

Stalled... *but Safe*

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Only the worst forecasts seem to keep many people at home during the wintertime. Fortunately, most of the people who venture out make it to their destination safe and sound. However, there are always those who become stranded temporarily, and sometimes uncomfortably, for several hours or days as a blizzard rages. Occasionally the storm takes its toll, and reports of deaths hit the headlines.

Traveling during the winter months, in the upper midwest, without planning and being prepared for bad weather can be dangerous and risky. If car trouble develops or an emergency is encountered, travelers may not be able to survive an extended period of time without the basics of shelter, food, and clothing. Survival can be difficult when man is pitted against nature.

Several problems are caused or aggravated by low temperatures and wind. The wind can increase the effects of the cold as it lowers the skin temperature even more. For instance, if the temperature is 30 degrees and there is a wind of 15 miles per hour, exposed flesh will feel an effective temperature of 19 degrees. Then when the temperature drops to minus 10 degrees and the wind rises to 30 mph, the effective temperature on bare flesh will be 39 degrees below zero! Bare flesh will freeze very quickly!



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Wind Chill Factor Comparisons

A wind chill chart tells you how cold it feels like on bare skin as compared to how cold it really is.

	WIND SPEED												
	Calm	5	10	15	20	25	30	35	40	45	50	55	60
T	40	36	34	32	30	29	28	28	27	26	26	25	25
	35	31	27	25	24	23	22	21	20	19	19	18	17
E	30	25	21	19	17	16	15	14	13	12	12	11	10
	25	19	15	13	11	9	8	7	6	5	4	4	3
M	20	13	9	6	4	3	1	0	-1	-2	-3	-3	-4
	15	7	3	0	-2	-4	-5	-7	-8	-9	-10	-11	-11
P	10	1	-4	-7	-9	-11	-12	-14	-15	-16	-17	-18	-19
	5	-5	-10	-13	-15	-17	-19	-21	-22	-23	-24	-25	-26
R	0	-11	-16	-19	-22	-24	-26	-27	-29	-30	-31	-32	-33
	-5	-16	-22	-26	-29	-31	-33	-34	-36	-37	-38	-39	-40
A	-10	-22	-28	-32	-35	-37	-39	-41	-43	-44	-45	-46	-48
	-15	-28	-35	-39	-42	-44	-46	-48	-50	-51	-52	-54	-55
T	-20	-34	-41	-45	-48	-51	-53	-55	-57	-58	-60	-61	-62
	-25	-40	-47	-51	-55	-58	-60	-62	-64	-65	-67	-68	-69
U	-30	-46	-53	-58	-61	-64	-67	-69	-71	-72	-74	-75	-76
	-35	-52	-59	-64	-68	-71	-73	-76	-78	-79	-81	-82	-84
R	-40	-57	-66	-71	-74	-78	-80	-82	-84	-86	-88	-89	-91
	-45	-63	-72	-77	-81	-84	-87	-89	-91	-93	-95	-97	-98

Wind speeds greater than 40 mph have little additional chilling effect.
(Environment Canada)

Know These Winter Weather Words

Watches and warnings for hazardous winter weather are issued by the National Weather Service. These weather statements should be listened to carefully since the weather affects all of us.

Winter Storm Watch

Severe winter weather conditions may affect your area.

Winter Storm Warning

Severe winter weather conditions are imminent.

Ice Storm Warning

Significant, possibly damaging, ice accumulations can be expected. Freezing rain or drizzle means precipitation is expected to freeze when it hits exposed surfaces.

Heavy Snow Warning

A snowfall of at least 4 inches in 12 hours or 6 inches in 24 hours is expected. Heavy snow can mean lesser amounts where winter storms are infrequent.

Blizzard Warning

Considerable falling and/or blowing snow and winds of at least 35 miles per hour are expected for several hours.

Severe Blizzard Warning

Considerable falling and/or blowing snow, winds of at least 45 miles per hour, and temperatures of 10 degrees F or lower are expected for several hours.

High Wind Warning

Winds of at least 40 miles per hour are expected to last for at least one hour. In some areas, this means strong, gusty winds occurring in shorter time periods.

When bad weather is predicted, it is only common sense to take precautions. If you must travel, plan carefully and notify people of your plans. Otherwise, postpone the trip, or delay your trip enroute and stay secure in a town along the way. Let others know of your plans when you decide to stop for the storm to prevent possibly life threatening searches for you.

Plan Your Trip

Obtain weather and road reports from your local law enforcement office, or a radio or TV station which receives hourly weather and road reports, or call one of the numbers listed at the end of this publication.

