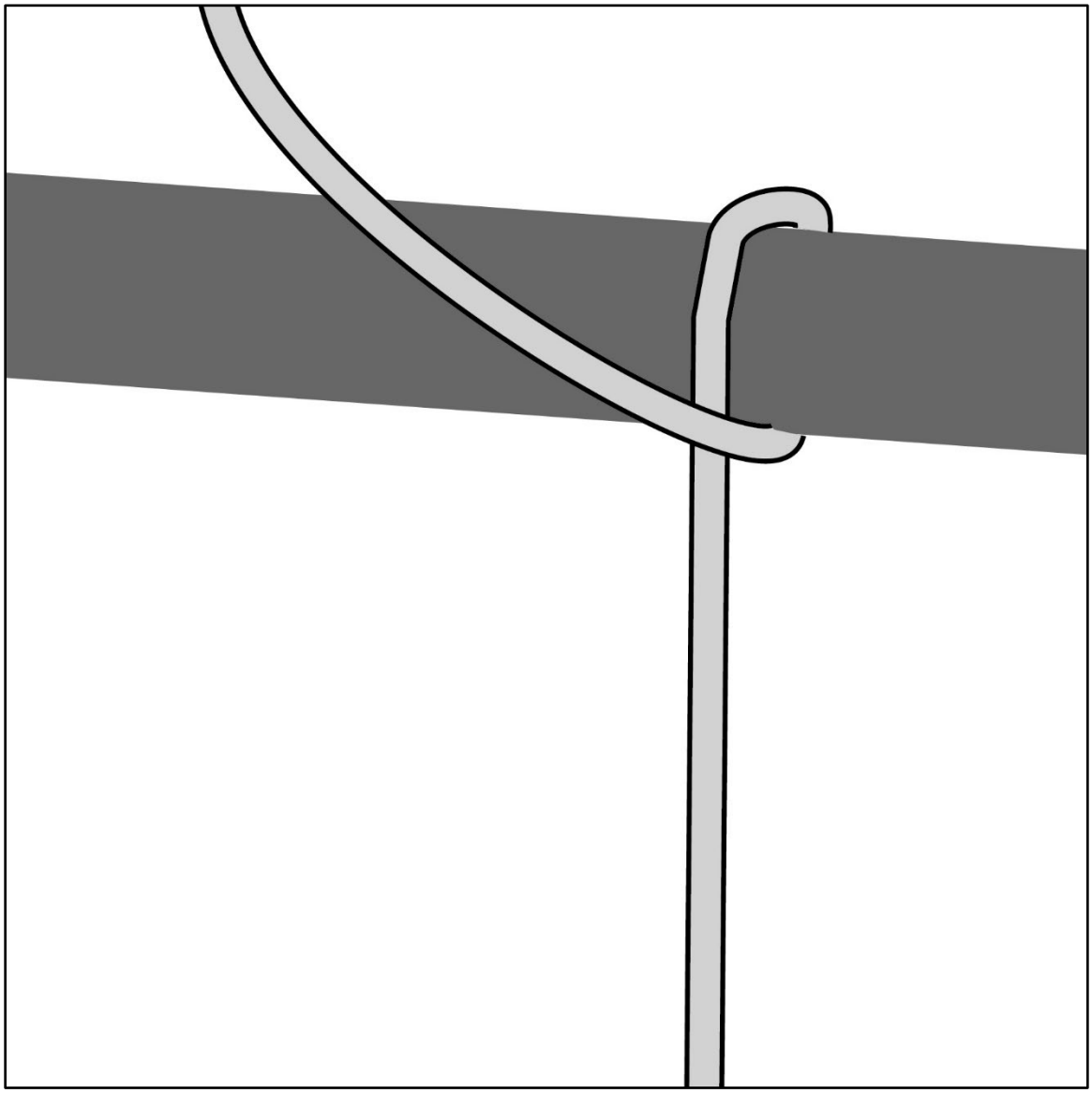


Figure 7-13. Half hitch

7-45. The overhand knot is used to make a knotted rope for a hand line, or to temporarily whip the end of a rope to keep it from unraveling. (See figure 7-14.)

