

## MILITARY SKIING

### PREFACE

Combat operations in cold regions characteristically produce vulnerable flanks, rear areas, and lines of communication. Attacks against these kinds of objectives require fast, silent, oversnow mobility. Units on skis are best suited for deep penetrations followed by surprise attacks against these targets.

Military skiing is a means of oversnow mobility which allows the soldier to traverse most types of terrain using standard equipment while carrying or hauling his basic fighting and subsistence load. In

this manner, he can arrive at his destination prepared to accomplish any assigned mission.

Most military skiing is done on flat or rolling terrain requiring the use of cross-country (Nordic) skills. Tactical considerations sometimes dictate skiing down steep slopes requiring skill at downhill (Alpine) skiing techniques. Gaining and maintaining a downhill skiing capability within military units present a major training challenge.

Skills associated with downhill skiing are much more difficult to attain than those for cross-country movement. Alpine training time can be reduced drastically, however, by using the most modern equipment and training techniques.

As soon as troops have attained satisfactory skill levels at both Alpine and Nordic skiing, exercises are conducted as often as possible. These exercises test newly acquired military skiing skills under combat training conditions.

This circular outlines a ski training program of 26 hours divided into three (3) phases. Lesson content makes use of the most up-to-date instructional techniques available.

Phase II develops balance, confidence and motivation within the student soldier and promotes early mastering of Phase III skills.

Attempting to place Phase III ahead of Phase II for a more traditional military approach to training will lengthen the required training time and may actually inhibit learning Phase II skills.

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# PHASE ONE – Basic Movement

## TRAINING OBJECTIVE

**Task:** To teach the soldier to walk on skis and to perform proper sidestep, controlled fall and recovery, herringbone, and kickturn.

**Conditions:** Given flat, snow-covered terrain and proper equipment, the soldier is taught basic movement techniques and practices movement during supervised exercise.

**Training Standard:** Each soldier demonstrates reasonable proficiency in all basic movement skills.

## ADMINISTRATIVE INSTRUCTIONS

This two hour class is the soldier's introduction to military skiing. It is a hands-on class. Each skill is described, demonstrated, and then practiced. No classroom work is required. A parade ground or other flat, open terrain is used for practical work. Classes and demonstrations can be conducted at platoon level, but all practical work is done at squad level with one instructor or assistant per squad. Instructors and assistants are qualified skiers. Troops are dressed appropriately for weather. Either standard military mountain/ski

boots or vapor barrier boots are worn. Ski bindings are fitted prior to the class, and poles are checked for proper length. When troops show proficiency in all skills, a short test course may be set up to conduct a practical examination.

## **LESSON CONTENT**

### **Walking**

This is the simplest movement in skiing and is the basic step in forward motion. On level ground, sliding actions of variable degrees can be experienced.

Learning to feel the dimensions of the ski is most easily accomplished while standing in place on the flat. After only a few exercises, such as lifting one ski then the other, or pivoting one ski around its middle, the student gains a general feel for the skis. The first steps on skis can then be tried. Walking first in a straight line and then in circles will induce some gliding. Double pole pushes transmit the feeling of tensing up the stomach muscles while crouching to maintain balance. Walking both with and without the use of poles establishes natural rhythm. Arm movement instruction should not be given during this class as it is likely to confuse the student.

## Technique

From a natural upright standing position, with the knees slightly bent, skis parallel and shoulder width apart, shift weight to one ski.

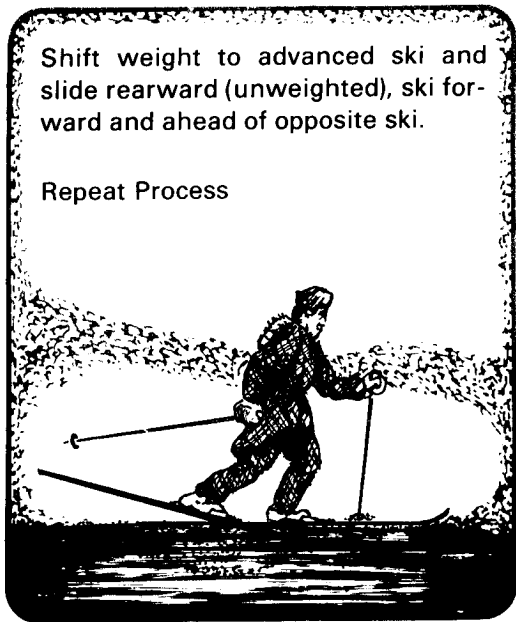


Step straight forward as in natural walking.



Shift weight to advanced ski and slide rearward (unweighted), ski forward and ahead of opposite ski.

Repeat Process



(NOTE: Initial exercises are used to familiarize the student with the feel of the skis, but can be used as warm-up exercises throughout ski training.)

- While standing still, lift first one foot and then the other, while stressing the feel of having all weight on one ski.
- Standing on one ski, lift the other and rotate it laterally about the vertical axis of the body (use poles for support).
- Rock back and forth, then zero in so weight is distributed over entire foot.
- Sidestep left and right in a straight line, then rotate first around toe of ski and then around heel.
- Walk straight and in circles, left and right.

- Push off with both poles, skis parallel and hip width apart, coasting to a full stop each time.

### **Common Errors**

- Looking down. (Instructor should correct on occurrence.) Looking down at skis is a major problem throughout ski training. It prevents the skier from seeing visual terrain cues that help him maintain balance and coordination.
- Lifting ski off snow. Maintain contact between ski and snow at all times. (Instructor should stress gliding.)
- Placing one ski on top of another. One of the consequences of the first two common errors. Experience corrects.
- Uncoordinated pole plant. (Instructor

should stress the use of natural arm swing as in normal walking.) Proper pole plant should begin to occur spontaneously with experience unless inhibited by overcoaching.

### **Falling and Recovery**

**Falling.** The instructor deals with the entire class at the first incident of a soldier falling. Whenever possible the skier “controls” his fall by relaxing into a sitting position whenever he feels that a fall is imminent. Recovery from such a fall is much easier and injury is less likely to occur.

**Recovery.** Whatever the student’s position after a fall, have him position his skis downhill from his body across the fall line.

(NOTE: During training on flat ground, verbally designate direction of fall line if no slope is present.)

Tuck the skis up close under the hips.

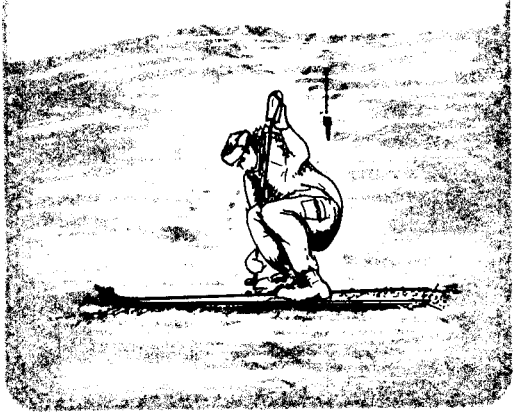


Remove ski poles from the wrists and place them together with points into the snow, close to the skier's hip.





With right (left) hand grasping the poles near the basket and left (right) hand clasping the top of the poles, push down and pull up respectively.



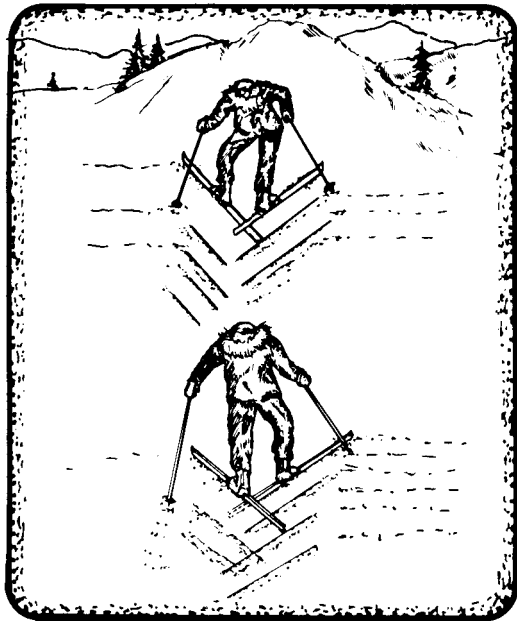
As the hips leave the snow, step uphill, ski under the body to help support the arms as they lift.