Tell someone of your plans, route, alternate route, destination and estimated time of arrival. When you arrive at your destination, tell those who need to know.

Dress according to the weather conditions and be prepared for worse conditions.

Do not leave without a full tank of fuel and check the engine's oil level.

Check the vehicle for survival equipment, and don't leave without it.

Winter Driving

Winter driving puts added strain on cars and drivers alike. Well-equipped and winterized, your car can take you safely to your destination. In the event of an emergency, the well-equipped car can provide you with lifesaving shelter and provisions. The following tips may help you get your car in shape for winter driving:

- Check the headlights and tail lights. Do they all work?
- Does the car's defroster/heater work properly?
- Is the exhaust system free of leaks that can cause asphyxiation?
- Use the recommended weight and grade of oil in the engine for winter conditions. Low temperatures can cause oil to thicken, making starting more difficult and adding strain to the battery.
- Is the battery in top condition? The power of a battery declines as the temperature drops. Most new batteries today are considered maintenance free and fluid levels cannot be checked. However, if the battery is nearing the end of its warranty life, maybe it should be replaced. Be sure the terminals are clean and tight.
- The fan and alternator belts need checking. Broken belts are not easy to replace in rough winter conditions and the engine may not run for very long without them.

- The engine cooling system must have antifreeze protection to the lowest temperature you expect. Hoses and clamps must not leak. Flush and replace antifreeze that is older than two years.
- Is the engine properly tuned for winter conditions? An out-of-tune engine can be very difficult or impossible to start in below-zero temperatures. A good winter tune-up is travel insurance.
- Are the windshield wiper blades in good shape? Good vision is essential in winter driving conditions.
- Are the brakes in good, safe condition? Brakes that are poor in summer are much worse in winter. If the brakes are suspect, have them checked at a competent brake shop.
- The car radio should be in good working condition; it will keep you advised of weather conditions as you travel and entertain you if you should become stranded. A cell phone or CB radio is communication that can speed up rescue efforts.
- Keep the gas tank as full as possible. More condensation will form in a half-full tank than in a three-fourths full tank. This can lead to ice-plugged fuel lines and stalled engines. Fuel filters should be clean and free flowing.
- Snow tires provide 51 percent more pull in snow and 28 percent more pull on ice than regular tires. Tire chains provide three times more pull in snow and six times more pull on ice. Use tire chains that fit properly. Don't mix radial tires with bias ply tires (especially side-to-side); vehicles will be dangerously difficult to control.

There is little difference between snow tires and regular tires in stopping performance. However, tire chains can cut the stopping distance in half. There are other traction products that can work with varying results. You should try them before depending on them for the winter.

Front-wheel drive cars do not need added weight for improved traction. But, extra weight can be added to the trunk of a rear-wheel drive car for winter traveling. This is often in the form of sand bags (can be handy on ice) or salt bags. Adding too much weight can adversely affect handling. A guide to use is: add 75 pounds for subcompact cars, 100 pounds for compacts and intermediates, and up to 150 pounds for full-size cars. Sand can be useful with front-wheel drive cars to improve traction on slippery surfaces for short distances.

Tests have shown that decreasing the tire pressure in the drive wheels will not improve traction of any style of car. Tires, snow or regular tread, will perform their best at normal inflation pressures. The lower tire pressure will only cause tires to wear faster, make handling difficult and very dangerous, and adversely affect the ride.

Vehicle Equipment

Winter travel requires that some additional safety and repair items be added to the trunk of the car. You should always have a good spare tire, tire wrench, and jack to change it with. You should also carry tire chains, container of sand, booster cables, tow rope or chain, gasoline antifreeze, windshield cleaner fluid, flares, repair tools such as pliers, wrenches and screwdrivers, pocket knife, bright red or orange cloth, 50 feet of nylon rope, and a shrill plastic whistle for signaling. In the car, you should carry a fire extinguisher and flashlight with spare batteries, they work better when they are warm.



In The Trunk – Items to keep in the car trunk during the winter months include: good spare tire; tire chains; small shovel; sand or cat litter for traction on slippery surfaces; jumper cables; tow chain, strap or rope; small hand tools; 50 feet of ¼ inch rope; ice scraper with snow brush.



In The Car – Keep these items in the passenger compartment: fire extinguisher, gas line antifreeze, windshield de-icer, 50 feet of ¼ inch rope, flash light and spare battery, ice scraper with snow brush, pocket knife, two-way radio set or cell phone, sunglasses, small candles, maps or road atlas.