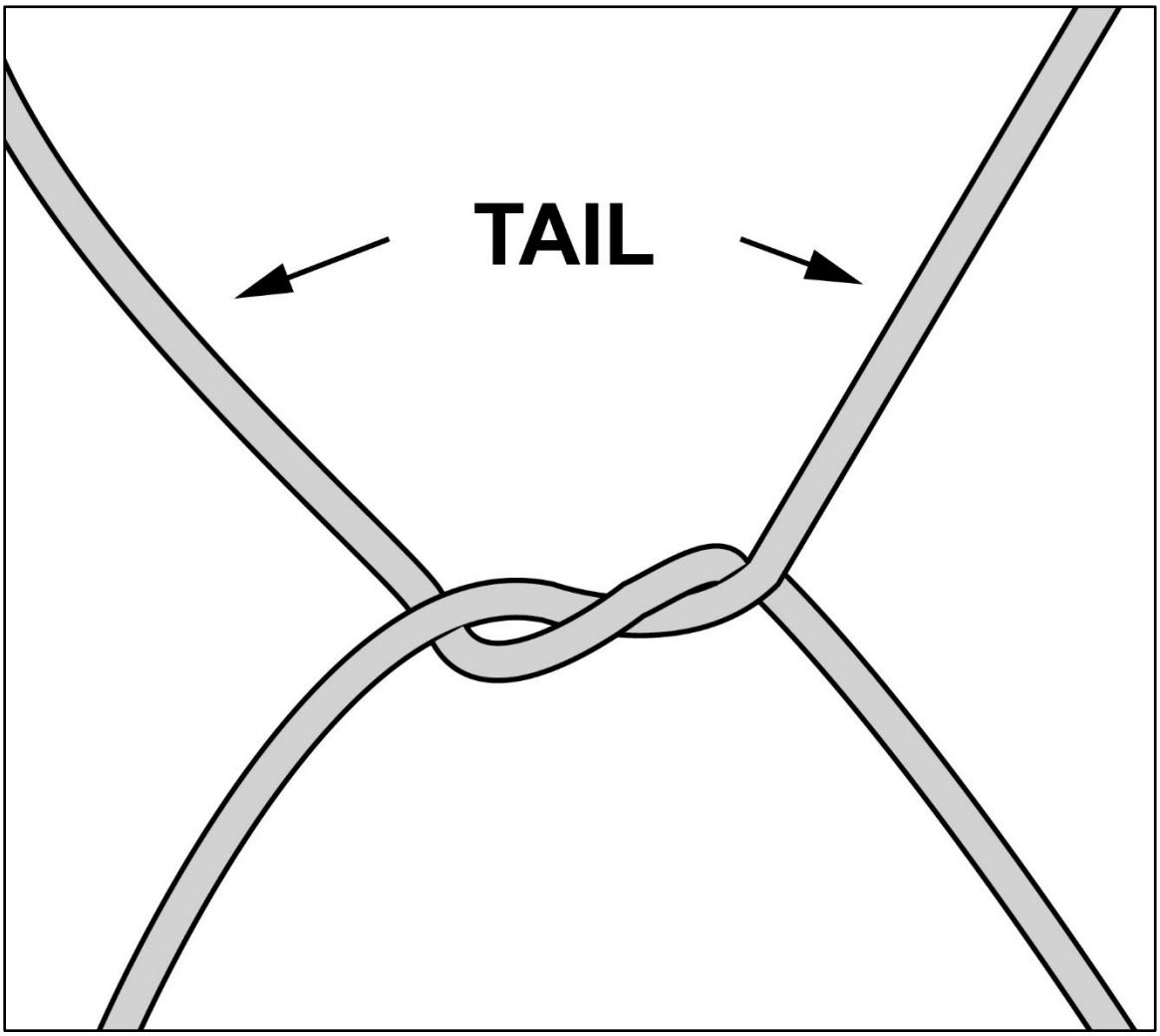


Figure 7-14. Overhand knot

7-46. The square knot is used to tie the ends of two ropes of equal width together. The knot is secured by tying a half hitch on each side of the knot. If properly tied, the square knot does not slip or jam. Soldiers should be careful to follow figure 7-15 or they may end up with a *granny knot*, which can slip and jam.

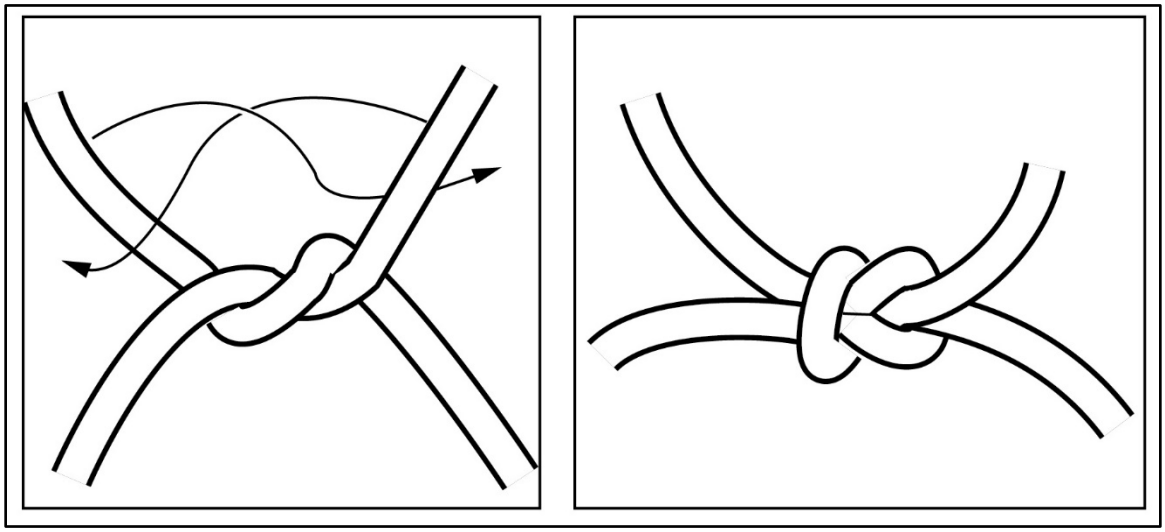


Figure 7-15. Square knot

7-47. The clove hitch is the most useful of the hitches. It can be used to tie the end of a rope to a post or eye, or it can be used to secure the middle of a rope without using the ends. (See figure 7-16.)

