SNOW-SURVEY SAFETY GUIDE

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This SNOW SURVEY SAFETY GUIDE is for the use of every employee in the Soil Conservation Service who is engaged in hazardous snow survey operations. It should be carried by employees on snow surveys to serve as a quick reference for use in emergencies that occur in remote areas where medical assistance is not available and where low temperatures, snow, and high altitudes increase the dangers of accidents and even threaten survival.

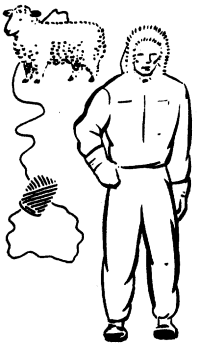
It will also be useful to our employees in the northern part of the United States since they also are subjected to similar hazards even though they may not be in mountainous areas.

The manuscript was prepared by a committee composed of Ashton Codd, Chairman, W. T. Frost and R. T. Davis, all State Snow Survey leaders, in consultation with other snow survey workers.

The committee worked with Earl H. Breon, Director of First Aid Service, American National Red Cross, Dr. Melvin T. Johnson, Chief of the Division of Employee Health of the U. S. Department of Agriculture, in developing the first-aid section of the guide. Information from the American Red Cross First Aid Textbook, Ski Patrol Manual, and other publications has been freely used.

PREPARING FOR TRAVEL

Clothing



Loose-fitting, lightweight woolen clothing in several layers is the best dress for cold-weather outdoor work. The several layers with air space between fibers and layers are effective insulation to retain body heat. Also, you can remove layers to prevent perspiring.

To protect you from wind and snow, your outer garment should be tightly woven and water repellent and have a parka hood.

Medium-weight, long underwear is a **MUST** for cold-weather snow operations. Avoid too heavy a weight; use part cotton, part wool. Your personal preference or allergies will govern. Two-piece suits are preferable. The new fish-net underwear is very good—a real insulation against cold weather.

Two or three pairs of socks are better than one very thick pair. Wear silk or cotton next to skin, then light wool, then heavy wool. Each pair must fit properly and be put on without wrinkles—otherwise, blisters are inevitable.

The new thermal socks help in extreme temperatures, particularly when riding in vehicles or when using snowshoes and pacs. They also make good slippers around the cabins.

Do not overload boots with socks; leave room for circulation—snug but not tight. Put all the sock tops inside your trousers.

A trouser of wool, poplin, or water-repellent gabardine is best. Avoid heavy trousers and so-called "tin-pants." For protection from cold, use more layers of underwear. The expected temperature will dictate how many.

All trousers should have elastic holddowns to go under the arch of the foot to hold trouser in shoe. Outer clothing should be hard finish (not soft and fuzzy) to prevent snow from adhering.

Some oversnow foot travelers like their trousers on the outside of the shoes with holddowns running under the arch of the shoe. If you do this, find some way to tie the bottom of your trouser around your shoe top to keep the snow from working up your leg and getting you wet.

Ski boots, pacs of half rubber-half

leather, or all rubber pacs are appropriate foot gear.

Ski boots should have semilimber soles to permit climbing on skis. They should be waxed, not greased. Paste shoe polish applied in several coats is as good as most fancy preparations.

Pay special attention to your ski-boot-sole edges and welts. Varnish or lacquer edges to make them waterproof.

With pacs, always use inner soles of felt or cork. Varnish the joint between rubber and leather to waterproof.

To seal the gap between your ski-boot top and trouser, ski gaiters are a great help. They keep out snow and keep the feet warm and **DRY.**

A light cotton work shirt under a wool shirt makes for comfort and extra layers of clothing.

The long thigh-length parka with bottom drawstring to blouse up around your belt line is the best outer garment.

A full-length front zipper is preferable. Your hood should be full enough to protect most of your face—you should be able to cover

your mouth to provide warm breathing to protect your lungs from very cold air.

A ski cap of water-repellent cloth with wool lining and long tie-down earflaps is essential. Knitted woolen caps collect snow and are not good on the trail even though handy around camp.

Always use mittens in preference to fingered gloves. They protect your fingers and are warmer. Leather-palmed poplin or canvas mittens with wool mitt liners are best. Long gauntlets are essential.

The large, soft-rubber-rimmed goggle with polarized green plastic lenses is probably most suitable. Glass lenses are likely to shatter during an accidental fall and damage your eyes.

If lenses fog when you become warm, punch extra or larger ventilation holes in the top and sides, but not the bottom. Dark smoky-colored lenses are also good.

Amber or yellow lenses give little protection in clear sunshiny weather. But when it is storming or overcast they are excellent to bring out shadows. They improve your sense of definition.

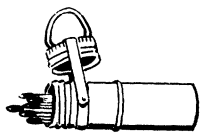
If you wear dark glasses, they should have sides that protect from light. In an emergency a cloth with holes cut in it or paper with small slits will prevent snow blindness.

Remember, all clothing should fit loosely. Baggy knees in trousers and loose-fitting shirt, sweater, and jacket are comfortable and warm. Blood circulation and retention of body heat are of utmost importance in keeping warm.

Keep wrists, neck, and ankles dry and covered. Keep from sweating; peel off layers to keep cool when working hard or hiking. Open the neck of your shirt and parka wide—much heat will escape. When you rest, button up and throw on a jacket or sweater; take care of yourself.

PERSONAL EQUIPMENT

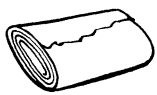
Equipment carried in pockets—



Matches—wooden; waterproof by dipping in warm paraffin or carry in a waterproof case.

Pocketknife—Boy Scout type equipped with sharp blade, awl, screwdriver.

Goggles—dark with side protectors.

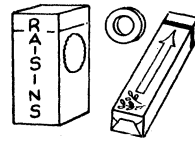


Toilet tissue.

Compass—pocket type, not too small; an Army lid compass or the type carried by fireguards in the U. S. Forest Service.

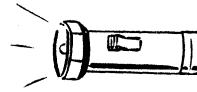
Notebook and pencil—to record data and observations made during trip, leave messages, etc.

Trail food—nuts, raisins, gum, sugar cubes, fruit drops to munch on along the trail.



Bandanna—large kerchief, for which you will find many uses.

Ointment for lips or for burns.



Flashlight—small 2-cell light, extra batteries and bulb.

Equipment carried in rucksack or other pack—

Parka or windbreaker—water repellent and windproof with attached hood.

Extra jacket—shirt or sweater for extra layers of warmth.

Extra inner soles—particularly if you are wearing shoe pacs.

Extra mittens—outers and liners.

Extra wool socks—light, medium, and heavy if you wear that many, to change into in the evening or when other socks are damp.

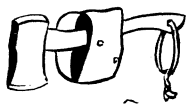
Scarf—to be worn over mouth and nose during subzero temperatures

to warm breath and prevent freezing of lungs.

Spare large kerchief.

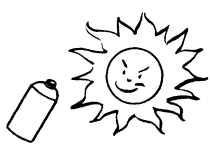
Hand ax—small, sharp hand ax with a sheath and a wrist thong through hole in handle.

More waterproof matches—for emergency use.



Tinder—candle, railroad fusee, or other fire-starter material. (Some carry pitch wood, heat tabs, kindle sticks, carbide chunks, etc.) Fusee may also be used for signaling.

Small first-aid kit and extra roll of 2-inch adhesive tape to tape heels before each trip and for minor repairs to clothing and equipment.



Sunburn lotion or ointment—to prevent burn by early application.

Emergency food—not to be used except under emergency conditions such as an unexpected overnight bivouac.

Ski waxes and climbers—if you are traveling on skis, don't forget plain paraffin and small can of boat spar varnish for snowshoes.

Cup or tin can.

Emergency flashlight, headlight type—with fresh batteries.

Avalanche cord—roll of 40 to 50 feet heavy cotton string dyed red if you are to travel in avalanche country.

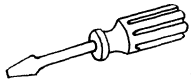
Emergency kit—to repair your special foot-travel equipment, etc.—

Strong cord or rawhide.

Nylon cord—about 20 feet.

Braided picture wire—about 10 feet.

Pliers—light but strong, with wire-cutting blade.

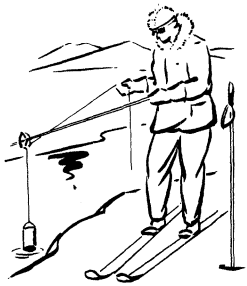


Screwdriver—stubby but strong, and small Phillips blade for ski edge screws.

Note: Pack should fit high on your back and should have a waistband to keep it from chafing your back and to prevent being hit on the head during a fall. An army rucksack on an A-frame is good for light loads if kept high and snug to the frame. A packboard is far better when heavy loads are being carried. Regardless of type, the pack must have a frame to keep the load away from your back. When loading your pack, keep items for trail use on top or in outside pockets.

PARTY OR COMMUNITY EQUIPMENT

Tools or equipment for the job—



Snow sampler and kit, if measuring snow.

Soil-moisture meter, if necessary.

Maps of area to be traveled.

Emergency equipment—

Extra cable binding for ski and strap for snowshoe.

6-ounce can with cord in hole at rim to obtain water from open stream.

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Large rubber bands cut from inner tube of auto tire.

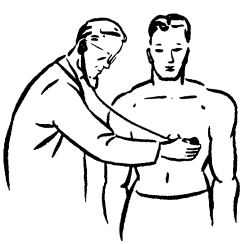
Plastic tarpaulin (6 x 8 feet) for emergency shelter from wind and rain. Additional ¼-inch nylon rope.