## Herringbone

This movement is used for rapid climbing of slopes for short distances. (*NOTE:* Initial instruction is given on flat terrain.) Some techniques follow:

- Face uphill with ski tips spread to form a “V.” Rotate knees inward to produce strong pressure on inside edges of skis.
- Placing all weight on one ski, lift the other ski and move it forward a comfortable distance.
- Transfer weight to the forward ski and edge it inward. The other ski is then brought forward as before. The body is kept well forward and down. Ski poles are used for balance as in walking.



## Kick Turn

Use the kick turn to reverse direction while standing still. This is a good way to conceal a change of direction in a ski track. Some techniques follow:



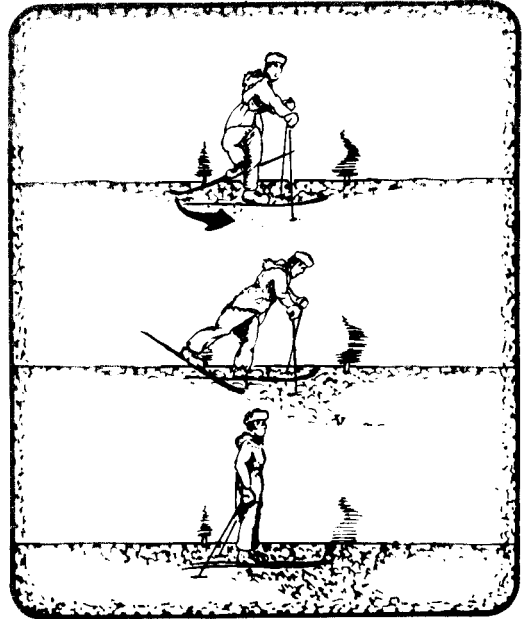
- Standing with skis level, place both ski poles on uphill side with downhill pole to rear of body and hands close to hips, so that poles and uphill leg form a stable tripod.



- Move downhill ski slightly to the rear to gain momentum and swing leg forward until ski is straight up and heel of ski is touching the snow.



- Rotate downhill leg outward so that tip of ski swings rearward and downward to rest parallel with uphill ski, but pointed opposite.
- Shift weight to downhill ski, rotate upper body to face downhill.
- Lift uphill ski and ski pole simultaneously and rotate through the fall line until both skis are again parallel and facing in the same direction.



## PHASE TWO—Downhill Movement

### TRAINING OBJECTIVE

**Task:** To teach the soldier reasonable skill in downhill movement of skis under varying snow conditions, with and without ski poles.

**Conditions:** Given a snow covered slope of varying degree and given proper equipment, each soldier is taught downhill movement on skis progressing in sequence from straight running through step turn, wedge, wedge turn, sideslip, basic christy, and stem turn to parallel turns.

**Training Standard:** Each soldier demonstrates reasonable proficiency in downhill

movement on skis over varying terrain and varying snow conditions.

### ADMINISTRATIVE INSTRUCTIONS

No classroom work is required. Classes consist of demonstrations and practical work. Classes and supervised practice are conducted at squad level with one qualified ski instructor per squad. A recreational Alpine ski area is used, if available. If a ski lift is used, additional instruction on how to use the lift is necessary. Some uphill movement without a lift is recommended. Course of instruction consists of a total of sixteen hours of classes and

supervised practice in two-hour increments. One hour minimum of supervised practice is required for every hour of classwork. Ideally, two hours of classwork, followed by two hours of supervised practice is conducted each day. Two two-hour classes, each immediately followed by two hours of supervised practice, is the maximum daily workload for troops in excellent physical condition.

Class content is divided as follows.

*First 4 hours:* Straight running, step turn, wedge.

*Second 4 hours:* Wedge turn, side slip, basic christy.

*Third 4 hours:* Stem turns.

*Fourth 4 hours:* Parallel turns.



# LESSON CONTENT

## **Straight Running**

In straight running, skis are held parallel and a comfortable (natural) distance apart. Ankle and knee joints are flexed with the upper body erect and slightly forward as in a boxer's alert position. Elbows are flexed at  $90^\circ$  and relaxed at the side. Hands are kept within the field of vision as the skier looks forward. Muscles are relaxed.

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## Exercises

- Straight run with natural runout.
- Lift alternate skis.
- Bounce.

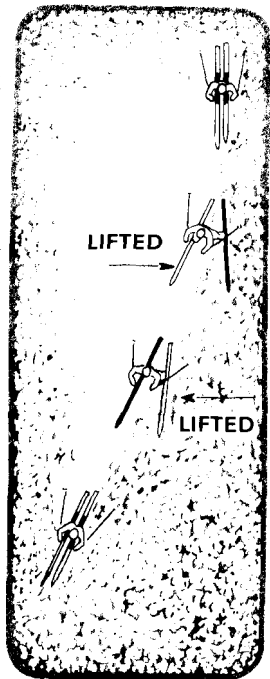
## Common Errors

- Looking down.
- Sitting back. Watch for stiffness. Fear may be caused by using terrain which is too steep or has no runout, allowing the skier to coast to a natural stop.
- Bending at waist. Reinforce boxer stance.
- Unequal weighting.
- Hips are not centered.

## Step Turn

Once the soldier has mastered the ability to shift his weight from one ski to another while moving, introducing the step turn allows him to change direction and control his rate and amount of descent.

The primary purpose of teaching the step turn at this time is to allow the skier to practice straight running at increasing speeds with confidence in his ability to terminate the descent when he desires.





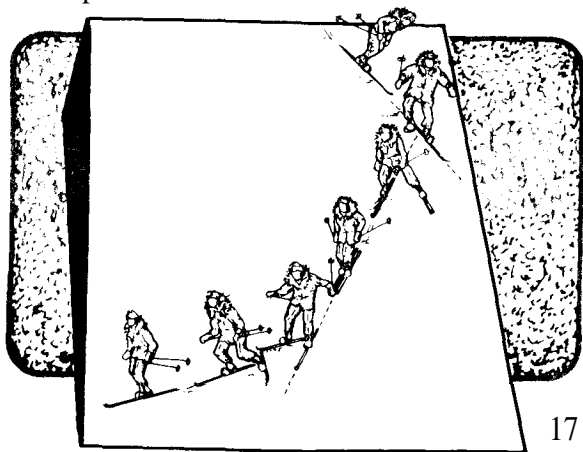
## Technique

- ❑ While straight running, place all weight on ski opposite desired direction of turn.
- ❑ Lift the other ski, opening tip slightly toward desired direction of turn.
- ❑ Step down onto lifted ski and lift other ski to parallel wide track position.
- ❑ Repeat process until moving in desired direction, or until skis have moved away from the fall line toward an uphill direction enough to stop forward movement.