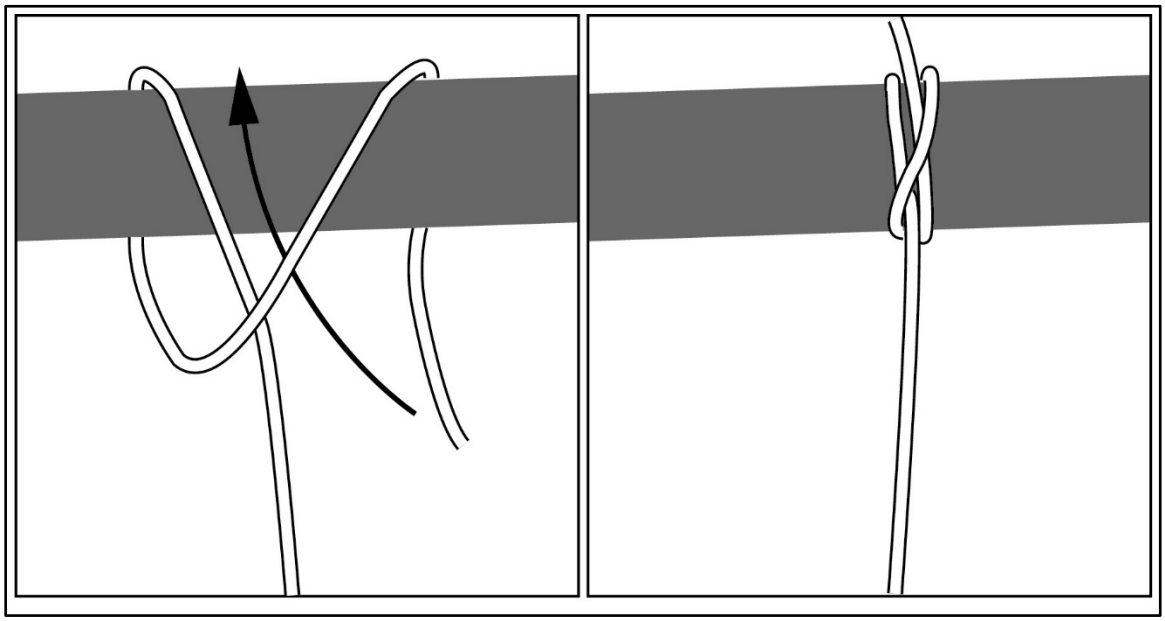


Figure 7-16. Clove hitch

7-48. The double sheet bend is used for tying two different width ropes together. (See figure 7-17.)

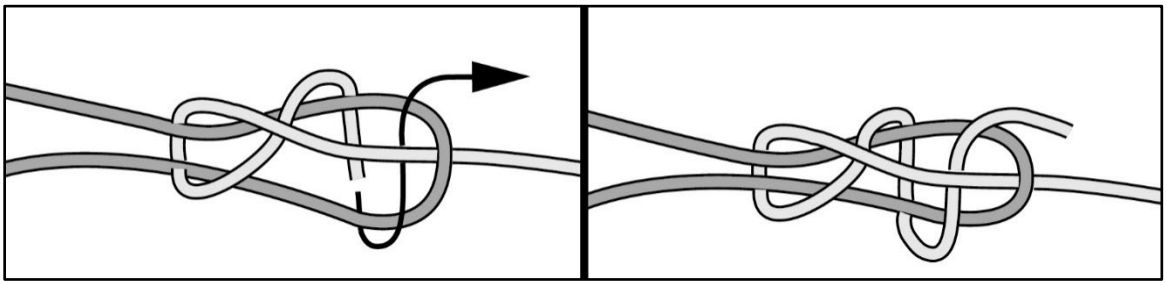


Figure 7-17. Double sheet bend

7-49. The bowline is used to form a loop that does not slip on the end of the rope. (See figure 7-18.)