Malleable sheet of metal (6 x 8 inches) for repairing broken ski.

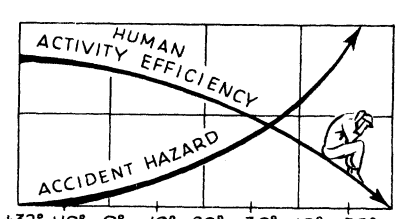
RULES FOR OVERSNOW TRAVEL

"Service employees making snow surveys will always work in parties of not less than two men where personal hazard is involved."—Adm. Memo. 108.

Have a physical examination before the beginning of the winter travel season—to protect you and as a safety measure for your companions.



During cold weather, human efficiency declines with lower temperatures. Mental operation and muscular reactions slow down. As a result, the accident hazard increases at an alarming rate. When working in severe cold weather, move slowly and act slowly.



Always check your clothing, equipment, supplies, and personal needs before leaving home or the office.

One member of the party should be designated as leader of the party—usually the one most familiar with terrain to be traveled. What he decides is followed by all others.

Thirst quenching on snow trips—

Drink heartily before leaving base camp and again upon returning. Train yourself to get along without drinking water en route.

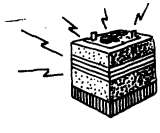
Eating cold snow is likely to make thirst seem worse.

If you find open water, draw some with the stringed can in your emergency equipment.

To feel less thirsty, try chewing a small dry twig or sucking on a small pebble or piece of hard candy.

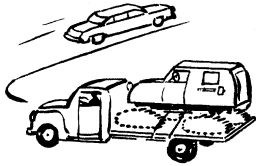
HIGHWAY TRAVEL IN WINTER

A good battery is essential for cold-weather starting—check it!

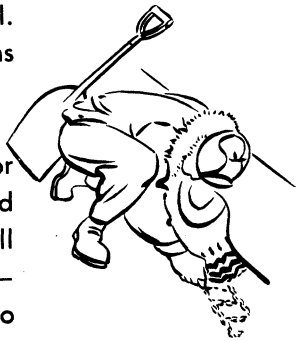


Highway travel should always be cautious. Don't hurry (you will live longer). A car and accom-

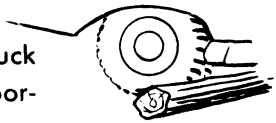
panying truck with sno-cat should stay together on highway. When entering snow-covered secondary roads, put on chains.



Shovel, ax, tire chains, and tow cable or chain are essential. Don't be afraid to use the chains before you get into trouble.



Before you leave your car or truck, turn it so that it is headed for home while the motor is still warm. Don't set the handbrake—it might freeze. Use low gear to hold the car in place; better yet, block with rock or log.



If traveling with a pickup or truck with battery under the floorboards, check to see that slush or mud has not accumulated on top of the terminal posts. This material will freeze in place and it contains enough conductivity to run down a new battery.

Hide the keys to the car or truck in the vehicle in a place everyone in the party knows. Do not take them on the back-country ski, snowshoe, or sno-cat trip. The chances of keys getting lost or misplaced are too great.

It may be wise to leave a note on the windshield stating your business and probable date of return.

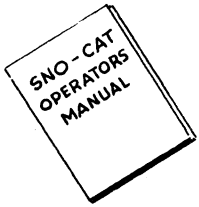
Carbon-monoxide gas is a hazard in every gasoline-driven vehicle—be sure to provide constant ventilation regardless of how cold the temperature.

It is SCS safety policy that engine exhaust of all oversnow vehicles exhaust vertically from a point above the cab. This is to prevent carbon-monoxide gas from entering the cab when the vehicle sinks deep into the snow. Take special care to provide ventilation in cars and trucks when warming them up.

Carbon-monoxide gas is also a hazard in tar-paper covered cabins—you must have adequate ventilation. Other cabins even when buried deep under the snow get enough oxygen through chinks and crevices to provide safe ventilation if wood fires furnish heat.

VEHICLE TRAVEL IN WINTER

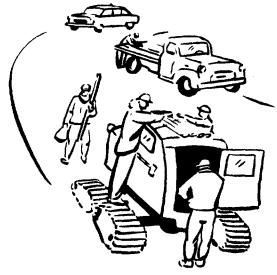
Read and follow the suggestions in the Operators' Manual for your special vehicle. These machines have special requirements.



Be sure you don't leave anything in the truck or car that you'll need later. Inspect and check equipment and supplies. Check your equipment from truck or car to sno-cat.

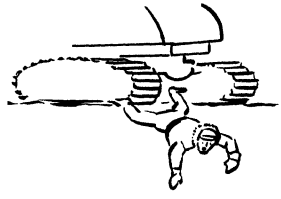
Take no one with you who cannot "walk out" from the most distant point in case of breakdown.

Be positive each passenger and the driver has proper skis or snowshoe equipment to "walk-out" if necessary.



Take time to travel safely. Know the limitations of the vehicle and avoid dangerous places and side-hills.

Be cautious of moving parts, tracks, and wheels. Keep tag-end ropes tied. Be sure transmission is out of gear when stopped or idling.



Include emergency equipment for emergency breakdown or overnight camp—sleeping bags, mountain tent, gasoline stove, food, saw, ax, shovel, spare parts (see Operators' Manual), and tools.

Check radio equipment in accordance with instructions and arrange and keep contact schedule. Keep away from antenna when radio transmitter is being used; you could get electrocuted.

At end of day or at cabin, turn vehicle in direction of next day's travel. Pack snow by driving back and forth. On this packed space, place some tree boughs

and run machine on top of boughs. This prevents steel parts from freezing solid to snow surface.

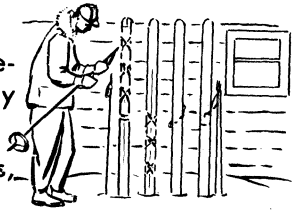
If extremely low temperatures are expected during the night, drain oil and cooling fluid into vessels; remove battery from vehicle to warm shelter. Heat oil and fluid next morning to insure starting.

Take extreme caution when refueling with gasoline. There is danger from cigarette fire, from spilled gasoline and from freezing hands when the weather is cold. Gasoline can be colder than the freezing point of water. If enough gasoline is spilled on your clothes to wet your skin, remove the clothes immediately to prevent blistering.

FOOT TRAVEL

By Skis

A few days before leaving headquarters, inspect skis and pertinent equipment—



Check running surfaces; make repairs to base material or apply new coat.

Check bindings, screws, cables, and toe irons for shoe fit.

Check edge screws; replace loose screws in plastic wood.

Wax ski boots, giving special attention to sole edges and welts. Varnish or lacquer edges for wet snow. Check laces; replace if questionable.

Check climbers; make needed repairs.

Check ski poles, spikes, baskets, shafts, and wrist straps; varnish bare wood parts and repair worn parts.

Travel suggestions—

Alternate trail breakers frequently—don't try an "iron man" act.

Travel at a steady pace that slowest man can sustain without struggling.

If boots start to rub or pinch, stop immediately and correct the cause—such as fold in sock, too tight laces or straps, or nail. If red spot appears, cover with gauze and tape smoothly.

Select a good route—often the difference between an easy trip and an ordeal, between safety and danger.

Use climbers where long, steady climb is expected.

Select easy traverse grade. Use kick turn sparingly. Choose turnarounds.

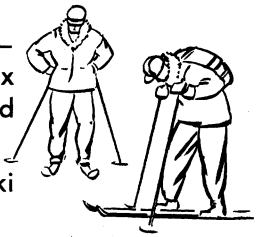
Inspect climbers and tighten after 10 minutes' use. Keep eye on man ahead and warn him if his tail strap or rope is loose or slipping.

Use herringbone or sidestep on short climbs only—say up to 30 feet; this step is much too tiring for long climbs.

Use ski poles to advantage—handles down and points to rear.

Rest at short, frequent intervals—learn to rest standing and balanced, supported by poles against body or against shoulders. Never lie down on the snow to rest.

Always wear mittens—not gloves—when skiing. If too warm, remove liners.



Use ski wax to make trip easier—hard wax for dry snow; soft wax for wet snow. Paraffin is good for wet snow but does not last.

When skiing downhill, always ski under control.

Take off wrist loops for downhill and hazardous slides through timber or brush along trail and across avalanche terrain you con't avoid.

Don't make high-speed turns. Keep control and make long traverses with turnaround or kick turn.

Keep party together; do not let a member go off on his own. The best skier shepherds the group to help if a member of the party falls.

Inspect equipment upon return and repair any damage.

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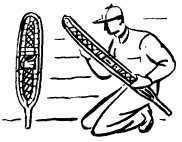
By Snowshoe

A few days before leaving headquarters, inspect bindings; make necessary repairs. Snowshoe should be freshly varnished with boat spar varnish.

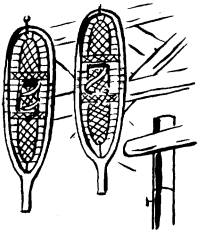


Take at least one ski pole as a walking staff; it is a safety measure.

Keep heel strap of binding down low on boot or pac—away from large tendon. Avoid "squeak" heel.

If boots start to rub or pinch, stop immediately and correct the cause—such as a fold in sock; too tight laces; or nail. If red spot appears, cover with gauze and tape smoothly.

Always carry 2 lengths of ¼-inch manila rope 6 or 7 feet long for making locks around edge of webs for hard-crusted snow or ice.



At end of day's trip, hang snowshoes up to dry—not too close to the stove or stovepipe. Keep them out of reach of rodents.