## Common Errors

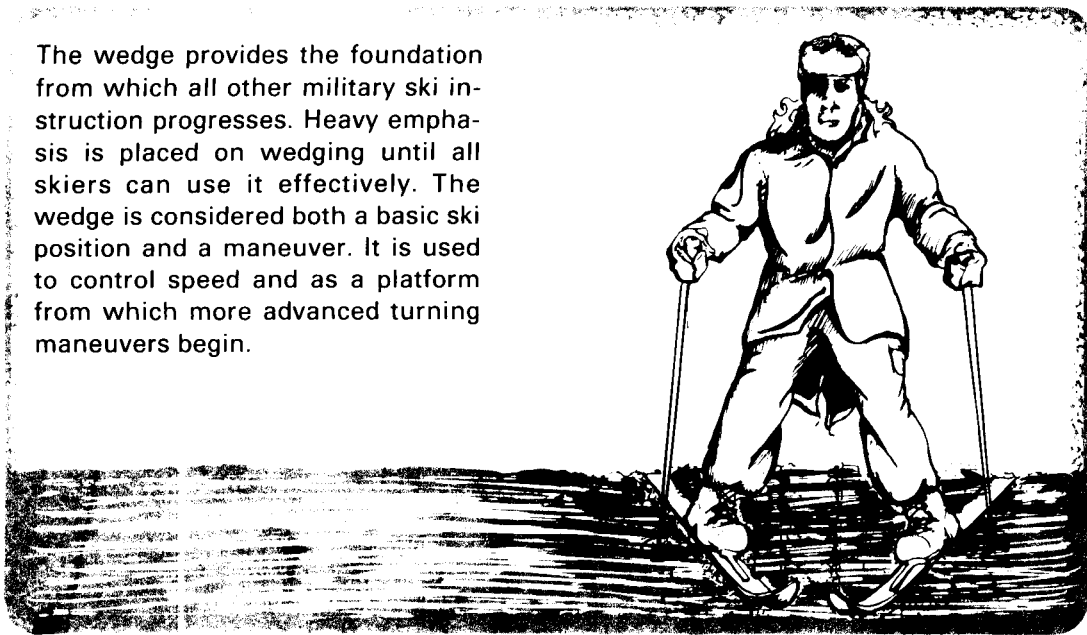
- Looking down.

n Incomplete weight shift from ski-to-ski. This is often an indicator of moving too fast *or* tensing up. This maneuver must be practiced starting at very slow speeds, increasing speed with skill.



# Wedge

The wedge provides the foundation from which all other military ski instruction progresses. Heavy emphasis is placed on wedging until all skiers can use it effectively. The wedge is considered both a basic ski position and a maneuver. It is used to control speed and as a platform from which more advanced turning maneuvers begin.



## Technique

- A gliding wedge position is formed with the upper body in a straight running position. The tails of the skis are pushed outward to form an inverted V. The knees are placed in a straight line between hip and boot to keep the ski flat on the snow. Weight is distributed evenly on both skis. Speed is regulated by increasing or decreasing the angle of the V.
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- ❑ From a gliding wedge, a braking wedge is formed by rolling (angulating) the knees inward to engage the inside edges of the skis.
  
  - ❑ Maximum braking occurs when V of skis is wide, knees are angulated inward, and the skier sits back slightly to increase pressure on ski edges.
- 



## Exercises (stationary)

- ❑ From wide track parallel, push tails apart into wedge.
- ❑ From a position of strong flexing at ankle and knee joints, straighten legs to produce a hopping (up-unweighting) effect. While unweighed, open tails to wedge. Return to flexed position and repeat up-unweighting, returning to wide track.

## Exercises (moving)

- ❑ Gliding wedge to coasting stop.
- ❑ Alternate straight running and wedging.
- ❑ Gliding to breaking wedge and stop.
- ❑ Alternate gliding and braking wedge.

*NOTE:* Encourage up-unweighting during

these exercises to develop rhythm.

## Common Errors

- Hips not centered. Causes unequal weighting and edging of skis.
- Sitting back.
- Knees together. Causes uncontrolled edge engagement and disengagement.
- Not in wedge. (Instructor should demonstrate proper technique.) Toes should be in, and heels should be out while standing. Try shallower terrain to correct this fault while moving.

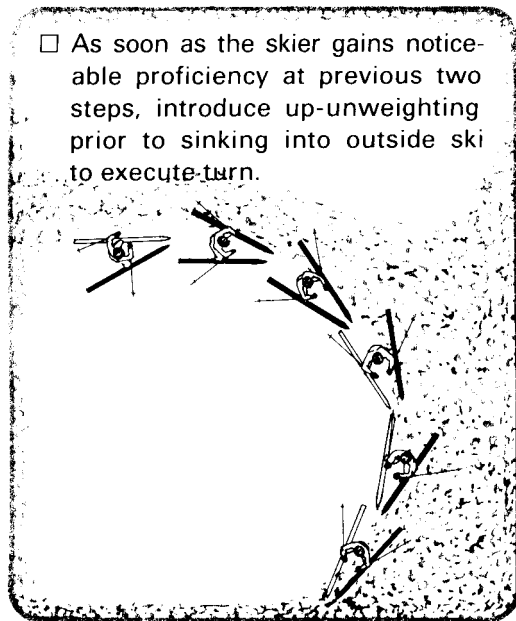
## Wedge Turn

This is an efficient turn for use at slow speeds. The wedge turn provides a stable platform when the skier is carrying pack and rifle and allows him to retain control

under most conditions. Fundamentals of this turn are an important part of all advanced skiing. Many military skiers will not achieve excellence at downhill skills beyond this point because of time constraints during initial training. Strong skill at wedge turning will allow efficient execution of most military missions.

## Technique

- ❑ While moving in a gliding wedge, steer in small deviations left and right by consciously turning the opposite foot toward the desired direction.
- ❑ While steering, place additional weight and pressure on the steered (outside) ski by bending the outside knee.



- ❑ Vary width of gliding wedge.
- ❑ Foot-steer alternate skis.
- ❑ Foot-steer with increased downward pressure. Increase steering to vary radii of turns.
- ❑ Ski linked turns.
- ❑ Slalom through ski poles.

*NOTE:* During these exercises, skiers should practice alternately with and without ski poles.

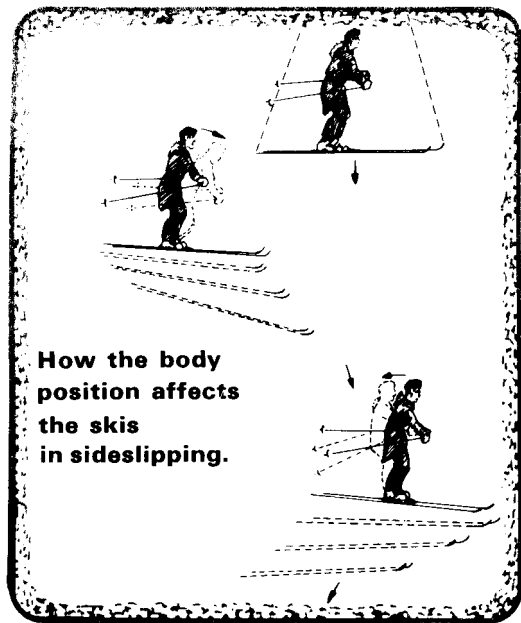
### Common Errors

- Transferring weight with hips. Watch for visible “hip swing” and correct by stressing feet and knees.
- Leaning to inside of turn. Inside ski should be unweighed.
- Bending at waist.
- Ankle and knee joints not flexed.



# Sideslip

Development of a christy from a wedge turn requires introduction of sideslip or skidding at this point. Some students will have inadvertently performed a basic christy during wedge-turning practice. When this happens, it should be encouraged and reinforced. It means the skier has spontaneously begun to feel the effects of skidding as a natural progression from wedge to christy. At this stage of learning, the skier will have difficulty coordinating separate and simultaneous leg movements normally associated with sideslip exercises; however, a brief lesson in traversing and sideslip is necessary to help the student get the feel of skidding needed to perform basic christies.







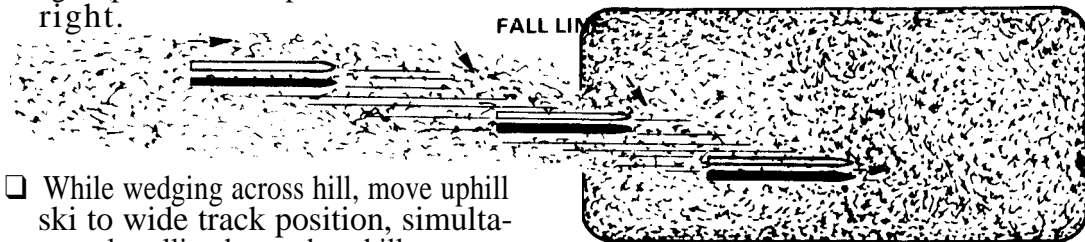
## Technique

From an edged position, i.e., traversing the side of a hill with knees angulated uphill to engage uphill ski edges so as to prevent slipping downhill, roll knees out and downhill until ski edges no longer prevent skis from sliding toward the fall line.