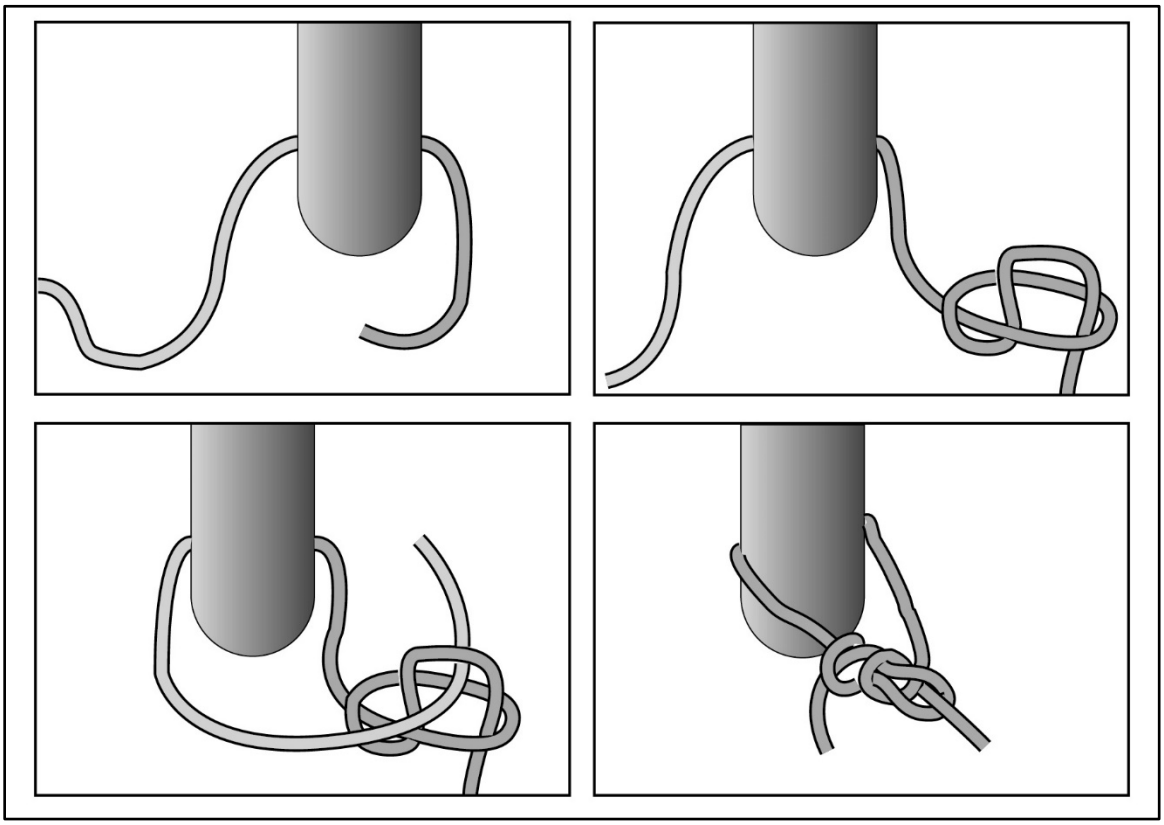


Figure 7-18. Bowline

7-50. Remember the qualities that make a good knot; they are easy to tie and do not jam or become hard to untie. Also, a good knot will not slip when weight is put on it.

Appendix A

U.S. Customary to Metric Measurement Conversions

A-1. The standard modern form of the metric system is officially called the International System of Units. In 1988, Congress designated this system (commonly known as the metric system) as the preferred classification of weights and measurements for trade and commerce. Most of the world operates on the meter for length and the kilogram for weight.

A-2. There are two options for converting U.S. customary system measurements to the metric system: apply mathematics to calculate the answer or consult an online conversion calculator. The math requires only a simple multiplication problem to turn a customary size to a metric size. Table A-1 lists approximate common equivalents between the two systems of measurement. These numbers have been rounded to the second decimal place.

A-3. Table A-1 on page 108 is presented as a handy field reference. There are far more measurement conversion units used in the world today. A comprehensive list of these equivalents can be found at the National Institute of Standards and Technology website. (The website address can be found in the reference section of this publication.)

Table A-1. Basic U.S. customary and metric conversion chart

TEMPERATURE	
Fahrenheit to Celsius	**Celsius to Fahrenheit**
Deduct 32 from degree Fahrenheit and multiply by 5, then divide by 9	Multiply degree Celsius by 9 and divide by 5, then add 32
LENGTH and SPEED	
U.S. Customary Unit to Metric Unit	**Metric Unit to U.S. Customary Unit**
1 in = 2.54 cm	1 cm = 0.39 in
1 ft = 0.30 m	1 m = 3.28 ft
1 yd = 0.91 m	1 m = 1.09 yd
1 mile = 1.61 km	1 km = 0.62 miles
10 mph = 16.09 kph	10 kph = 6.21 mph
10 knots per hour = 11.51 mph	10 kph = 5.40 knots per hour
****AREA***	
U.S. Customary Unit to Metric Unit	**Metric Unit to U.S. Customary Unit**
1 in^2 = 6.45 cm^2	1 cm^2 = 0.16 in^2
1 ft^2 = 0.09 m^2	1 m^2 = 10.76 ft^2
1 yd^2 = 0.84 m^2	1 m^2 = 1.20 yd^2
1 $mile^2$ = 2.59 km^2	1 km^2 = 0.39 $miles^2$
1 $mile^2$ = 640 acres	1 km^2 = 247.11 acres
* To calculate square footage, multiply length by width to find area (length number X width number = area). The small number (^{2}) is a mathematical shortcut symbol for squared, meaning that the larger number needs to be multiplied by the smaller number. In this case, the number to multiply is two.	
VOLUME	
U.S. Customary Unit to Metric Unit	**Metric Unit to U.S. Customary Unit**
1 fluid oz = 29.57 ml	1 ml = 0.03 oz
1 cup = 0.24 liters	1 liter = 4.23 cups
1 pint = 0.47 liters	1 liter = 2.11 pints
1 quart = 0.95 liters	1 liter = 1.06 quarts
1 gallon = 3.79 liters	1 liter = 0.26 gallons
MASS	
U.S. Customary Unit to Metric Unit	**Metric Unit to U.S. Customary Unit**
1 oz = 28.3 grams	1 gram = 0.0035 oz
1 lb = 0.454 kg	1 kg = 2.20 lbs
Legend: = (mathematical symbol)—equal; ^{2} (mathematical symbol)—squared; cm—centimeter; ft—foot; in—inch; kg—kilogram; kph—kilometers per hour; km—kilometer; lb (or lbs)—pound(s); m—meter; mph—miles per hour; oz—ounce; U.S.—United States; X (mathematical symbol)—multiply; yd—yard	

Appendix B

Battle Drill 1: React to Direct Fire Contact While Dismounted—Platoon (07-PLT-D9501)

Conditions: The platoon is conducting operations in a live training environment independently or as part of a company or larger force. The platoon is dismounted. While stationary or moving, the enemy engages the platoon with direct fire. Some iterations of this task should be performed in mission oriented protective posture 4 and at night.

Standards: The platoon reacts to direct fire contact while dismounted according to ATP 3-21.8. The squad in contact returns fire immediately and seeks cover. The squad in contact locates the enemy and places well-aimed fire on known enemy positions. Leaders point out enemy positions and identify the types of weapons, such as small arms and light machine guns. The squads that are not in contact assume the nearest covered and concealed position. The platoon leader reports the contact.

(Asterisks indicate a leader performance step.)

Performance Steps

1. The squad in contact immediately returns well-aimed suppressive fire on known or suspected enemy positions while taking up a covered position.