Do not use hard-leather-heel shoes or boots on snowshoes; use rubber pacs or overshoes. If you have only hard-heel shoes, find some

way to protect the webbing of the snowshoe; a piece of innertube tied to the hard heel or a leather patch fastened under the heel will do it.

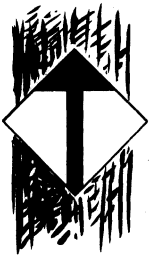
At end of trip, make necessary repairs to webbing and bindings. When dry and tight, coat with boat spar varnish.

Routes of Travel

Stay on the planned (marked) route. Your route has been planned by your leader for your safety and for reaching your destination with a minimum of effort. Study your route map before leaving highway. Keep your eyes open for landmarks and remember them.

If you must leave the planned route, stop your party and develop your plan before moving on.

In unknown terrain you should move ahead only with extreme care, marking your route with blazes, cloth strips, etc., carefully observing all possible hazards and routing your party accordingly.

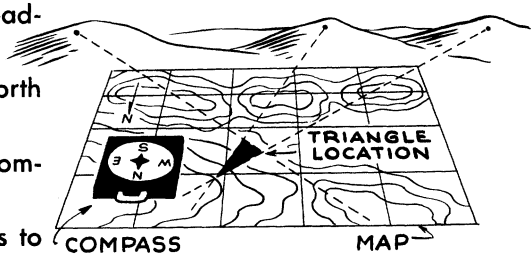


WHEN YOU ARE LOST

STOP—The instant you think you may be lost, stop immediately. **YOU ARE YOUR GREATEST HAZARD.** Don't lose your head!

Control panic—

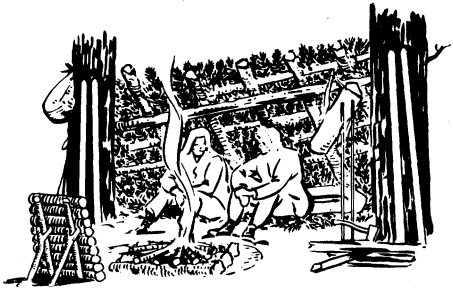
Use your map of the area and trust your compass readings.



Orient map north and south.

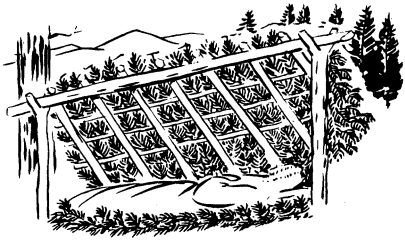
Site on three prominent peaks.

Extend site lines to intersect on map. Your location is within the inner triangle of intersecting lines.

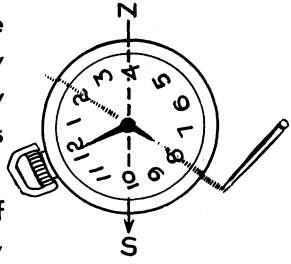


If there is doubt about finding your way, make camp early so that you will have time to set it up before darkness makes this task an ordeal.

Remember what mountaineering you have been taught; build the best protection you can with what you have available. Don't panic; this has happened to others.



If the sun is shining a common watch can be used as an emergency compass. Hold a match or swig upright at the edge of the watch. Turn the watch until the shadow of the twig falls directly along the hour hand. Halfway between the hour hand and 12 is south.



Plan your route and work out of base camp, not too far in any one direction, until you know where you are.

Stay together—Do not separate to find your way out—stay together.

By using your compass, work your route with blazes or broken branches, or with strips of cloth if clothing can be spared.

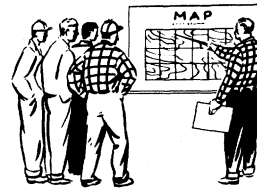
WHAT TO DO WHEN SOMEONE ELSE IS LOST

When it is necessary to organize a search, there must be a search leader. This should be someone who has authority and who can get necessary equipment. The seriousness of the situation and ruggedness of the terrain will govern the authority to call upon. If a snow-survey party is overdue, notify the Soil Conservation Service snow-survey supervisor immediately; he is probably the one most familiar with the details of the terrain and the ability of the party to survive.

On a field rescue party, see to it that some capable person is the field party leader. All directions must come from one head.

Advice from entire party is important, but the leader makes final decision. Adopt plan of action and route of travel; carry out the original plan.

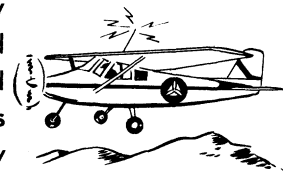
If original plan proves unsuccessful, call party council and plan again.



Always use full party for search; stay within communication radius.

A search party should work slowly. Note all tracks and signs of tracks. Note new blazes, freshly broken shrubbery, or signs of travelers.

Remember, the Civil Air Patrol has members at all airports. Weather permitting, this organization by radio communication to ground party can cover large or small areas quickly and effectively, thus eliminating much unnecessary work and anxiety. Your snow-survey supervisor will contact Army or Coast Guard Air Rescue if necessary.



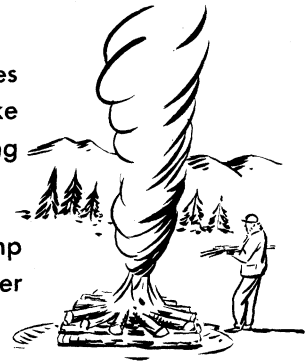
SIGNALING FOR RESCUE

Foot or Vehicle Rescue Party

Voice signals to a rescue party on foot or in oversnow vehicles are difficult to hear; save your energy and breath.

Build a fire with green branches to make an abundance of smoke during the day; build a blazing fire at night.

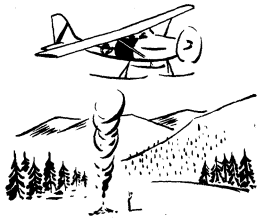
Make fresh tracks from your camp to open country—especially after a storm.



Signaling for Airplane Rescue

Be prepared to make signals to any airplane that passes.

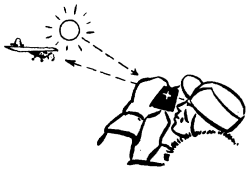
A large smoke fire in an isolated section of the snow-covered mountains will always attract attention from the air.



If the sun is shining, a mirror or other shiny object may be used as a signal. Some emergency kits now have special signaling mirrors.

You can make a good signaling device from a tin-can top or anything that is shiny on both sides. Punch a cross-shaped hole in the center of the shiny object. Hold the object about 3 inches from

your face and toward the plane. The light coming through the hole and shining on your face will be reflected in the side closest to you. While keeping a sight on the plane move the shiny object so that the reflected cross of light is over the cross-shaped hole. The beam from the sun will then be aimed at the plane. You cannot signal while directly in line with the sun and the plane.



No.	MEANING	SYM.
1	REQUIRE DOCTOR SERIOUS INJURIES	I
2	REQUIRE MEDICAL SUPPLIES	II
3	UNABLE TO PROCEED	X
4	REQUIRE FOOD AND WATER	F
5	REQUIRE FIREARMS AND AMMUNITION	⌄⌄
6	REQUIRE MAP AND COMPASS	□
7	INDICATE DIRECTION TO PROCEED	K
8	AM PROCEEDING IN THIS DIRECTION	↑
9	PROBABLY SAFE TO LAND HERE	△
10	REQUIRE FUEL AND OIL	L
11	ALL WELL	LL
12	NO *negative*	N
13	YES *affirmative*	Y
14	NOT UNDERSTOOD	JL
15	REQUIRE ENGINEER	W

International Ground Air Emergency Code

1 Lay out these symbols by using strips of fabric or parachutes, pieces of wood, stones, or any other available material.

2 Endeavor to provide as big a color contrast as possible.

3 Symbols should be at least 8 feet in height or larger if possible. Care should be taken to lay out symbols as depicted to avoid confusion with other symbols.

4 In addition to using these symbols, every effort is to be made to attract attention by means of radio, flares, smoke, or other available means.

AIRCRAFT ACKNOWLEDGEMENTS

MESSAGE UNDERSTOOD

An aircraft will indicate that ground signals HAVE BEEN understood by: Rocking from side to side *or* making GREEN flashes with signal lamp.

MESSAGE NOT UNDERSTOOD

An aircraft will indicate that ground signals are NOT understood by: Making a complete right hand circuit *or* making RED flashes with signal lamp.

Use the International Ground To Air Emergency Code. All pilots carry a copy.

Mark the needed code symbols by laying pine or fir branches on snow or by tramping the code symbols in the snow. Make them at least 8 feet high and spread them apart. Read instructions.

AFTER SIGNAL HAS BEEN ANSWERED, BE SURE TO ERASE SYMBOLS

If you locate a disabled person, or if one of your own party is disabled, examine him quickly and accurately. Start immediately applying the proper FIRST AID as outlined on the following pages.

STOP BLEEDING—PROTECT THE WOUND —PREVENT SHOCK

Remember, you are not a doctor; don't overdo First Aid.

If you move an injured person whom you suspect has broken bones, use extreme caution—especially if there is a back injury. Should it be only a short distance to a suitable campsite, probably the quickest way to move the injured man would be on branches off a nearby tree. Carefully drag him onto the branches, using the long axis of his body—either his shoulders or his heels.

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If there are neither steep climbs nor too much sidehill, try to bring patient out to civilization. Several rescue-sled sketches are described on the following pages.

If the snow is soft and travel difficult, one man alone should not attempt to move the injured man; make camp and wait for rescue.