## Exercises

- Standing still on slope with skis perpendicular to fall line and poles spread wide, roll knees toward fall line until sideslip occurs. Practice left and right.

- ❑ While moving on a side hill traverse, roll knees outward until sideslip occurs. Roll knees uphill until edges again prevent sideslip. Practice left and right.



- ❑ While wedging across hill, move uphill ski to wide track position, simultaneously rolling knees downhill to create sideslip.

### Common Errors

- Leaning into the hill. Keep upper body over skis, controlling edging and sideslip with knees.

- Uncoordinated simultaneous edging with one ski while skidding with the other ski. Keep upright body position.

If the skier persists in having problems in foot coordination, try unweighting uphill ski with concentration on skidding with downhill ski only. When this occurs, the unweighed ski should follow the other naturally.

# Basic Christy

Progressing from wedge turns, the basic christy introduces the skidding used as a foundation from which more advanced turns are learned.

## Technique

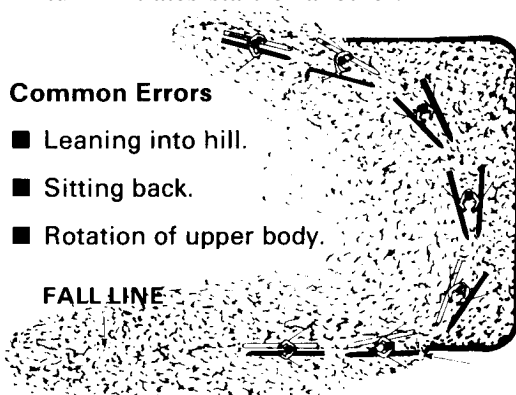
Start a wedge turn. As the turn crosses the fall line, steer the unweighed uphill (inside) ski into a wide track position.

## Exercises

- ❑ From a traversing wedge, steer uphill ski parallel and sideslip. Practice left and right.
- ❑ Practice basic christies starting closing of skis to parallel earlier and earlier

until skis can be closed before reaching fall line.

- ❑ Link turns closely so that finish of one turn initiates start of another.



**NOTE: BRING SKIS TOGETHER AS TURN IS INITIATED.**

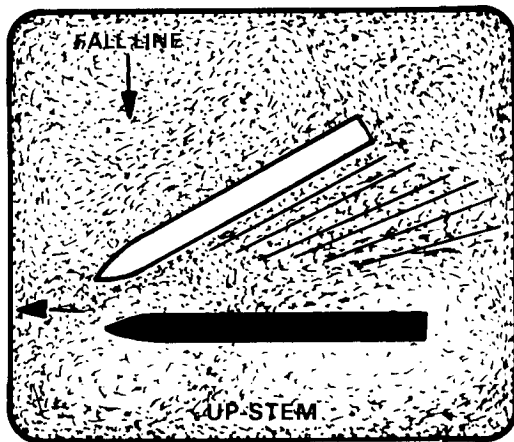
## Stem Christy

The act of “stemming” is nothing more than moving the skis into a wedge position. The purpose of the stem is to provide a platform or timing device from which to launch a parallel turn. As skill grows at making turns using the basic christy, the skis are brought parallel earlier and earlier. Less and less time is spent in the wedge. When the wedge becomes the turn-initiating movement, it is referred to as a stem. In military ski training, the stem turn provides a teaching link between the basic christy and the parallel christy.

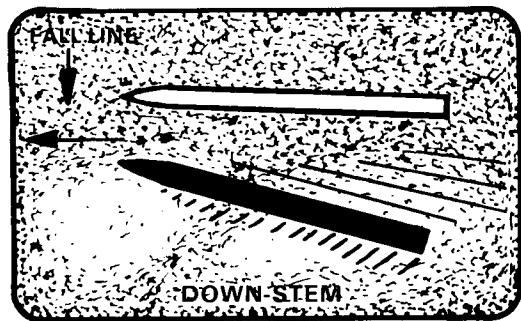
This publication describes two types of stem christy:

- *UP-STEM CHRISTY*
- *DOWN-STEM CHRISTY*

*Up-stem christy* uses a gliding uphill stem with a gradual shifting of weight and edge engagement to the outside (uphill) ski.



*Down-stem* christy uses a positive edge engagement or “checking” of the downhill ski with more dramatic shifting of weight to the outside ski. This turn is an excellent vehicle for introducing the pole plant. Down-stemming is effective on steep terrain since speed is checked at the start of each turn.



## Technique

### UP-STEM CHRISTY

- From a previous turn or a traverse, push uphill ski into a wedge position with weight on downhill ski.
- Shift weight to uphill (outside) ski while steering it into the turn.
- Steer inside ski to parallel position.
- Follow through to new direction of movement.

## Exercises

Practice up-stem christies, decreasing angle of traverse and increasing slope.

## Common Errors

- Pushing entire ski out rather than just tail, which usually results in a fall or aborted turn.
- Stepping ski out rather than pushing. To progress smoothly, the ski tail should be pushed uphill.
- Losing traverse with downhill ski. Roll downhill knee uphill more.
- Rotation of upper body.
- Stemming ski forward or backward. Instructor should demonstrate proper position while standing still.

## Technique

### *DOWN-STEM CHRISTY*

- From a previous turn or traverse, push tail of downhill ski outward.
- Flex downhill knee and ankle and roll downhill knee inward to engage inside edge of downhill ski.
- Anticipate turn by rotating upper body to face in direction of turn.
- Plant downhill (inside) ski pole and with a pronounced push off from downhill ski, transfer weight to uphill (outside) ski.

- Simultaneously push outside knee forward, down, and inward to change edge engagement and begin steering.
- Rotate inside ski parallel to outside ski.
- Follow through to new direction of movement.

### **Exercises**

- During traverse, down-stem to edge set and recover. Integrate pole plant.
- Down-stem turns with varying rigor during push off. Vary speed and radius of turns until a series of closely linked down-stem christies can be performed on steep terrain.

### **Common Errors**

- Leaning into hill. Keep an upright body position during weight transfer and a relatively quiet upper body during the turning sequence.
- Improper pole plant. Use natural rhythm of arms and leg movement.
- No edge set. Roll downhill knee more positively uphill during stemming.
- Hips over stemmed ski. (Instructor will demonstrate position showing centered hip position.)
- No anticipation. (Instructor will demonstrate and have student practice while standing still.)

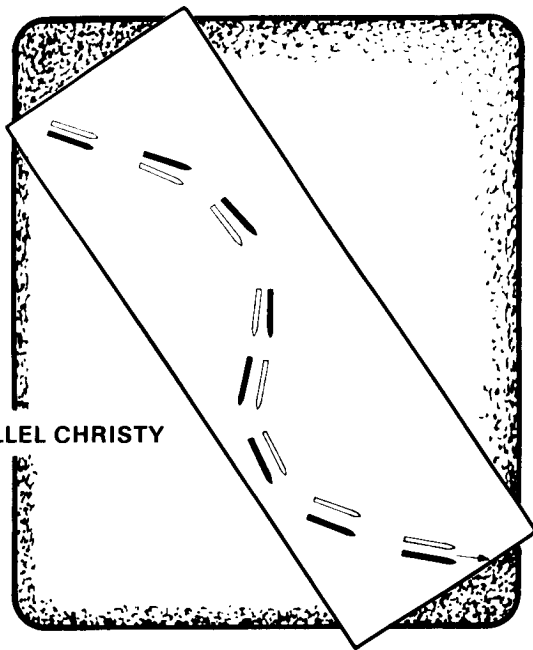
# Parallel Christy

Several variations of turns with skis kept parallel represent the most advanced form of skiing. In military skiing, the need for skill in parallel turns is limited to relatively long downhill traverses in unpacked powder where other turns may be difficult and very tiring. Units with limited available time for ski training may consider this instruction optional depending on student progress.