2. The squad not in contact assumes the nearest covered and concealed position. (See figure B-1.)

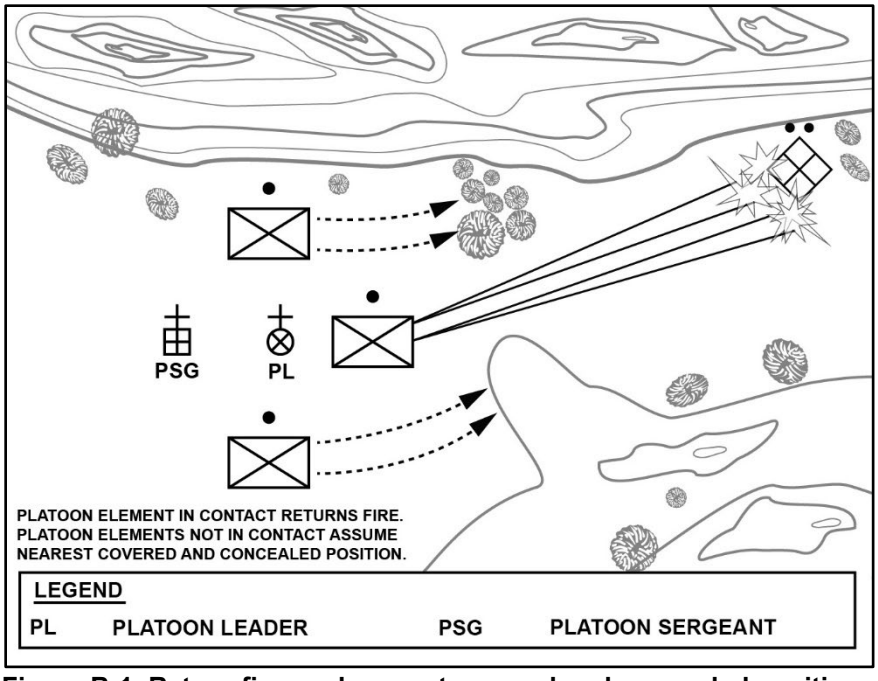


Figure B-1. Return fire, and nearest covered and concealed positions

* 3. The squad leaders engage known or suspected enemy positions with well-aimed suppressive fire and report information to the platoon leader and platoon sergeant.
* 4. The squad leaders control the fire of their Soldiers by using standard fire commands (initial and supplemental) containing the following information:

a. Alert.

b. Weapons or ammunition (optional).

c. Target description.

d. Direction.
e. Range.
f. Method.
g. Control (optional).
h. Execution.
i. Termination.

5. Soldiers maintain visual or vocal contact with their leaders and the other Soldiers on their left or right (if applicable).

6. Soldiers maintain contact with the team leader and indicate the location of enemy positions.

* 7. Leaders visually or vocally check the status of their personnel.

* 8. The squad leaders maintain visual contact with the platoon leader.

*9. The platoon leader moves up to a covered and concealed position where it is best to observe, communicate, and control the engagement. (See figure B-2.)

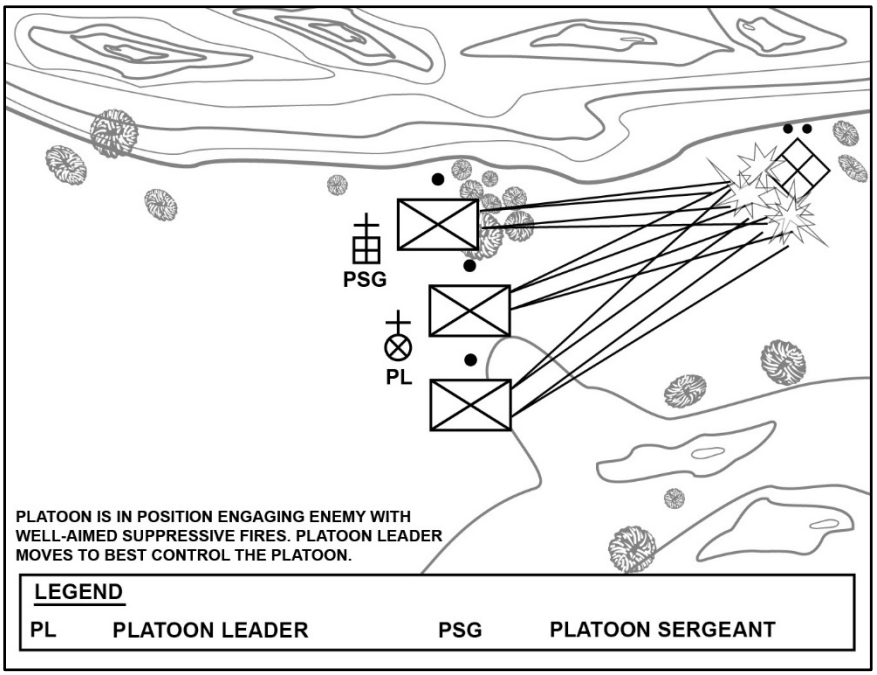


Figure B-2. Well-aimed fires and platoon leader control

a. The platoon leader brings the radio-telephone operator, forward observer, squad leader of the nearest squad, one crew-served weapon team (machine gun team if available).
b. The squad leaders of the squads who are not in contact move to the front of their squad.
c. The platoon sergeant moves forward with the remaining crew-served weapons and links up with the platoon leader, assuming control of the support element.

* 10. The platoon leader determines whether the platoon can gain and maintain suppressive fires with the squad already in contact (based on the volume and accuracy of enemy fires against the squad in contact).

* 11. The platoon leader confirms the commanders' criteria to disengage and determines whether or not the platoon moves out of the engagement area.