Build a good fire near your patient. Brush snow off him before warmth of fire melts it and wets his clothing. A warm fire has a "homey," comforting effect and helps to eliminate fear.

If there are three members in the party and the injury is serious, send the best mountaineer for help—but do this only in an emergency. Never leave an injured man alone.

Great care must be taken when transporting an injured person over the snow. Make the injured man comfortable; keep him as warm as possible. Use extreme

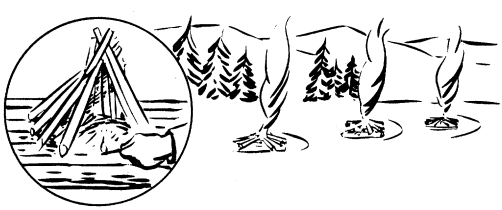
care on sidehills and take downhill runs easily. Continue to talk encouragement to the injured, assuring him of getting out to a doctor as soon as possible. Check the lashings on the sled frequently. Check the comfort of the patient. Follow transportation suggestions in the First Aid section of this Guide.

Inventory all food and ration it out very sparingly—you may be several days finding your way out.

Distress signal is 3 of anything—the answer is 2 of the same. In other words, S O S and O. K. Don't wear yourself out shouting. Be sure plenty of evidence of your whereabouts can be seen about your bivouac especially if you may be asleep when a search party is in the vicinity.

Follow the open country close to timber if possible. Stay clear of brushy creek bottoms. Main canyons usually lead to some form of habitation.

When you get out, notify nearest authorities and contact your home base at once to halt search parties.



CONSTRUCTING THE RESCUE SLED

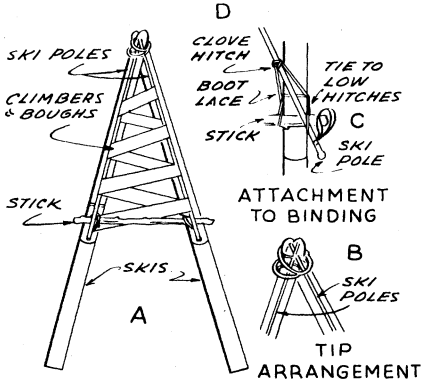
The **V**-shaped rescue sled (Model No. 1) is easily built. This sled is suitable for hauling short distances.

Should a long haul be necessary, use sled fashioned after Model No. 2.

If extra pair of skis is available, you can make the rescue sled shown in Model No. 3. This model is the most satisfactory.

Rescue Sled Model No. 1

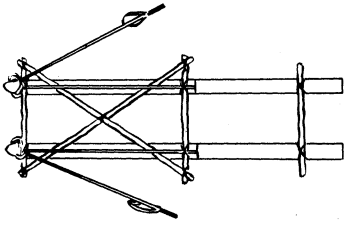
Interweave the ski poles by running the handle of one up through the basket of the other. Then jam the tips of the skis into the outside spaces of the interwoven baskets. If there are holes in the ski tips, overlap the tips and bind them together tightly; this helps to strengthen the framework. Bring the pole handles back over the skis. Cut good-sized stick or limb of tree, 18 to 20 inches long, and fasten it across the skis just behind the ski bindings. Tie this cross brace in place with rope, twine, ski-binding cables, or toe straps. Include the handles of the ski poles in this tie-down. Fasten shoe laces or some other good stout string with a "clove hitch" around the ski-pole shaft. Pull the ends of the strings very tight back to the toe irons and cross brace and tie them securely. Make a crosswebbing by winding ski climbers or rope spirally around the ski-pole shafts. Lay boughs and blankets (if available) on this crosswebbing. If the injured man is able to sit up and ride forward, a pack-sack can be fastened to the sled as a backrest. If he must be laid down, his head is best forward.

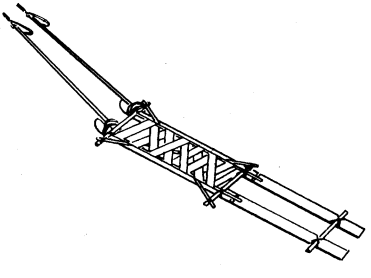


Rescue Sled Model No. 2

Place 2 skis side by side about 20 inches apart and lash with 3 cross sticks of proper length—1 at the tips of the skis, 1 at the foot bindings, and 1 at the rear of the skis, for the patient's ankles. Then place a ski pole over each ski, slipping the basket ring over the point of the ski and lashing it to the forward cross stick—the handle of the ski pole to the center cross stick. Lash diagonal brace sticks from the front stick outside the skis back under the ski poles to the opposite ski outside the bindings at the center. All lashings should be very tight.

Lace ski climbers or rope back and forth in a crisscross basket pattern between the ski poles to form a woven bed. The inverted jacket-stretcher idea could be used. For handles, push two ski poles through the baskets in the sled. Be sure and tie the injured man on the sled so he does not slide off.

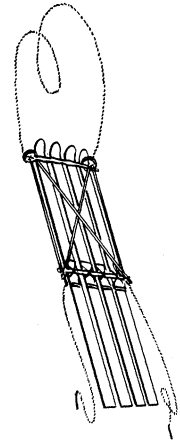




Rescue Sled Model No. 3

This sled requires 4 skis and a long piece of stout rope. It takes several men to pull the sled and guide it with side ropes.

You need 2 cross sticks made from poles or from brush branches cut to fit across the 4 skis. Place these cross sticks at the tip end of the skis and at the center lashed to the bindings. Lash each ski to the cross sticks. Make the forward cross stick fast to the tips where they begin to curve upward. Here again, holes in the tips of the skis are mighty handy. Diagonal cross lashing helps keep the rigging in shape. Cover the sled frame with boughs or clothing, especially at the metal bindings. Tie the injured man onto the sled to keep him from rolling off and causing more injury. Take particular caution for safe braking action on downhill slopes.



Remember, all sleds must be built strong and knots made tight. It may be better to wait for help rather than attempt a long haul alone. There may be two victims and no help for either.

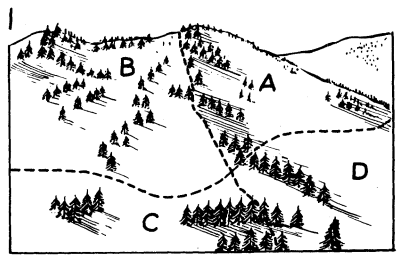
AVALANCHE

Places Where Avalanches May Occur

On slopes steeper than 25°—the critical zone is from 35° and steeper (A).

Steep, untimbered gullies are natural avalanche paths (A, B).

Scars on timbered slopes are apt to be avalanche paths if steep (B). Heavily timbered slopes seldom slide (C, D).



Steep southerly slopes favor avalanches in new snow and in late spring.

Avalanche Weather and Time

New snow—10 inches or more—plus 1 inch or more per hour; strong wind—12 m. p. h. or more.

Fair weather with rapidly rising temperatures after a heavy storm. Above freezing temperatures for 36 hours in spring promotes deep thawing and wet avalanches. Rain has the same effect plus the extra weight.

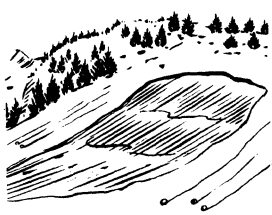
Avalanche danger is therefore greatest after 10 inches of new snow has accumulated and for 24 to 48 hours following such a storm. Sun or rain action on the snow that results in deep thawing also causes avalanches.

Signs of Avalanche Danger

An overhanging cornice that may drop and cause the snow on the slope beneath to slide.

Dry snow underfoot that is soft and deep and does not pack into a clean, sharp track. It sifts into the track like sand instead.

Damp snow that slithers out from underfoot and rolls away in balls or slips away like a blanket. Sun-formed snow balls are visible.



Wind-packed "slab" snow on steep slopes. This snow settles suddenly underfoot with a crunching sound. It may fracture into blocks and start an avalanche.

Travel Procedures in Avalanche Terrain

Avoid avalanche hazards by good route selection.

Detour all known avalanche paths or slopes if possible.

If avalanche terrain **MUST** be crossed—

During a severe storm HOLE up

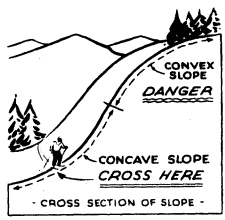
and wait until snow has had a chance to slide or settle.

Travel is relatively safe during the first few hours of a storm.

In thawing weather the period between midmorning and sundown is most dangerous.

Early morning hours before sunup are safest.

Crossing Known Avalanche Terrain



Climb up a safe terrain on the side of the avalanche area to a point where an easy downhill traverse in good snow on a concave slope is possible.

Cross in a clear area on good snow on a concave slope.

Loosen pack; loosen ski or snowshoe harness; take hands out of wrist loops on poles; put up parka hood and fasten across face, up to eyes; tie one end of avalanche cord to belt or upper arm; let other end trail behind loosely.

Let one man cross on easy traverse, gliding to other side; then next man in same tracks; then the next, until party is across.

The same procedure is followed by a snowshoe party.

Oversnow machines should unload passengers before crossing dangerous slopes. Passengers should

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cross as outlined above, ahead of the vehicle.

DON'T TAKE UNNECESSARY CHANCES

What To Do If Caught in an Avalanche

If your are caught on a moving snow mass, ski or snowshoe across to the edge as quickly as possible. Get out of the way as far as possible.

To avoid becoming buried—

Get rid of skis, poles, snowshoes, and pack if possible.