## Technique

- ❑ From a previous turn or traverse, anticipate the turn by facing the upper body toward the fall line.

PARALLEL CHRISTY





- ❑ Move both knees forward and down, placing most weight on downhill ski. Plant the downhill ski pole.
- ❑ Extend knees to produce up-weighting and roll knees toward the inside of the turn to change edge set from outside to inside (uphill to downhill) edges of skis.
- ❑ Flex both knees forward, shifting weight to outside ski and steer toward new direction of travel.

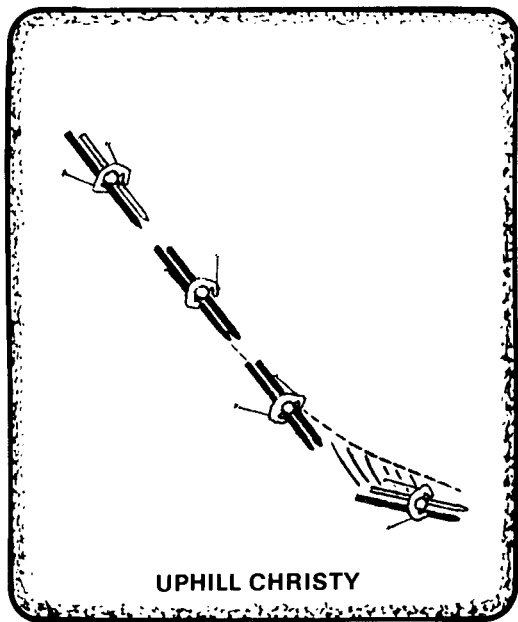
### **Tips for Deep Snow**

- ❑ Keep skis fairly close together.
- ❑ Maintain equal weight on both skis as much as possible.

- ❑ Maintain center of gravity close to center of ski by keeping body more erect than normal.
- ❑ Maintain speed to prevent sinking too deeply into the snow.
- ❑ Avoid sharp turns of more than 45°.

### **Exercises**

- ❑ Up-unweighting exercises, static and moving. Show pole plant on down motion, then up motion.
- ❑ Uphill christies both from traverse and from fall line to stop.
- ❑ Linked turns on varying speeds.
- ❑ Run slalom course.



## Common Errors

- **Rotation.** (Instructor will demonstrate and emphasize the importance of anticipating and maintaining a quiet upper body.) This is very important for military skiers who normally carry a heavy pack.
- **Sitting back.** Be especially watchful for this in powder skiing where the weight is more centered on the ski.

# PHASE THREE—Tactical Skiing

## TRAINING OBJECTIVE

**Task:** To teach the soldier tactical proficiency at moving and fighting on skis on all varieties of terrain and in varying snow conditions with combat loads.

**Conditions:** Given snow covered terrain of the varying conditions expected during the battle or during movement to contact, the soldier is taught to move and fight on skis while carrying combat loads.

**Training Standard:** Each soldier demonstrates the capability to move swiftly and silently across a snow-covered battlefield to gain and maintain enemy contact while carrying a combat load.

## ADMINISTRATIVE INSTRUCTIONS

No classroom work is required. Classes and demonstrations may be held at platoon level. There should be one instructor or assistant per squad. (*NOTE:* The ski instructor here is not necessarily qualified in the same sense as necessary for Phase II. Any capable military skier is qualified to teach Phase III.) Any normal training area with a variety of flat, rolling, wooded, and open terrain is suitable. Course of instruction is eight hours as follows.

*First 2 hours:* Waxing, diagonal step, two-step diagonal, movement on flat terrain.

# LESSON CONTENT

## Waxing

*Second 2 hours:* Supervised practice on broken, hilly terrain, ski-joring, use of climbers, ski pole riding.

*Third 2 hours:* Battle drill, firing positions, ahkio handling.

*Fourth 2 hours:* Practical examination to test the soldier in all acquired skills during all previous ski training. This practical exam may be administered as part of a field training exercise.

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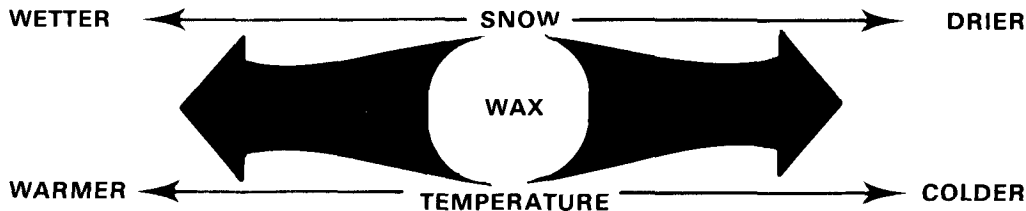
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Wax is used on the bottom of the skis to make them glide forward while preventing back slip. Variation in temperature and snow conditions requires waxes of varying properties. The US Army uses commercial ski wax. Temperature range and snow condition for each type wax are usually marked on the container. As the weather warms and the snow becomes wetter, apply softer wax. Conversely, the colder the weather becomes, the harder the wax should be.

Wax skis in a heated shelter, if possible, because wax sticks better to a warm surface. During movement, carry wax in an inside pocket to keep it warm. Make sure

the ski bottom is dry and free of old wax, particularly wax different from that to be applied. If necessary, wax can be applied directly over a different wax, if the new wax is softer than the one already on the ski. Wax can be removed using any hard-edged tool, such as a paint scraper or pocket knife. Be careful not to cut into the base of the ski.

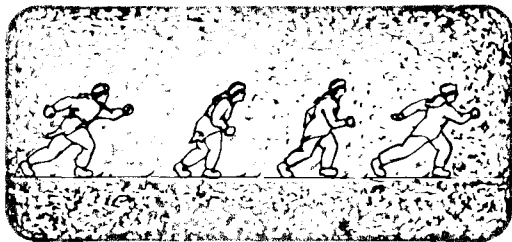
Apply wax over the entire bottom of the ski. Smooth the wax by rubbing it with the heel of the hand or a cork. If a fire or Yukon stove is available, heat the wax to make it easier to smooth out. Do not put the skis on the snow until the wax has cooled to air temperature. Test skis for proper waxing before starting on a long march.



## Diagonal Step

The basic movement of the diagonal is a walking step. Forward motion and glide are increased when the skier applies more effort to his step. This added effort is obtained by a lunge coordinated with an increased push from the poles.

The diagonal is the most widely used of all skiing steps. It is applied under all types of snow conditions on level ground.



### Technique

- Lean forward with well-bent knees and ankles. Keep feet flat and shift body weight to right ski.
- Slide left, pushing unweighed ski straight forward by a springing motion from ankle, knee, and hip, straightening the body and transferring the weight to the left sliding ski.
- Complete the springing motion (lunge) above by straightening the right knee and pushing off from the right foot, thus completing the weight transfer.
- Keep body weight on the sliding (left) ski and, as the glide nears completion, bend left knee and ankle in preparation for the next lunge. Meanwhile, the right leg is relaxed and moves the ski

forward in preparation for the next step. As this leg reaches a position approximately alongside the left leg, the next step is made with the right ski by lunging from the left leg.

- ❑ When using ski poles, execute the lunge as above, except that as the left foot is slid forward, swing the right ski pole straight to the front and place it towards the tip of the right ski; or, when the right ski is slid forward, bring the left ski pole forward.
- ❑ Glide is increased by a push with the ski pole. The ski pole is leaned slightly to the front while the arms are kept close to the body.
- ❑ The pushing action of the ski pole is

increased progressively by the muscles of the arms and shoulders. The push is finished off by a sharp straightening of the arm for added power. When the push has been completed, the arm is relaxed and brought forward close to the body in preparation for the next poling action.

- ❑ During the coordinated movement of pole and lunge, emphasize correct timing and a long glide. The main power glide is obtained from the lunge executed by each leg; the poling action provides only a secondary source of momentum. All motions are rhythmic and fluid. Use poles in a relaxed manner and allow the pressure of pushing to focus on the wrist strap.