Winter Driving Techniques

When your car is tuned up and prepared for winter travel, knowing a few driving techniques can help keep you out of many stalled situations.

Winter driving always requires allowing extra time and **SMOOTH AND GENTLE DRIVING**. Your driving habits must change with the seasons if you are to stay out of trouble. Turns cannot be taken as fast as in the summer. Starts must be slower and stops must be planned much more in advance. Even tire chains on ice take as much as four times the distance as regular tires on dry pavement!

When the car does go into a skid, you should turn the steering wheel to steer in the direction of the skid and remove all pressure from the gas pedal. As the car starts to straighten out, steer accordingly so that it continues straight and in control. Apply pressure to the gas pedal only when you have obtained directional control of the vehicle. If you need to stop in order to regain your composure and calm down, then do so as soon as it is safe to stop.

Stopping on ice and snow is different than on dry pavement, just use a firm pressure on the pedal without pressing too hard. Do **NOT** pump the brake pedal of a vehicle equipped with ABS (Automatic Braking System) brakes. The ABS brake system will automatically pump the brakes for you, faster than you can and stop the vehicle safely. Most vehicles equipped with ABS brakes can be identified by the ABS logo, showing up someplace on the instrument panel when the engine is started.

If the front wheels of a vehicle are braked hard enough to stop turning, they will not guide the vehicle; it will just slide straight ahead regardless of what you do with the steering wheel. You do not have steering control when the front wheels are sliding.

For cars without ABS, pumping the brakes is the most effective way to stop the car and maintain control. The brake pedal should be pumped rapidly enough that the wheels do not stop and remain locked up. You must plan your stops ahead of time, and always be prepared to stop, since stopping the car by pumping the brakes does require more time.

If you should become stuck in snow, you can often

rock the car out without damaging the transmission if you do it correctly. Otherwise, delays can be longer and repairs can be expensive, in addition to the towing charge.

Use the forward and reverse gears to move the car back and forth in its stuck position. Stop the car at the end of each forward or reverse run so that the driving wheels are stopped before shifting to the opposite direction. Do not shift the transmission into the opposite gear if the driving wheels are still rotating; use the brake gently to stop them. Easy does it! Do not attempt to use speed to get out; it is hard on the drive system of the car and can be more dangerous. Slow and easy is the best advice. If the car is hung up on accumulations of snow, the snow under the car must be removed before the vehicle is going to move, and some shovel work will need to be done.

Car Sizes

Tests conducted by the National Safety Council revealed that small cars have some advantage over larger cars when stopping on glare ice, but do not have as much starting traction. Many of the smaller and intermediate sized cars have front-wheel drive, which has a distinct advantage over rear-wheel drive in steering, starting, and stopping.

When You Become Stuck and Stranded

The first rule of survival when you become stuck and stranded in your car is to **STAY WITH THE CAR!** The only time you should dare to venture away from the vehicle is after the storm has gone down and you can easily see an occupied house. Your sense of direction is almost immediately lost when you attempt to walk in a blowing snow, white-out situation. When people are disoriented in a white-out situation, they tend to walk in a circle. The snow will have already filled in their tracks when they circle around to where they have already walked, so they don't know where they have been or where they are going.

Soft snow is one of the most difficult materials to walk in. A snow depth of more than 4 inches will cause a person to walk in an unnatural, bent-over position. This position, along with the effort of lifting the feet

much more than usual to clear the snow, will fatigue a person very quickly. The cold and wind also accelerate the loss of energy. Very quickly, the body cannot expend enough energy to maintain strength and internal body heat. Hypothermia develops quickly. The distance you can cover on a good day is impossible while attempting to walk in a storm.

It is always better to stay in the vehicle where you are protected from the wind and cold. It requires much less energy consumption to stay with the car and minimize activity. Many more storm survivors are found alive and well in their car than are found walking around in the snow, wind and cold. Those who leave their vehicle are usually found frozen in a snowbank or draped over a fence, dead. Stay in the car and survive!

Hypothermia

Hypothermia is the number one killer of many outdoor sports enthusiasts. It has often been called 'The Killer of The Unprepared.'

Symptoms

Hypothermia is a condition where the body temperature, or core temperature, is lowered too much. The blood has cooled down, and the oxygen carried to the brain has been reduced, dulling the senses. The victim is fatigued, delirious, and loses the dexterity of the arms and legs. When the body's core temperature continues to drop and nears 85 degrees F, the victim will slip into unconsciousness. Treatment must be started immediately to prevent failure of the heart and lungs, and possibly death.