Swim vigorously lying on your back with your feet downhill—try to stay on the surface.

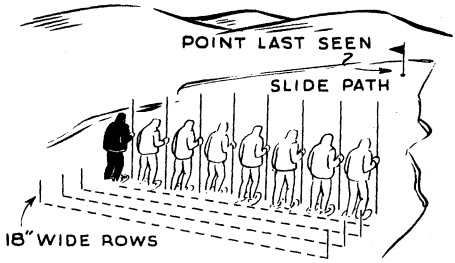
Cover your mouth and nose—especially if it is a dry snow avalanche. Suffocation can otherwise result.

When the slide stops, make a supreme effort to get a little air space around your head and chest—do this instantly as the slide hardens and freezes almost at once if it is wet snow.

RESCUE OF AVALANCHE VICTIM

"Hasty" search by surviving members of party.

Mark distinctly the spot where victim was **LAST SEEN.** A ski, snowshoe, or tall pole stuck in the snow makes a good reference point.



Make quick search of slide path along the fall line below the "last-seen" point, looking for avalanche cord.

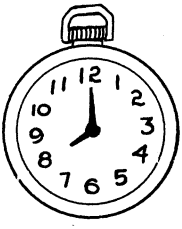
Probe or dig around any piece of clothing or equipment you may find; mark spots with poles.

Probe thoroughly along the fall line directly below the "last-seen" point and from there to the toe of the slide. (The heel of the ski and ski poles minus baskets will serve if willow or other probes are not available.)

The most likely place to search after the above has been tried is in the main pileup of snow and in transitions or eddies where part of the slide stopped.

REMEMBER—MINUTES COUNT

When you find an avalanche victim, examine for fractures, then treat for suffocation, then give first aid. Be careful; prevent shock.



Go for help if after 2 hours you have been unable to locate victim.

Notify proper authorities as soon as you can.

Be prepared to return to avalanche area with rescue party or at least provide adequate description of the site.

PRINCIPLES OF FIRST AID

The snow surveyor should be honest enough to admit it if he has a minor illness that could develop into something serious or be infectious to an entire party confined in cramped quarters.

Many injuries on snow-survey trips occur in cabins. Prevention is better than first aid.

The most common injuries on snow surveys are cuts, bruises, sprains, and fractures. All involve shock if serious.

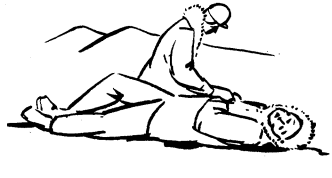
The most important considerations in first aid are the wishes of your injured companion. Make him as comfortable as possible. Try to keep him reassured. Seem calm and cheerful.

Remember, nature is on your side in the treatment of injuries in snow and cold and in clear air as compared to warm or congested areas.

Observe these points —

Treat injuries in this order, immediately—

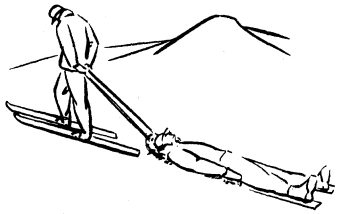
- Serious bleeding.
- No apparent breathing.
- Poisoning.
- Shock.



Get help if possible. One member of the survey party should go for help if feasible; otherwise, wait for rescue.

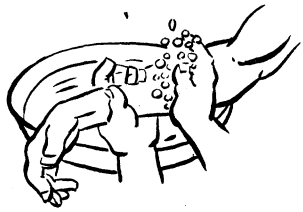
Give nothing to eat or drink to an unconscious or internally injured person.

Move only if absolutely necessary.



Any wound, no matter how small, should be touched only with a sterile pad or the best substitute, such as a clean folded handkerchief, sterilized with boiling water or alcohol. Don't breathe on wounds.

Wash hands thoroughly, if possible, before treating any wound.



Wash wound with soap, if possible, then wrap.

Serious External Bleeding

First Aid

Expose wound by cutting clothing from wound. Do not remove clothing.

Apply pressure at once. Seconds count. Loss of 2 pints of blood can be fatal.

Apply direct firm strong pressure preferably on sterile dressing over wound first. Direct pressure on the wound will seldom fail to control bleeding if enough pressure is used.

If this fails, and the bleeding is life threatening, apply tourniquet close to the wound but with unbroken skin between it and the wound and tightly enough to stop bleeding. Partial or complete severance may be the only time a tourniquet is justified.

Additional instructions—

Elevate injured part unless broken.

Bandage tightly over sterile pad on wound.

Do not give stimulants.

Keep victim quiet.

Internal Bleeding

Signs and Symptoms

Restlessness.

Anxiety.

Thirst.

Pale face.

Weak, rapid pulse.

Weakness.

First Aid

Keep victim flat on back. (Exception: If he has difficulty breathing due to lung puncture, prop up only slightly.) Turn his head to side for vomiting. Keep him quiet, reassured.

Move him only in lying position.

Nose Bleed

First Aid

Seat victim with head thrown back, breathing through mouth, clothing at neck loosened.

If bleeding from one nostril only, press this nostril to middle partition for 5 minutes.

STOPPAGE OF BREATH

If you think breathing has stopped, seconds count. What you need to do is to get air (oxygen) in and out of your companion's lungs. Your every maneuver that doesn't help ventilate him works against his recovery. You have even less time if he has been struggling, as in an avalanche.

First Aid: Artificial respiration

There are various ways to give artificial respiration manually. The most effective way for you to start your companion breathing again is to breathe into him just as soon as possible. This is known as mouth-to-mouth breathing.

Place victim on his back on a blanket or extra clothing, not on the cold snow.

Loosen his clothing but do not remove it.

Turn the victim's head to one side and with the fingers of one hand clear his mouth of any foreign matter. Get snow out of the mouth, eyes, and ears of avalanche victims.

Place your hands at the base of the victim's jaw near his earlobes, then lift his jaw up so that the lower teeth are in front of the upper teeth—in other words, get his chin into a sword-swallower's

position. You must provide a free air passage.

Place your mouth over the victim's to make a leak-proof seal. At the same time lay your cheek against his nose to close off his nasal passages.

Now blow (puff) into the victim till you see his chest rise. (When you blow you are pushing in mouthfuls of fresh air, not the exhaust from your lungs.)

As soon as you see his chest rise, take your lips away and let his lungs empty themselves.

Repeat this procedure about 12 times per minute.

The lower jaw must be kept jutting out at all times to maintain the free air passage. Every time you blow you can tell (by the resistance) whether you have achieved a free passage.

Another way to open the victim's air passage is to open the victim's mouth wide enough to insert your thumb. Using your thumb as a lever, hold the underpart of his jaw with your first finger and lift directly upward. Use your other hand to pinch his nostrils closed and thus prevent leakage through his nasal passages when you blow into his mouth.

If the victim's abdomen becomes distended (because of improper position of head and neck), stop temporarily and press on his abdomen to expel the air. This takes only a few seconds.

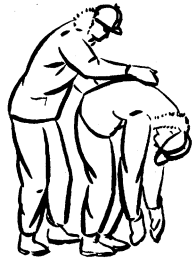
Electric Shock and Lightning

Hazard—Down powerlines and low powerlines close to deep snow surface.

Always protect yourself against shock. If victim is on wire on ground, remove wire with dry pole or rope before touching him.

Use "mouth-to-mouth breathing" if you think victim has stopped breathing.

Choking



Hold victim upside down or bend forward as far as possible, then give sharp slap on back.

If breathing stops, use "mouth-to-mouth breathing." The obstruction may be only partial; you may be able to blow by it.

POISONING

Carbon Monoxide Poisoning

First Aid

Move the victim to fresh air while holding your breath or taking only a few breaths.

If victim is not breathing or if his breathing is irregular, weak, or slow, give artificial respiration at the usual rate. Occasionally you can time the expiration phase with that of the victim's attempts to breathe.

After the victim starts breathing, keep him lying down and watch him constantly.

From Swallowed Poisons

Signs and Symptoms

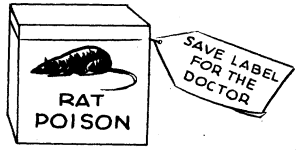
Pain in stomach and vomiting; diarrhea with food poisoning.

Flushed or bloated face.

Mouth may be burned.

Convulsions.

Unconsciousness.



First Aid

Dilute the poison—give large amounts of fluids.

Try to wash the poison out by inducing vomiting.

Give antidote if known. Save the label to give to the doctor.

Food Poisoning

Signs and Symptoms

Uncomfortable feeling in upper abdomen.

Pain and cramps.

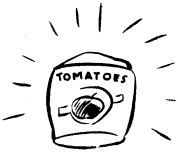
Nausea and vomiting.

Diarrhea.

Prevention

Do not eat food that does not taste right.

Dispose of food cans that are swollen or bulged.



Dispose of food cans that show rust points.

Don't eat open food if there are signs of mice or rats, especially if rat poisons have been used in cabin.

First Aid

Never give a physic.

Dilute and wash out same as for other poisons.

Keep victim warm, in bed.

If vomiting persists, give small drinks from glass of water containing teaspoon of soda.

Give black coffee or strong tea.

Rocky Mountain Spotted Fever Tick Bites

Prevention

Examine body and clothes after any exposure and always remove ticks after each shift.

Have partner inspect back.

If head of tick has penetrated skin, wet with turpentine or kerosene. If this fails to make tick back out, dry the area and then apply the hot end of a match to the rear of the tick.

Symptoms of Disease

Chills and fever.

Sweating.

Pains in bones, muscles, joints.