## Two-Step Diagonal

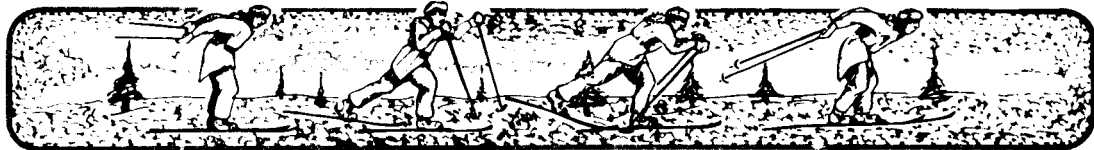
This step is used to attain a longer and faster glide on the level. It is also used as an aid through dips and over bumps.

### Technique

The two-step diagonal is a combination of a fast walking step and a diagonal. Push is obtained by double poling.

- ❑ From a standing position with the knees slightly bent, take a walking step with the left ski to start moving initially.

- ❑ Lunge from the left leg, in a continuous motion, to produce a long glide on the right ski.
- ❑ While gliding on the right ski, bring the left ski slowly forward and even with the other ski to complete the first two-step and prepare for the next two-step. This action should be started before the momentum of the glide has been lost.
- ❑ As the first step is made, bring both





ski poles forward a comfortable distance and set them into the snow alongside the skis in coordination with the lunge of the second step.

- Pushing action with the poles is applied the same way as described above for one pole. As the poles leave the snow, bring them straight forward in preparation for the next step. It is most important to time this motion properly to coordinate with the next lunge.

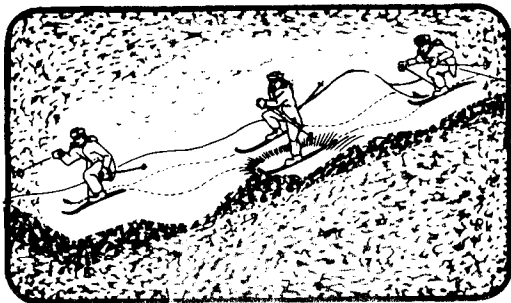
## **Variations and Applications of Ski Steps**

In long, cross-country movement, particu-

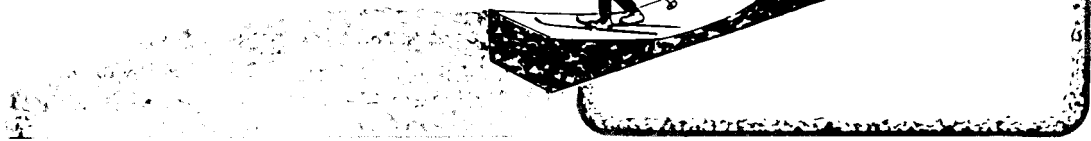
larly when skiing with pack and rifle, varying techniques are used according to the terrain to conserve energy. Soldiers attempt to obtain as much glide as possible from the skis during each step. During the glide, the skier's muscles rest momentarily. Constant use of the same step is monotonous and tiring. To avoid this, rhythm and steps are varied often. The same effect occurs in poling. To rest arm and shoulder muscles, several steps are often taken without poling. In the diagonal step for instance, the first two steps can be made without using poles. Additional combinations of steps and poling are made at the skier's discretion, placing more emphasis on leg rather than arm work, or vice versa.

In bumpy terrain, ski steps and poling are used individually or in various combinations to give a strong pushoff, which provides the skier sufficient glide for a continuous motion through a dip and over a bump. When a series of bumps and dips is encountered, the poling action is generally applied on the crest of the first

bump to obtain sufficient momentum to reach the top of the next bump in a continuous glide. A step supported by double poling may be applied when skiing through the dip. There are other situations where double poling is applied to gain or increase forward motion of the ski without taking a step.



Forward lean of the body is increased as slope steepens since skis will slide faster. The opposite is true as the slope lessens. Generally, the body is nearly perpendicular to the slope regardless of pitch to insure proper balance. Skiing over bumpy terrain threatens the stability of the skier. To minimize this, keep the knees supple to act as shock absorbers, allowing the upper body to remain as quiet as possible. To further increase stability on large bumps, the skier increases knee bend and extends the legs to normal position as soon as the top is passed; i. e., allow-



ing the skis to drop away. This action will lessen the chance of being thrown into the air. When moving through a hollow, normal ski and body position is maintained, with knees absorbing the sudden change of pressure. In deep snow, leading with one ski improves balance.

When skiing from soft snow onto hard snow, forward lean is increased because the skis will gain speed and have a tendency to run from under the skier. The opposite is true when running from hard snow onto soft snow. In this case, lean slightly to the rear and advance the leading ski farther ahead just before the soft snow is entered. On icy crust, stability is improved by keeping the skis farther

apart, or by running in a wedge. To control speed when the slope is rutted, side-slipping may be necessary. On icy snow, the skis may chatter in a turn. To correct this, keep body weight well forward and carefully control edging of the skis as the turn is made. Crusty snow, which will not support the skier's weight (breakable crust), is the most difficult to cope with. Speed is kept slower while making all turns. Sometimes it's necessary to use the step turn or a kick turn to change direction. Ski pole riding can be used to control speed over difficult, steep terrain; particularly when carrying or hauling heavy loads. The straps of both poles are removed. Grasping both handles in one hand, the tips pressed against the snow,

between the legs, by pushing downward at the center of the poles with the other hand. The skier must avoid catching the pole tips or baskets on brush which may be sticking up out of the snow. An alternate method used for traversing is to hold the poles on the uphill side of the body.

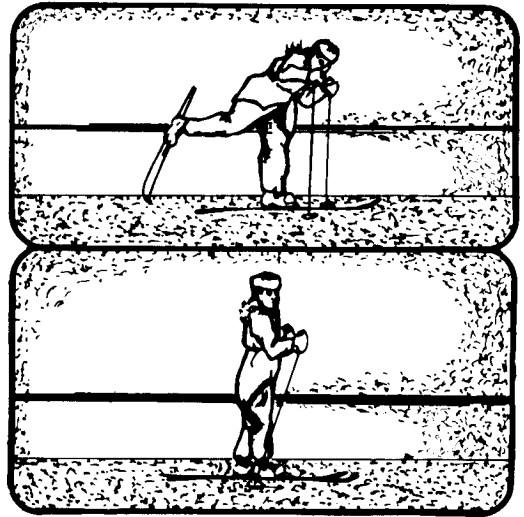
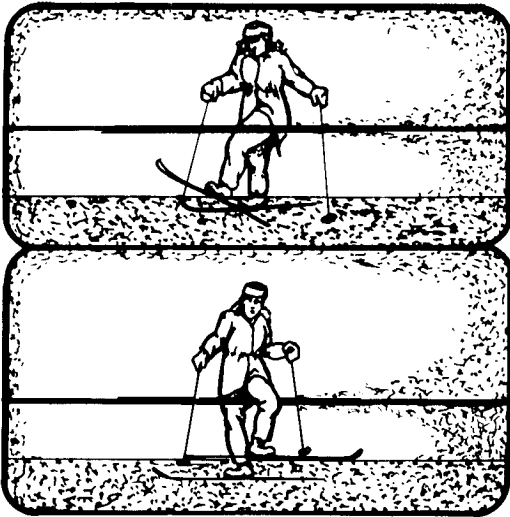
Moving downhill through the woods requires shorter radius turns and quick reaction. The skier must always be alert to sudden obstacles when skiing in the woods. This is the most challenging kind of skiing, requiring skill at all methods of controlling skis. During unit movement in wooded terrain, one man falling can block the progress of all personnel behind him. If an individual fails, he should move off

the track as quickly as possible, even if this results in losing his original position in the column.