* 12. The platoon leader assesses the situation and identifies the—
a. Location of the enemy position and obstacles.

b. Size of the enemy force engaging the squad in contact. The number of enemy automatic weapons, the presence of any vehicles, and the employment of indirect fires are indicators of enemy strength.

c. Vulnerable flanks.

d. Covered and concealed flanking routes to the enemy positions.

* 13. The platoon leader decides whether to conduct an assault, bypass (if authorized by the company commander), or break contact.

* 14. The platoon leader reports the situation and begins to maneuver the platoon.

Evaluation Preparation

SET UP: Provide the Soldier with the equipment and/or materials described in the conditions statement.

BRIEF THE SOLDIER: Tell the Soldier what is expected by reviewing the task standards. Stress the importance of observing all cautions, warnings, and dangers to avoid injury to personnel and if applicable, damage to the equipment.

Performance Measures	**GO**	**NO GO**
1. The squad in contact immediately returned well-aimed suppressive fire on known or suspected enemy positions while taking up a covered position.	_____	_____
2. The squads not in contact assumed the nearest covered and concealed position.	_____	_____
3. Squad leaders engaged known or suspected enemy positions with well-aimed suppressive fire and reported information to the platoon leader and platoon sergeant.	_____	_____
4. Squad leaders controlled the fire of their Soldiers by using standard fire commands (initial and supplemental).	_____	_____
5. Soldiers maintained visual or vocal contact with their leaders and the other Soldiers on their left or right (if applicable.)	_____	_____
6. Soldiers maintained contact with the team leader and indicated the location of enemy positions.	_____	_____
7. Leaders visually or vocally checked the status of their personnel.	_____	_____
8. Squad leaders maintained visual contact with the platoon leader.	_____	_____
9. Platoon leader moved up to a covered and concealed position where best to observe, communicate, and control the engagement.	_____	_____
10. Platoon leader determined whether or not the platoon could gain and maintain suppressive fires with the squad already in contact (based on the volume and accuracy of enemy fires against the squad in contact).	_____	_____
11. Platoon leader confirmed the commanders' criteria to disengage and determined whether or not the platoon must move out of the engagement area.	_____	_____
12. Platoon leader assessed the situation.	_____	_____
13. Platoon leader decided to conduct an assault, bypass (if authorized by the company commander), or break contact.	_____	_____
14. Platoon leader reported the situation and began to maneuver the platoon.	_____	_____

References

ATP 3-21.8, Infantry Platoon and Squad

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Appendix C

Emergency Visual Signals

C-1. Efficient Army field operations depend on clear, concise, and accurate communication. There are many ways that Soldiers can signal with each other using gestures, sounds, and symbols.

C-2. Ground-to-air visual markings that relay specific concepts or requirements can be made with VS-17 panel markers, dragging brush into the desired shape(s), or stomping the symbol into the snow. (See figure C-1.)

REQUIRE DOCTOR- SERIOUS INJURIES		WILL ATTEMPT TAKE-OFF	
REQUIRE MEDICAL SUPPLIES		AIRCRAFT SERIOUSLY DAMAGED	
UNABLE TO PROCEED		SAFE TO LAND HERE	
REQUIRE FOOD AND WATER		REQUIRE FUEL AND OIL	
REQUIRE FIREARMS AND AMMO		ALL WELL	
REQUIRE MAP AND COMPASS		NO	
REQUIRE SIGNAL LAMP WITH BATTERY AND RADIO		YES	
INDICATE DIRECTION TO PROCEED		NOT UNDERSTOOD	
PROCEEDING IN THIS DIRECTION		REQUIRE ENGINEER	

Figure C-1. Ground-to-air markings

C-3. Perhaps the most common forms of Army signaling are known as hand-and-arm and ground-to-air signals. These tend to be specialty-specific, but many are also used within several disciplines

C-4. Signals that Soldiers are most likely to use in cold-weather situations are depicted in the following figures. Figure C-2 portrays hand-and-arm signals. Figure C-3 and figure C-4 (on page 116) represent some of the most-often used ground-to-air signals. (More detailed information on these types of signals can be found in TC 3-21.60.)