Backache and headache.

Coughing, vomiting, weakness.

Rash appears in 2 to 4 days.

First Aid

Complete rest.

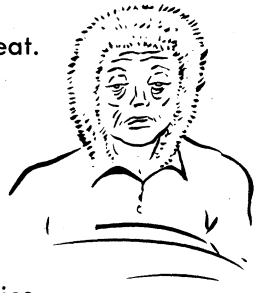
Early treatment by doctor.

SHOCK

Shock is a depressed state of most of the body functions brought on by injury. Unless treated, it may result in death although the injury itself would not be fatal.

TREAT FOR SHOCK IN ANY INJURY CASE

Factors Contributing to Shock



Exposure to extreme cold or heat.

Pain.

Rough handling.

Improper transportation.

Loss of blood.

Fatigue.

Broken bones and internal injuries.

Signs and Symptoms

(Symptoms usually develop gradually and may not be noticeable at first.)

Skin pale, cold, moist, clammy.

Eyes vacant, lack luster, pupils dilated.

Breathing shallow, irregular, or rapid.

Nausea, faintness, or even unconsciousness.

Pulse weak, irregular, rapid, or absent in extreme cases.

First Aid

Keep injured person lying flat. Raise legs 12 to 18 inches, unless there are head or chest injuries.

Keep injured person only warm enough to prevent chilling. It is better that he be slightly cool.

If injured person is thirsty, give him water in sips. Mix salt or soda with it if available.

Additional instructions—

Keep victim quiet and undisturbed. If injury is extremely serious, notify doctor so he can judge if plasma may be needed.

HEAT INJURIES

Burns and Scalds

Symptoms and Classification

First degree; skin reddened.

Second degree; skin blistered.

Third degree; skin cooked or charred, may extend to underlying tissue.

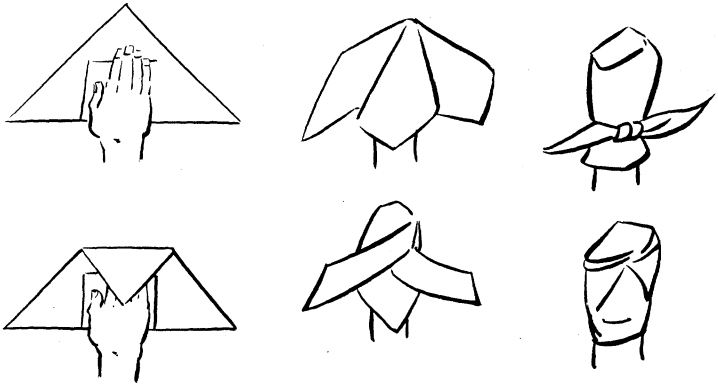
First Aid

For small first- and second-degree burns covering up to 1 percent of body surface (size of hand)—

Place sterile gauze over burned area.

Bandage entire area snugly.

Rebandage only after 3 days.



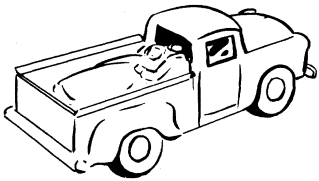
REMEMBER—SHOCK IS THE GREAT KILLER IN BURNS

For large burns of any degree—

If doctor or hospital is available within an hour or less—

Treat for shock.

Rush to hospital.



If in isolated area—

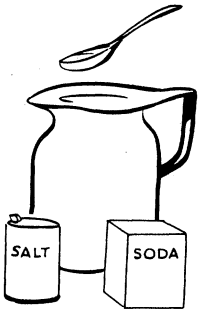
Remove clothing from burn; cut around where it sticks for doctor to remove later.

Cover burn with sterile dressing.

Cover this with 8 to 10 layers of loose, sterile or clean dressing.

Dress burns so separate skin areas cannot touch burned or unburned skin.

Treat for shock.



If victim is conscious, he should drink all he can of solution containing ½ teaspoon baking soda and ½ teaspoon of salt to 1 quart of water to replace fluid leaked through burn.

Plasma is very important in early treatment of burns, so notify doctor of extent of burn so he may

judge if plasma is needed.

DO NOT—Touch burn with fingers.

DO NOT—Breathe on burn.

DO NOT—Apply antiseptic.

DO NOT—Break or drain blisters.

DO NOT—Change dressing. Doctor should do this.

Chemical Burns

Flush thoroughly with water to remove all of chemical.

Treat like other burns.

Electrical Burns

Treat like other burns, but cover wider area because they are usually more extensive than they appear to be.

Snow burn—Windburn—Sunburn

Mountaineers and snow travelers are particularly susceptible to these injuries. Protection to prevent this is far better than treatment afterwards—use preventive lotions especially those containing para-aminodenzoic acid.

Snow-surveyors' lotion:

- 1/3 tanic-acid powder by volume
- 1/3 glycerin
- 1/3 rubbing alcohol

INJURIES DUE TO COLD OR SNOW

Frostbite

Signs and Symptoms

Considerable pain in hands and feet, but not in cheeks, ears, nose.

Grayish-white color due to frozen tissues.

First Aid

Until victim can be brought indoors, cover frostbitten part with woolen cloth or with warm skin, such as hand or armpit.

Do not rub.

Bring into warm room, but avoid direct heat.

Give him a warm drink.

Rewarm the frozen part quickly in warm room, or by immersing it in water at body temperature (90° to 100°) or by wrapping it in warm blankets.

Gently massage near, but not on, frosted part with coarse dry towel. Start near the heart and work toward the frozen part to restore circulation.

Suggest that the victim does not smoke.

Prolonged Exposure to Cold

Signs and Symptoms

Numbness and drowsiness.

Victim staggers, his eyesight fails, and he may become unconscious.

First Aid

If only chilled and not unconscious, put him in warm bed and give warm drink.

If breathing seems to have stopped, apply "mouth-to-mouth breathing."

When victim responds, give him warm drink and put him in warm bed.

Snow Blindness

Prevention

Wear dark glasses in snow country, particularly in early spring and at high elevations.

Symptoms

Burning, smarting, sandy feeling in eyes.

Pain in eyes or forehead.

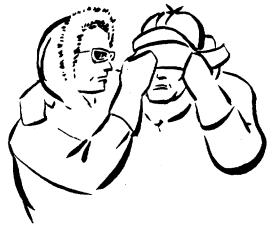
Sensitivity to light, eyes watering.

First Aid

Cold compresses on eyes.

Wash eyes with boric-acid solution.

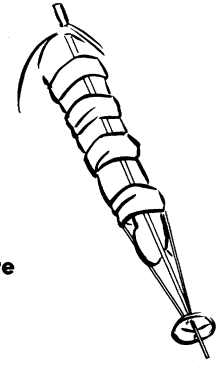
Wear dark glasses.



BONE FRACTURES

Fracture of Arm or Leg

Signs and Symptoms of Simple Fractures



Victim may hear or feel bone snap; grating.

Pain and tenderness at break.

Inability to use injured part or to move adjacent joints.

Broken part swollen and deformed, discolored.

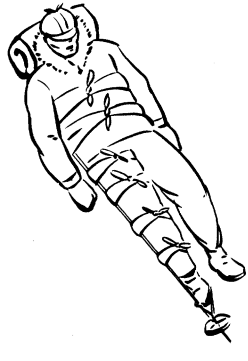
Signs and Symptoms of Compound Fracture

Same as above, plus presence of wound extending from fracture through the skin.

Fractured bone may protrude.

Frequently, severe bleeding.

First Aid



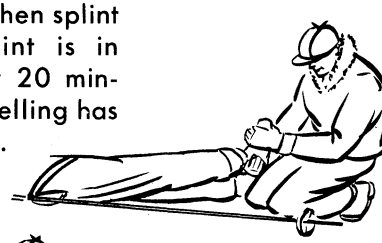
Keep broken ends and adjacent joints quiet.

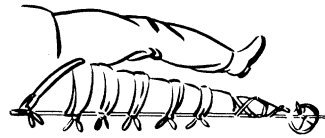
If bleeding, cut away clothing and control flow by sterile compress, then bandage. Use tourniquet only as last resort.

Move the victim only if absolutely necessary. If you must move him, get splints, pads, and ties ready, then—

> Completely immobilize fractured bone and next joint in either direction from fracture by well-padded splints. If long leg or arm bones are broken and victim must be moved some distance, apply traction splint.

When you apply traction splints, take special care not to apply excessive pressure. When bone is protruding, first place sterile dressing over wound; then splint in place. After splint is in place, examine every 20 minutes to be sure limb swelling has not cut off circulation.





Skull Fracture and Concussion

Signs and Symptoms

Bump or cut on head.

Victim dazed or unconscious.

Fluid or bleeding from ears; bleeding from mouth or nose.

Pulse rapid and weak.

Pupils of eyes unequal in size.

First Aid

Keep victim lying down.

Move only if necessary, and then horizontally.

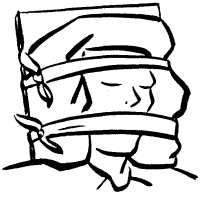
Give no stimulants.

Apply sterile gauze and bandage to open scalp wound.

If necessary, turn head gently to one side to drain mucus and other secretions.

Get doctor as soon as possible.

Do not leave victim alone.



Spine Fracture

Signs and Symptoms

Pain in neck or back.

If victim cannot open and close fingers readily, or grasp your hand firmly, his neck may be broken. if he can move fingers, but not feet or toes, his back may be broken.

Severe shock.