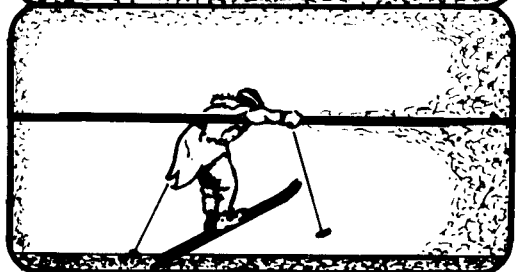
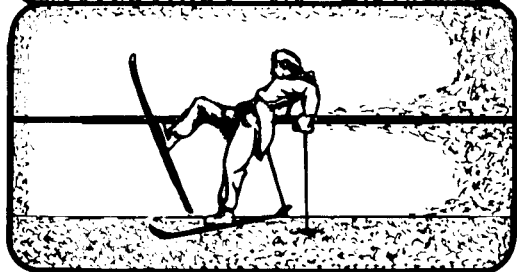
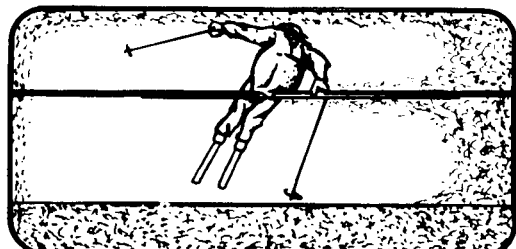
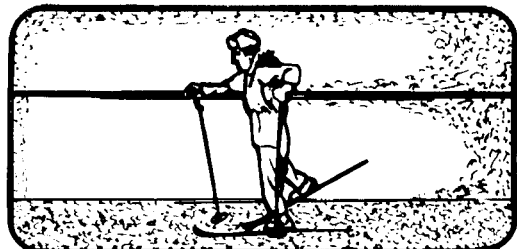
Crossing obstacles like ditches or fences can be very time-consuming for a unit. Whenever possible, disperse the men to cross on a broad front. Sometimes it is best to remove skis altogether.

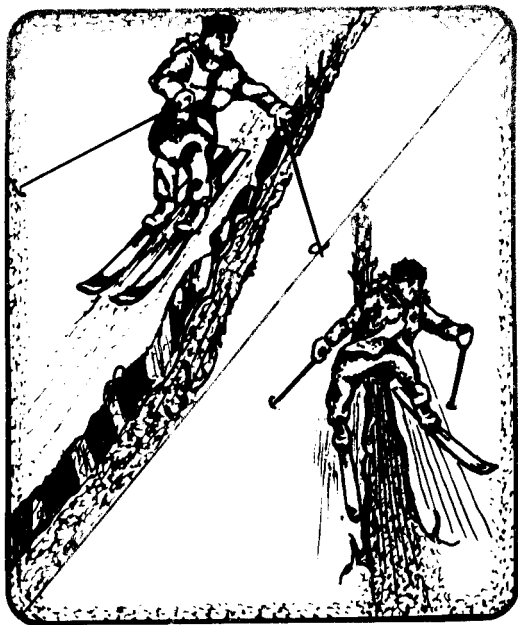
Low fences and windfalls 30 to 60 centimeters high (1 to 2 feet) are crossed by turning sideways to the obstacle so that the skis or snowshoes are parallel and alongside it, then stepping over first with one foot then the other. A kick turn over the obstacle is an alternate method.

In the case of rail fences or large diameter windfalls, it is often easier to sit on



the obstacle and swing both feet simultaneously to the other side.





Ditches or small streams are crossed by stepping over them sideways, using the ski poles for support.

If the ditches are too deep and wide, it is better to descend to the bottom, either by sideslipping or sidestepping, and then to climb the other side by sidestepping.

When it is necessary for troops to descend or ascend slopes which are too steep for their ability, or traversing is not practical, the sidestep is used. Otherwise, the skis are removed and the slope negotiated on foot, if the snow depth will permit. Mohair ski climbers are used for long uphill climbs when the slope is too steep for wax to hold it properly.



## Skiing with Pack and Weapon

Skiing with a pack and weapon changes the center of gravity and affects the techniques of movement. Some techniques follow:

- ❑ Lunges are shorter and pushes with poles less powerful.
- ❑ To aid in maintaining balance when skiing downhill over rough terrain, the leading ski is advanced farther and the knees are kept more flexible than when skiing without a load.
- ❑ Speed of descent is reduced and techniques are applied more cautiously.
- ❑ Slopes are climbed with a more gradual traverse.
- ❑ When skiing through woods or in brushy terrain, care is taken to prevent

any protruding parts of the weapon from catching on branches, causing loss of balance.

- ❑ In the event of a fall, it is sometimes more efficient to remove the pack and weapon before attempting to regain footing.

## Sled Pulling

Pulling a sled (ahkio) is hard work, requiring both teamwork and technique. Generally, the methods of hauling sleds apply to both skiers and snowshoes. Normally, the number of personnel pulling the sled is three, with one brakeman. However,

the number of pullers may change, depending on:

- Terrain,
- Weight of load,
- Type of movement, and
- Mission.



## Preparation for Sled Pulling

Techniques for sled pulling (ahkio) follow:

- The tow ropes are laid out and fastened by snap buckles in tandem system. The sled harnesses are adjusted to fit loosely on the pullers.
- Always consider using ski climbers for best traction. If climbers are not used, waxed skis provide best traction. Don't worry about glide; however, sliding capacity should not be entirely forfeited.
- Before moving out, check sled for proper loading and lashing to insure the lowest possible center of gravity.

## Pulling Sled on Varied Terrain

When pulling a sled over comparatively flat

terrain, skiers normally use the one-step ski technique. When crossing small ditches, stop the sled in the ditch while the pullers go as far as the tow ropes allow. Then all together pull the sled up out of the ditch. To change direction in the woods, continue to move straight forward until the sled comes to the desired turning point. Then move in the new direction with the turn being controlled by the puller nearest the sled—assisted if necessary by the man behind. When the forest is dense and space does not allow the men to move far enough ahead before the turn is made, start the turn by gradually making as gentle a curve as possible, while the two men nearest the sled (in front and behind) guide, lift, and otherwise assist in turning the sled.

## Uphill Climbing

To accomplish an uphill maneuver, use the following techniques:

- ❑ On short, gentle slopes the herringbone can be used.
- ❑ On a steep, short slope the pullers can use the sidestep. In this case, the rear man moves to the front and side of the sled, and while sidestepping, assists in pulling the sled by using the rope fastened to the front end.
- ❑ On very gentle slopes, an uphill traverse may be used. Ski climbers are used if the length of the slope justifies the time required to put them on.
- ❑ In difficult terrain, use a relay technique when the necessary equipment is available. A climbing rope, 36.5 meters (120 ft) long, or similar item, is fastened to the sled. The pullers then

climb uphill as far as the rope allows. While they stand in place, the sled is pulled up to their position. This procedure is repeated as many times as is necessary to reach the top. Care is taken to insure that the sled is well anchored each time the pullers move up, thus avoiding a runaway sled. Where steep slopes must be ascended for considerable distances, less energy will be expended if the sleds are left behind and the sled load backpacked to the top.

## **Downhill Movement**

Techniques for downhill movement follow:

- On very gentle slopes and in poor snow conditions where the sled will not

descend on its own accord, use a double-poling technique or a one-step diagonal. It is necessary to control the speed to prevent the sled from overrunning the pullers. The rear man can assist in this by braking the sled, although in most cases very little braking will be needed.

- A short, steep slope can be descended by sideslipping or sidestepping. If necessary, the rear man is assisted in the braking action by one or more members of the team. During short descents in wooded areas, the braker may position himself behind a tree for added stability in lowering the sled. If necessary, a succession of position moves are made.