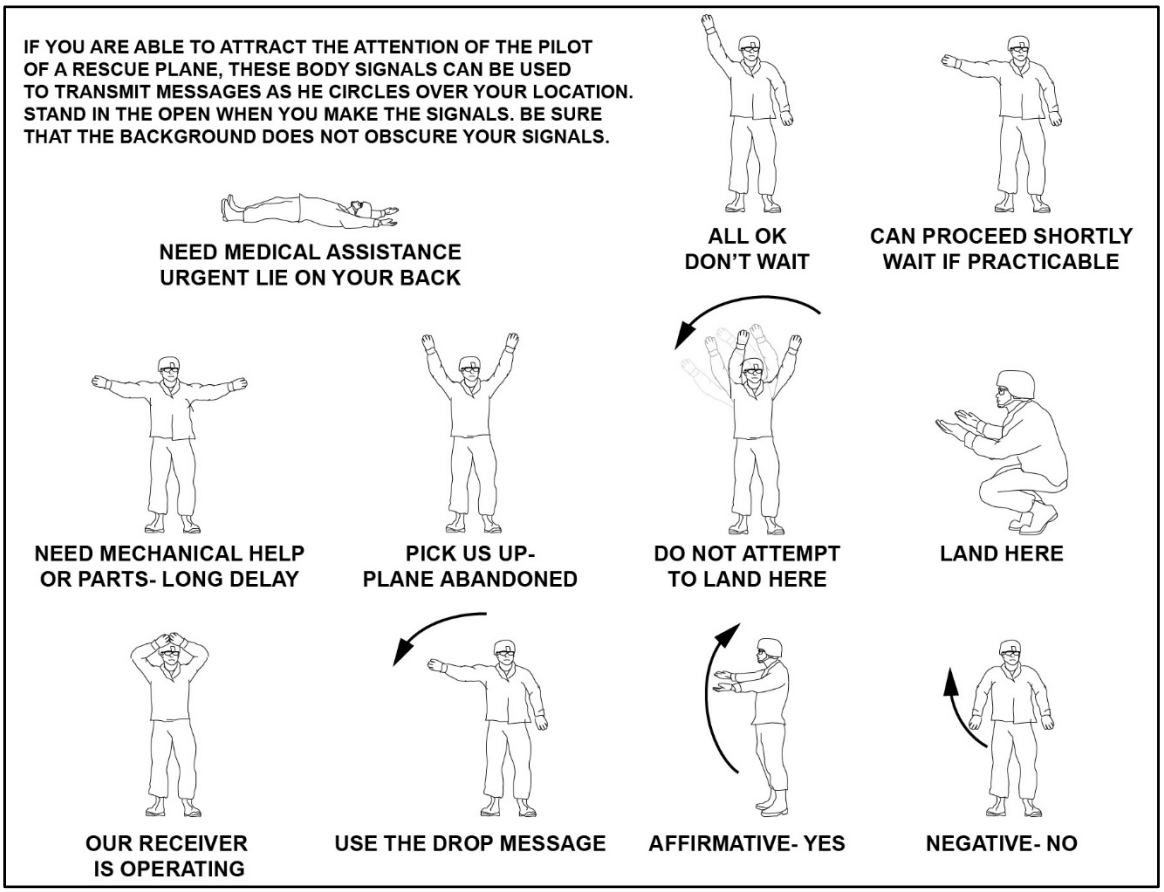


Figure C-2. Emergency hand signals

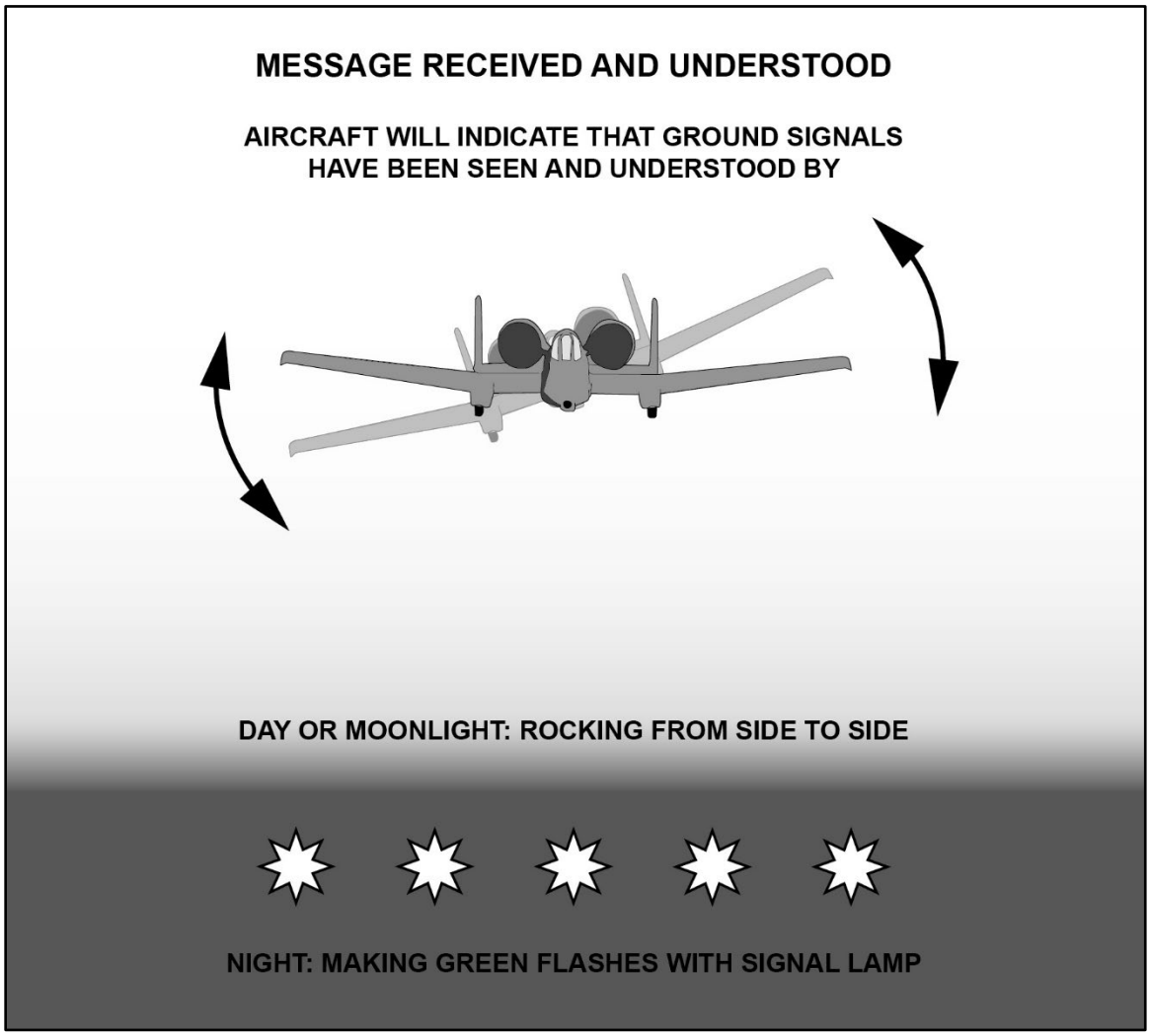


Figure C-3. Standard aircraft acknowledgements (understood)