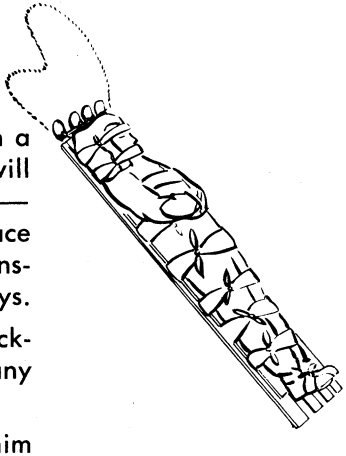
If unconscious and spinal injury is suspected, treat as a neck fracture.

First Aid

Don't let victim move, lift his head, or drink water.

Cover with blankets.

Get doctor if possible.



If you must move a victim with a fractured neck, your method will depend on materials available—face up on rigid surfaces, face down on nonrigid surfaces. Transport neck injuries face up always.

Do not tilt head forward, backward, or sideward under any circumstances.

Several people should slide him face up on wide board or other

rigid support along long axis of the body.

Pad head well at sides to keep face upward.

Tie hands across chest, and tie head and body rigidly to board.

When moving victim with fractured back, tie to rigid support with pad under lower spine.

Blanket lift can be used if victim stays face down.

Never permit a victim with suspected spine fracture to get into sitting position.

If you suspect lung puncture, ask the victim to breathe shallowly.

Pelvis Fracture

Signs and Symptoms

Much pain around pelvis if standing or walking. May be little or no pain if lying down.

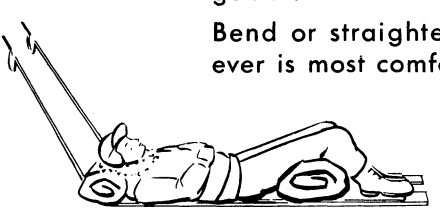
Severe shock.

First Aid

Move victim on back on rigid stretcher, door, board.

Bandage knees and ankles together.

Bend or straighten knees, whichever is most comfortable.



Rib Fracture

Signs and Symptoms

Severe pain on deep breathing or coughing.

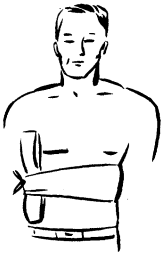
Break may be felt by fingers on rib.

Shallow breathing.

If lung punctured, frothy bright red blood may be coughed up.

First Aid

Object is to control pain and restrict rib motion.



If lung is punctured or rib is broken, do not bandage; have victim lie quietly; move him lying down; ask him to breathe shallowly.

Apply 2 or 3 triangular cravat bandages around body—

Tie first one loosely over break with knot over a pad on side opposite break. As victim exhales, tighten knot.

Repeat above with 2 more cravats, one above and one below the first one.

Nose Fracture

Do not splint.

Apply sterile compress to wound; hold compress lightly in place with 4-tail bandage.

Lower Jaw Fracture

Place palm of hand below jaw and raise it gently to bring teeth together.

Support jaw with bandage under chin, tied on top of head.

If victim vomits, release bandage, support jaw with hand, and rebandage.

Collarbone Fracture

Signs and Symptoms

Fracture sometimes can be felt by finger.

Injured shoulder lower than other shoulder.

Victim usually cannot raise arm above shoulder.

First Aid

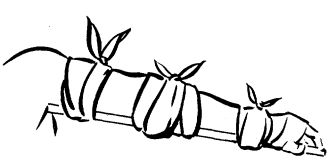
Put arm in triangular bandage sling, with hand raised above elbow level and ends of fingers uncovered.

Tie arm snugly to side of body.

Elbow Fracture

If arm straight, apply fixation splint entire length of arm.

If arm bent, apply arm sling and bind upper arm to body.



Hand or Wrist Fracture or Crushing

Apply padded splint to front of hand, from middle to beyond fingertips.

Place arm in triangular-bandage sling, palm down, with hand 4 inches higher than elbow.

Finger Fracture

Immobilize by splints and ties.

Support hand, slightly raised, in sling.

Kneecap Fracture

Straighten limb.

Tie limb to well-padded 4-inch board reaching from buttock to heel, leaving kneecap exposed. In emergency, a blanket can be used instead of board.

Foot and Toe Fracture or Crushing

Remove shoe and stocking, by cutting if necessary.

Apply several dressings padded with cotton or a small pillow; bandage snugly in place.

DISLOCATIONS—SPRAINS—STRAINS—BRUISES

Dislocations

Signs and Symptoms

Intense pain.

Deformity.

Swelling.

No movement.

First Aid

Apply cold compresses.

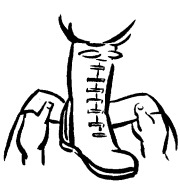
If necessary to move victim, support a dislocated elbow or shoulder in loose sling; pad under knees if hip dislocated.

Keep other dislocations immobilized in dislocated position, except first two finger joints or jaw, which can be reduced as shown in sketch.

Sprains—

Sprains—(tears of ligaments that support a joint).

Signs and Symptoms

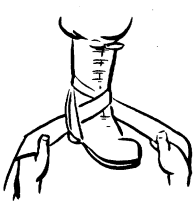


Pain at joint.

Swelling.

Discoloring.

First Aid



Elevate the part, if practical; put wrist in sling, ankle on padded support.

Apply cold applications—snow, ice, or running water in early stage; hot applications later.

If above cannot be done, immobilize as much as possible by bandaging.

Strains

Strains—(injuries to muscles or tendons)

Symptoms

Pain in muscles, increasing stiffness.

First Aid

Rest injured muscle.

Apply heat, but don't blister.

Gently rub upward on injured part.

Massage to loosen up muscles.

Muscular Cramps

Signs and Symptoms

Apparent knot in muscles, calf, thigh, or arm muscles; very painful; immobile.

Foot or leg draws up or off to angle; sharp pain.

Muscular spasm and quiver.

First Aid

Elevate knotted muscle higher than body trunk.

Warm, if possible.

Firm massage toward heart, with balm if available. Do not pound or bruise.

Rest; apply heat.

Bruises

Signs and Symptoms

Pain, swelling, discoloration.

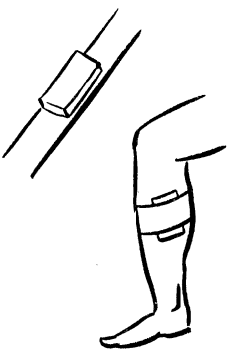
First Aid

Apply ice or cold cloths immediately to reduce swelling and relieve pain.

Elevate injured part.

If skin is broken, treat as any open wound.

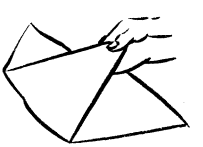
BANDAGING



Always apply sterile gauze pad directly on wound, then bandage over this.

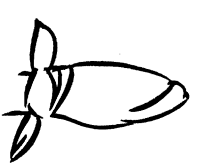
Never use absorbent cotton directly on wounds.

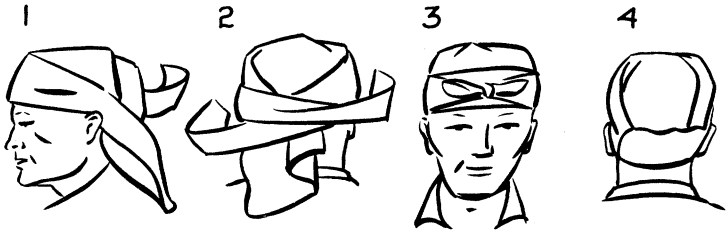
Never use adhesive tape directly on a wound except a narrow bridge, sterilized over flame, to hold wound edges together, as with butterfly taping.



Tie a knot where easy to reach.

Bandage snug but not tight; leave ends of fingers and toes uncovered, if possible, to check on constriction.

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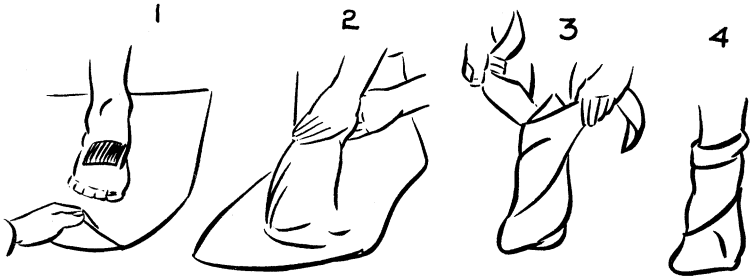
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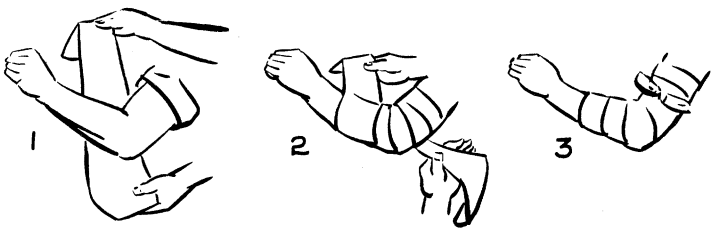
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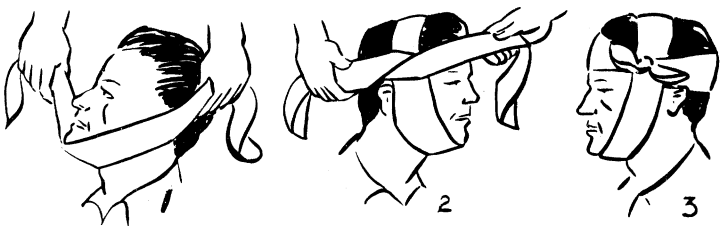
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WOUNDS

Treat all wounds, no matter how small to prevent infection. When bleeding is not severe, infection is the chief danger.