Symptoms of hypothermia are fairly easy to identify and treatment is effective if done promptly. Don't wait!

- Uncontrollable shivering is one of the most obvious, early signs of hypothermia.
- As the situation continues to worsen, the victim becomes clumsy, loses dexterity of the limbs, loses reasoning and memory, goes into muscular rigidity and death follows very soon.
- The symptoms are very difficult or impossible to diagnose on yourself because of delirium and loss of the ability to think clearly or at all.
- The loss of body heat must be reversed.

Treatment of Hypothermia

- Prevent further heat loss. Get the victim out of wet or cold clothes; they will significantly slow the warming process. Put the unclothed victim in a sleeping bag with one or two other unclothed persons. Their body heat will transfer quickly to the victim, raising the body temperature.
- You must add heat to the body in most cases of hypothermia. If the victim is conscious and able, feed warm drinks. But no alcoholic beverages! Place a scarf over the victim's mouth to warm the inhaled air. The victim cannot produce enough heat to return to normal body temperature, so heat must be added.
- Treat the victim very gently! Do not massage or rub down the victim, it may cause tissue damage. Jostling the victim can cause heart stoppage in severe cases.
- Minimize any movement of the victim. The energy reserves of the victim have nearly been used up and must be conserved for body heat. The victim will be nearly in shock and further activity can bring on shock. Activity could bring on cardiac arrest due to the colder blood cooling the heart.

Prevention of Hypothermia

The best way to prevent hypothermia is to stay warm and dry with the proper combination of preparation, clothing, food, and exercise to maintain good circulation.

Persons trapped in a blizzard should sleep with caution. You have a lower metabolic rate when you sleep so you produce less body heat. Some sleep is necessary, but do not remain idle and sleeping for long periods of time. Stretch and exercise periodically to maintain circulation.

Eating before sleeping will help to maintain body heat. Avoid medications that may induce sleep.

If you are not alone, take turns sleeping for short spells of time. There must always be someone awake in the car to watch the storm conditions, listen for weather forecasts, maintain emergency heating efforts, and respond to rescuers.

Clothing and Bedding

Warm clothing and bedding reduces body heat loss, making it easier to maintain a safe, comfortable body temperature. There are several ways to reduce heat loss.

- **Stay in the vehicle.** This eliminates the wind chill factor; there is no wind in the car to blow away body heat. The chance of hypothermia is greatly reduced also.
- **Wear clothing in layers.** One heavy coat is not as effective at maintaining body heat as is a number of layers of clothing. It is also easier to keep from overheating since clothing can be taken off a layer at a time. There must be an air space between the layers; the clothing must be loose. Stuffing your foot with several socks on into a tight fitting boot will not be as effective as fewer socks or a larger boot. Mittens are always warmer than gloves since all the fingers share the heat.
- **Keep dry!** Moisture is very effective at carrying away body heat when it evaporates. Replace damp socks with dry ones to keep your feet warm and dry. Avoid exercise that brings on a sweat, however slight it may be. A chill or shiver results in a loss of body heat that is difficult to regain. It is essential to keep dry, even more difficult in a storm with wet snow.
- **Take advantage of whatever insulation you might have.** Sitting on layers of newspaper can help. Insulate between yourself and the car door with layers of newspaper. However, take extreme care if you must smoke! Foam pads, wooly sheepskin (real or fake), blankets, even a reflective space blanket will help to keep you warm. If you have it use it!

What To Wear – The Layer System

The layer system described here is what you should use when you are stranded in a vehicle with little or no additional heat for warmth. These materials should be kept available in the vehicle throughout the winter months as survival gear. Residents and visitors of the Upper Midwest states should take this seriously; it can mean life or death!

LAYER ONE – Long underwear; choose cotton-lined wools or blends, or mesh. All cotton underwear is less



Clothing To Bring Along – Winter coats or parkas, balaclava, insulated gloves, stocking cap, insulated footwear, heavy socks, sleeping bag or quilts.

warm. Wear one pair of cotton socks under two pair of wool socks.

LAYER TWO – Long-sleeved turtle neck sweater or wool shirt and a coat or V-neck sweater and wool pants.

LAYER THREE – A jacket or parka with a wind proof, water resistant (it must breathe) outer layer. The insulating material can be fiberfill, downfill, or other insulating material. The liner or inner layer should be comfortable. Alternating quilt stitching should be used to prevent cold seams and spots. The jacket or parka should have a hood (snorkel type preferred). Insulated pants of the same construction should be worn also. A long coat is warmer than a car coat. A two-piece snowmobile suit with bib-type pants is warmer than an all-in-one. Long sleeves can cover your mittened or gloved hands for another layer. High necks should be selected as well as raglan sleeves, storm flaps over buttons, zippers, pockets, and belts.