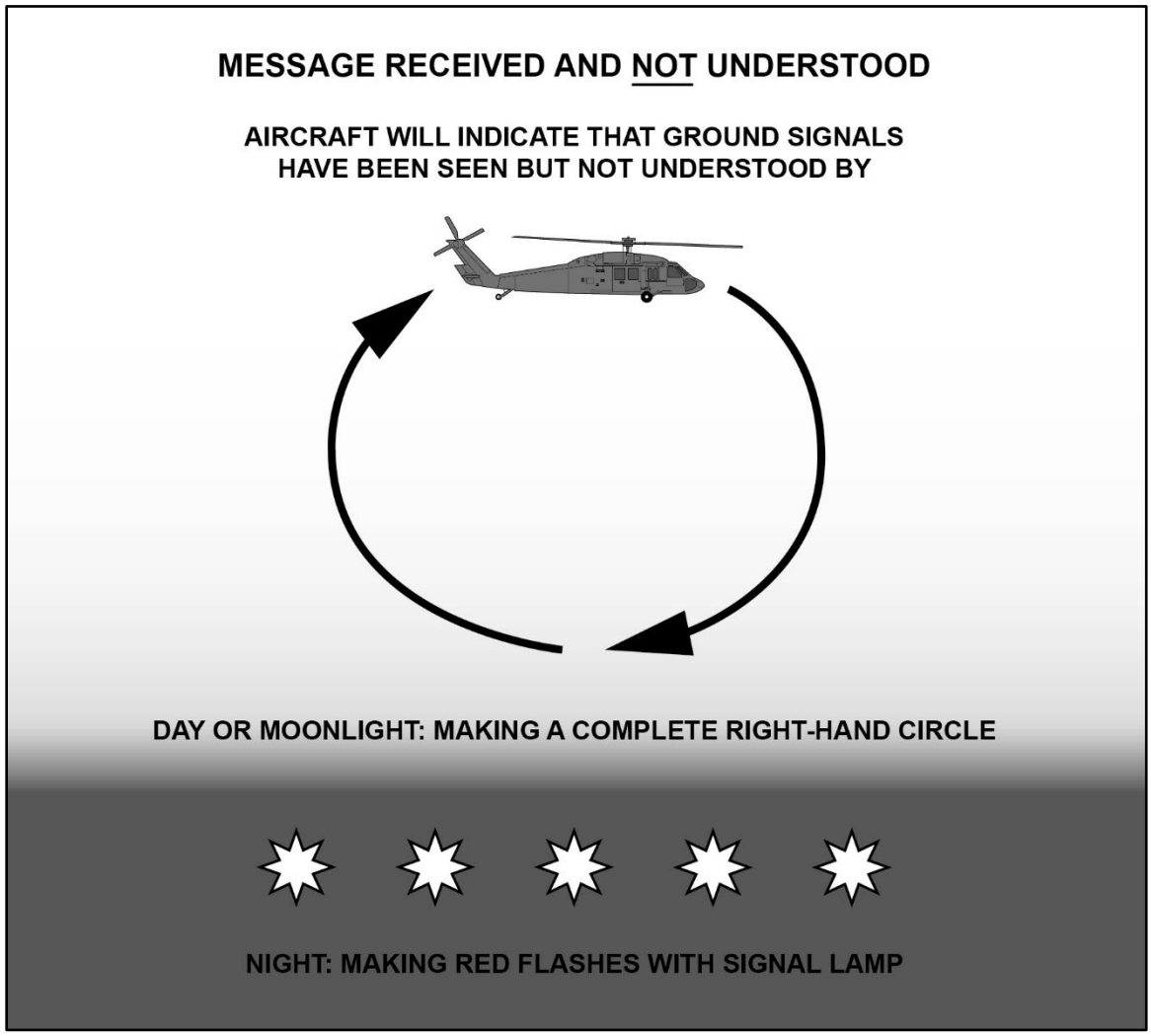


Figure C-4. Standard aircraft acknowledgements (not understood)

Glossary

The glossary lists acronyms.

ACRONYMS

°	degree (symbol)
–	negative (symbol)
+	positive (symbol)
AR	Army regulation
ATP	Army techniques publication
bivvy	bivouac
C	Celsius
CLP	cleaner lubricant preservative
cm	centimeter
DA	Department of the Army
F	Fahrenheit
FLC	fighting load carrier
FM	field manual
GPS	Global Positioning System
ICWB	intermediate cold wet boots
kg	kilogram
kph	kilometers per hour
LAW	lubricating oil, weapons
MANPADS	man-portable air defense system
MBC	mortar ballistic computer
MCW	meal, cold weather
MOLLE	modular lightweight load-carrying equipment
mph	miles per hour
MRE	meal, ready to eat
NSN	national stock number
NVG	night-vision goggle or goggles
OP	observation post
qR&S	reconnaissance and surveillance
SHA	Space Heater Arctic
SI	International System of Units
SOP	standard operating procedure
TC	training circular
TM	technical manual
TTP	tactics, techniques, and procedures

UCP/OCP	Universal Camouflage Pattern/Operational Camouflage Pattern
U.S.	United States
VB	vapor barrier
WAGBAG	waste alleviation and gelling bag

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