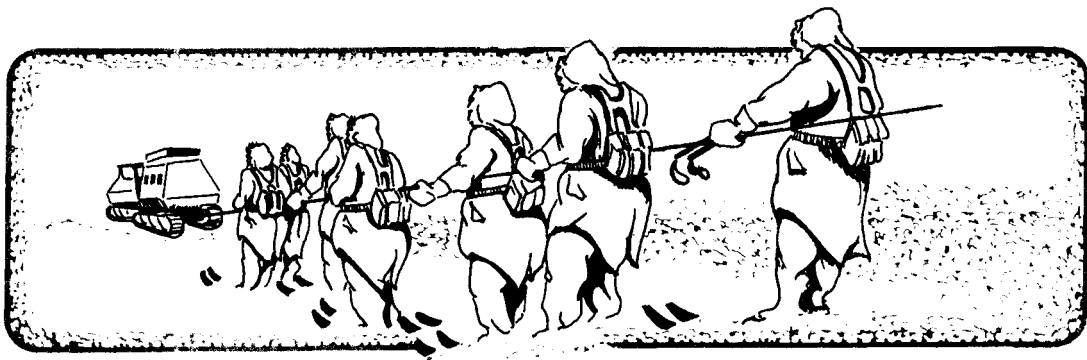
- ❑ On long moderate slopes, use the braking wedge to control speed. If more braking is necessary than can be applied by the rear man, he is assisted by the puller closest to the sled, who moves to one side or removes his rope and refastens it to the rear of the sled.
- ❑ The whole team is needed to brake the sled when going down a long, steep slope. Fasten all tow ropes to the rear of the sled. All men brake from the rear and/or one skier controls the sled by straddling its front. The braking wedge or sideslipping is used when long, steep downhill slopes are traversed. The puller nearest the sled and the rear man remain above the sled and as far from it as the ropes allow.

From this position, they can prevent the sled from sideslipping.

- ❑ In very steep terrain, a long rope can be used to lower the sled straight down the slope. This procedure is the reverse of the uphill-relay method described earlier and is good for evacuating wounded.

## **Skijoring**

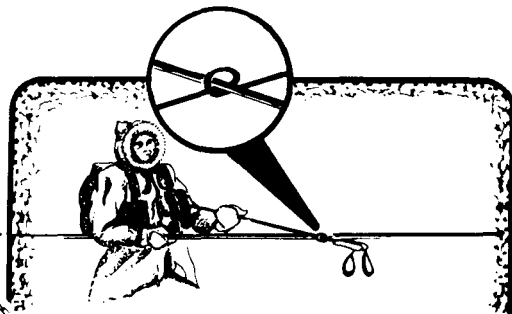
Skijoring is moving men on skis behind vehicles. The best routes for skijoring are snow-covered roads and trails, frozen lakes, rivers, or paths made by tracked vehicles. Speeds up to 24 kmph (15 mph) can be maintained on level ground by trained troops, depending on weather and



trail conditions. The number of men that can be hauled behind each vehicle varies depending on the type and mechanical condition of the vehicle. Towing more than two squads behind one vehicle is impractical, due to the increased length of the column and difficulty in making turns.

### **Use of Tow Ropes**

Two ropes, 36.5 meters (120 ft) long, are used for towing a rifle squad. The skiers, in columns of twos, are spaced at equal intervals behind the vehicle and outside the ropes. A gap of approximately 4 meters (12 ft) is left between individuals.



Several methods of towing are used depending on terrain and distance of movement:

- Each skier grasps a bight of rope and makes a 25 cm (10-inch) loop by tying a butterfly knot (see TC 90-6-1, *Military Mountaineering*). The loop is held with one hand and poles are held in the other, or a long loop can be formed by tying a butterfly knot in a 1.5 to 2 meter (5 to 7 ft)

bight of rope. The skier leans against the loop after placing it around the buttocks. He does not place the body through the loop.

- The ski-pole method is the least tiring way to skijor. Another advantage to this method is that a skier can exercise his hands to prevent frostbite during movement in extreme cold. The rope is looped around the poles to lock them in

position. The poles are held under the outside arm. The skier can rest against the ski pole baskets.

- When being towed through dense wooded areas, or when contact with the enemy is imminent, simply grasp the rope without tying the knot or using the ski poles as a rest. Maneuvering through narrow trails is thus easier and the troops are more prepared for immediate combat.

No matter what method of towing is used, troops are never allowed to fasten themselves to the tow rope. In case of a fall, they must be able to release their hold immediately to avoid serious injury to themselves or to other skiers. The ski poles are usually held in one

hand and are available for instant use. During training, and in combat situations when contact with the enemy is not probable, the ski poles may be loaded on the vehicles to avoid accidents.

### **Skijoring Technique**

The track is made as simple as the terrain permits. Steep slopes, obstacles, and sharp turns are avoided. When these cannot be bypassed, speed must be reduced so the skiers can maneuver. One man, usually the assistant driver, is responsible for stopping or slowing the vehicle to prevent casualties due to speed or obstacles. He



constantly observes the skiers and other vehicles, gives the driver orders, and signals the skiers when the vehicle will slow down, speed up, or stop.

When the vehicle begins its forward movement, each man on the rope moves forward under his own power for a few steps, gradually placing tension on the rope to prevent being suddenly jerked into motion and caused to fall. When under way the skier's body is leaned slightly backward, the knees are bent slightly, and the upper body is nearly straight. Skis may be farther apart than in normal skiing. One ski is kept slightly ahead of the other. The position should be one which allows the skier to relax while alert to on-

coming obstacles. If a skier falls, he should release the tow rope immediately and roll to the side to avoid being run over by the skier following.

During sharp turns, the vehicle is slowed to walking speed, and skiers walk around the curve being careful not to drop or step on the tow rope. Normal speed is resumed after the last man has made the turn. Vehicle stops and starts are done gradually.

While descending hills, skiers maintain a taut rope using the braking wedge or by moving to the side where deeper snow will slow them down. If the terrain will not allow controlled braking, and collision with the vehicle is immi-

ment, the skiers release the rope and disperse to the sides of the track. On short, downhill slopes, the vehicle increases speed temporarily so that the skiers need not brake. On long, steep slopes, skiers descend independently of the vehicle and reattach themselves at the bottom.

## Use of Ski Poles in Firing

- ❑ Firing in snow requires a firm support. On packed snow, the weapons may slide. Branches, skis, snowshoes, or sleds are used to provide a solid base.
- ❑ Skis and ski poles can be used in a variety of ways to form hasty weapons rests while firing on the move.

- ❑ Ski poles can be used as an elbow rest or as a weapons support from the kneeling position in shallow crusted snow. In deep, soft snow, the position of the poles can be reversed for added stability.





- ❑ In the prone position, the skis or ski poles can be used as elbow rests or as supports for the weapon.
- ❑ Automatic weapons can be fired from the prone position using a snowshoe or ski pole basket as a rest for the bipod. Some machine gunners attach a wide strip of canvas to the bipod legs. When the bipod is opened, the canvas stretches out between the legs over the snow and stops the legs from sinking.

Skis are used as far forward as possible,

and are left behind only when the objective can be reached more quickly and easily on foot. It is up to the small unit leader to decide when to do this. As a rule of thumb, skis are left at the last covered and concealed position, short of the objective (see FM 31-70 and FM 31-71). Deep snow may force units to assault the objective on skis.

As friendly forces approach the effective range of enemy weapons, they move by fire and maneuver. Troops proceed by short rushes on foot or on skis, whichever is more feasible. Troops rushing on foot drag their skis by holding them together by the tips (poles through the bindings) in one hand, with the weapon readily available for action in the other. Skis

may also be tied to the belt with a thong slipped through the holes at the ski tips.

When contact with the enemy is not expected, the weapon is carried across the back with the sling over either shoulder, and with the butt at the side or attached to the rucksack. When contact with the enemy is imminent, the weapon is slung around the neck and in front of the body, thus releasing both arms for rapid skiing. When contact with the enemy has been established, the weapon is carried in one hand and the ski poles in the other.

When the depth of the snow is less than 50 cm (20 inches), consider leaving skis in the last covered and concealed position short of the objective.

As soon as the objective has been seized, the skis, ski poles, or snowshoes are recovered and brought forward. A two-man team can quickly make a ski bundle and drag the skis of the entire squad at one time.

### **Additional techniques**

- In deep, loose snow, under hostile fire, it may be more advantageous to advance in a high-crawl position, holding the skis with hands through the bindings.
- Sliding forward in a low crawl on skis is another method of advancing, especially over firm snow.

**TC 90-11-1**

**30 DECEMBER 1981**

By Order of the Secretary of the Army:

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*General, United States Army*  
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