First Aid

If wound is serious and doctor is nearby, cover wound with sterile pad, bandage, and take victim to doctor.

In isolated areas thoroughly wash wound with soap and water, if possible, then cover with sterile pad and bandage; otherwise cover and bandage until washing can be done.

If wound is large enough so that it will have to be sewed up—

Take victim to doctor as soon as possible after washing, covering with sterile gauze, and bandaging. If doctor cannot be reached for several hours, close wound by finger pressure, apply butterfly taping, then bandage.

Dressings on small wounds that are not infected need not be changed.

Puncture Wounds

Encourage bleeding by mild pressure.

Apply sterile pad and bandage.

Always get doctor to clean wound to prevent lockjaw.

Abdominal Wounds

Keep victim quiet and on his back.

Give him nothing to drink.

Do not clean wound; cover with sterile dressing and bandage.

First Aid

If intestine is protruding, don't push it back in—

Cover with sterile dressing kept moist with warm salt water—1 teaspoon to a pint of water.

Raise knees.

Get to hospital as soon as possible, treating for shock enroute.

Animal Bites

Wash wound thoroughly with soap and water.

Apply sterile pad and bandage.

See doctor as soon as possible.

Eye Wounds

Object imbedded in eye or surrounding tissues—

Do not attempt to remove.

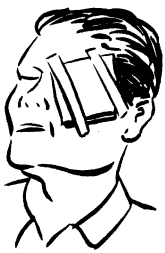
Apply sterile pad and bandage loosely if eyeball is injured, firmly otherwise.

Get to doctor as soon as possible.

To remove object not imbedded in eye —

Pull down lower lid to see if object is there.

If so, remove it gently with handkerchief corner.



If not, grasp upper eyelashes, have victim look upward, and pull eyelid forward and downward over lower eyelid.

Flush out eye with ½ teaspoon of boric acid in glass of water.

If object still there cover with sterile pad and bandage.

Objects Under Skin and Nails

Apply antiseptic, such as tincture of merthiolate or alcohol.

Sterilize needle, knife, or tweezers in flame, then remove object.

Encourage bleeding by gentle pressure.

Apply sterile pad and bandage.

If splinter breaks off under nail, scrape nail thin, then cut out V-piece over splinter and remove as above if patient cannot be taken to doctor within 12 hours.

Blisters

Prevention

If heels are susceptible to blistering, on dry skin before beginning trip apply 2-inch adhesive tape long enough to go from under arch, around heel, and up onto tendon; smooth carefully.

First Aid

Wash with soap and warm water.

Sterilize needle over open flame.

Puncture blister at edge.

Gently press out water or blood with sterile pad.

Apply sterile adhesive compress.

If blister has broken, wash dry with sterile gauze, apply sterile adhesive compress.

Infected Wounds

Signs and Symptoms

Throbbing pain and heat.

Extreme swelling, redness.

Pus and red streaks.

Tenderness, fever.

First Aid

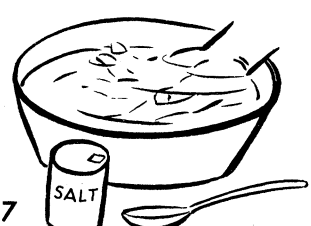
Rest in bed.

Make hot application of 3 heaping tablespoons of salt in 1 quart of water, put infected part directly in the solution preferably.

Change often enough to keep hot; continue for 1 hour.

Elevate part, then repeat hot application in 3 to 4 hours.

Repeat process until victim can see doctor.



MEDICAL EMERGENCIES

Heart Attack

Signs and Symptoms

Pain — violent agonizing pain around heart, usually behind upper breast bone.

Shortness of breath.

First Aid

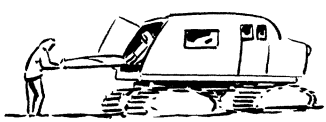
Reassure victim.

Keep him warm.

Keep him absolutely quiet and in position comfortable for him.

Move victim to doctor as soon as possible.

Give morphine if available.



Fainting

Prevention

Victim should sit down and put head between knees, or lie down immediately.

Signs and Symptoms

Perspiration.

Pale face, drooping eyelids.

Dizziness.

Shallow breathing.

Slow, weak pulse.

Unconsciousness finally.

First Aid

Keep victim in lying-down position with head low.

Loosen tight clothing.

Sprinkle cool water on face or use ammonia inhalant on nose unless bleeding.

Keep him resting until fully recovered.

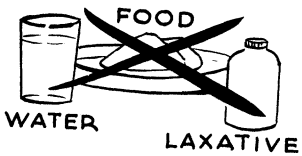
Appendicitis

Signs and Symptoms

Pain over all or part of abdomen.

Nausea and vomiting.

Pain and tenderness in lower right part of abdomen.



First Aid

Put victim to bed.

Don't give food, water, or laxative.

Apply cold compress to relieve pain.

Move victim to doctor as soon as possible.

Diarrhea

Put victim on tea or hot water and dry toast diet until he has no bowel movement for 24 hours.

Resume normal diet.

Internal Injuries

Signs and Symptoms

Nature and extent of injury usually is not clear.

Severe shock is often present.

First Aid

Keep victim lying down, treat for shock.

Do not give him liquids or food.

Transport him carefully in a lying position.

Move victim to hospital as soon as possible.

Earache

Do not allow victim to blow nose hard.

Apply sack or cloth pouch partly filled with hot salt heated in frying pan or some other heat-retaining material.

A drop of warm mineral oil in ear often brings relief.

If this is not effective, try cold pads.

Foreign Bodies in Ear or Nose

Insert warm mineral oil; let only doctor remove object.

TRANSPORTING VICTIMS

Do not be hurried into moving an injured or ill person. Poor methods can result in increased injuries. Victims often must be moved long distances under pioneering conditions, so plan and execute the job carefully to avoid aggravating injury or shock. Consider possibility of helicopter evacuation where difficult trail transportation is the other alternative.

Preparation

Always give essential first aid before transporting, then there is not so great a hurry to move.

Make victim as comfortable as possible; loosen tight clothing; always treat for shock.

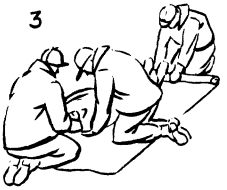
To put blanket under victim, pleat 2/3 of it beside him, grasp him at hips and shoulders, roll him about ⅛ turn away from blanket. Push the pleated part under him, roll him back over the blanket and ⅛ turn in other direction. Then pull blanket on through.

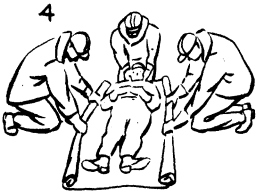
If there is any chance that the victim's back or neck has been injured, pleat the blanket at his head and let all pulling be along the long axis of his body.

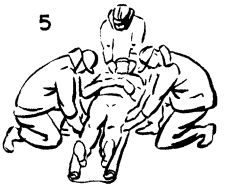
Be sure fractured parts are well padded.

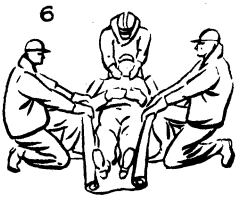
If a victim of a compound fracture of a leg has to be carried a long distance, traction splints will help to decrease serious shock and make him more comfortable.

Watch for dangers of dislocation with too much traction. Do not use traction on arms except in rare cases where serious shock is expected.







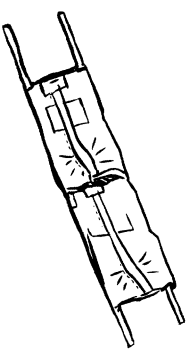


Improvised stretchers are satisfactory for short distances; for longer travel, especially through rough country, use the best equipment and manpower available, allowing for extra men to spell off the others.

Folding-type canvas or metal cots, or even chairs in some cases, are good emergency stretchers.

An air mattress provides for greater comfort on a stretcher and therefore less shock danger.

Toboggan and basket stretcher with extra blankets should be flown in and dropped if possible for back-country stretcher cases.



Loading

To load or unload a stretcher, three bearers are needed, a fourth is desirable.

Place stretcher close to victim, who is on back with feet tied.

Three bearers face victim's uninjured side, one at shoulder, one at hips, one at feet.

Bearers kneel on knees nearest victim's feet, place arms under victim, at neck, shoulder, back, thighs, legs, feet.

Bearer in command says "lift," all lifting victim together up on their knees. Bearer in command pushes stretcher against bearer's toes.

At his command "lower," the bearers gently lower victim to stretcher.

Unloading: Procedure is reversed.

Carrying

To carry stretcher, bearers are on ends, and usually two on each side if terrain permits.

Stretcher is raised and started off on given signals.

The front and side bearers start on left foot, rear bearer on right foot.

Victim is carried feet first except up hills, steep grades, or stairs.

Leg fracture victims are carried uphill feet first and downhill head first.

Rescue crew with a several-mile carry should have 10 to 12 men, paired off according to size, with each pair carrying stretcher for 10 to 15 minutes.

Watch victim for increased signs of shock and apply shock treatment; and check his dressings.

Victim is usually transported with head lower than body, unless head is injured or breathing is difficult.

Victim should be able to see where he is going.

Serious cases should be transported lying down.

Victims with head injuries need particular care. Victim with injury to back of head should be laid on his side.

Never jackknife an injured person into the back seat of a car.

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