LAYER FOUR – Sleeping bags designed for winter use. Summer weight sleeping bags do not have the

insulating capacity but will be better than none at all. Several blankets, including a reflective space blanket, are another option.

It is essential to wear a cap or hat since most of your body heat lost is lost through your head. Wearing a hat will keep your hands and feet warmer since that heat will not be lost through the head. The choice of hat is yours, but it should be insulated and fully cover the head and preferably the ears. A balaclava is an excellent choice since it can be worn rolled up like a conventional stocking cap or rolled down for full-face protection. A warm, knit scarf is good for the neck and can be worn across the face for good protection. Wool is warmer than synthetic, but if it isn't comfortable, it won't be worn; wear what is comfortable to you.

Sunglasses are not just for the summer. Sunlight reflected from the snow can be blinding. Sunglasses will reduce the glare and protect against snow-blindness. Select gray or green lenses. Orange and yellow lenses may increase the strain on your eyes, use with caution.

Use lip balm, hand lotion, or frost-protective cream to prevent chapped skin and lips.

Other individual needs must be met also. For families, don't forget such things as diapers and other sanitary needs. An infant with soiled diapers and no replacements available can be big trouble in no time.

Water and Food Supplies

If you don't take anything else along, carry a gallon of clean water. A lack of water can cause dehydration, a dangerous state. The body's most important need is clean, drinkable water.

You'll need to drink one to two quarts of water per day. This can include other liquids such as soft drinks, fruit juice, liquids from canned goods, coffee, tea, cocoa, or bouillon, but not alcoholic beverages. Melted snow should be used only if necessary and then it must be warm. Cold drinks will use up precious body heat; don't drink them. One gallon of fresh water should be available for each person traveling.

Some emergency food should be taken along even though a healthy person can go without food for up to 30 days. Most storms will last only two to three days, so vast stores of food are not really necessary. Food is a great morale builder.



Emergency Food Supplies – High energy breads or pastry, drinking or distilled water, breakfast bars, nuts, fruit, high energy candy bars. Keep these items warm, not frozen.



Medical Supplies – Toilet paper and large can, facial tissues, first aid kit, prescription medical supplies, tooth brush and tooth paste. Keep these items warm, not frozen.

For three days for each person you should carry along:

- One gallon of clean water
- Six cups of gorp (2 cups raisins, 2 cups peanuts, 2 cups chocolate chips or M&Ms)
- 18 pieces of fresh fruit. Choose from bananas, apples, oranges, pears, etc.
- Canned goods may be brought along with the can opener!
- 18 bread items such as cupcakes, sweet rolls, or doughnuts.

Each day, eat up to two cups of gorp, six pieces of fruit, and six bread items (not all in one serving). This food intake will provide approximately 2,700 calories per day.

Food and water should be kept inside the car to prevent freezing. Select foods to match the tastes and diets of the people traveling. Alcoholic beverages should be avoided but tobacco products should be provided for those who really need them. Survival during a storm is not the time to quit smoking, cold turkey! Alcoholic beverages dull the senses, impair judgment and affect the activity of the consumer — none of which is needed in a survival situation. A sober person is warmer, too.

Medicinal Supplies

Along with your first aid kit, take a box of tissues, toothbrush, wet towelettes, needed medications such as insulin, sanitary supplies and a covered container for toilet use.

Exercises To Do

As you sit in the car, your body will burn up about 2,700 calories per day if you're a male weighing 175 pounds or 1,700 calories if you're a 120 pound woman. At 155 pounds, you'll need roughly 2,400 (male) or 2,100 (female) calories.

As you move about, calories stored in your body are burned, providing energy to do work plus creating a good amount of heat. This heat warms you and the area around you.

Exercise, therefore, will heat both you and the vehicle. It will also loosen cramped muscles. Here are some to try. Use the minimums if you are not in the habit of exercising. Repeat exercises approximately every hour and a half.

NECK ROTATION – Lean head toward left shoulder and rotate back, right, front, and left. Return in opposite direction. Repeat three to four times.

NECK EXTENSION – Lace fingers behind your head. Push head back as hands resist. Do with head bent forward, straight, and back. Resist for six seconds at each place, counting 1001, 1002, etc., for each second.

ELBOW PULL – With the other hand, gently pull your elbow behind your head to stretch back of arm and shoulder. Hold for 30 seconds. Then pull other elbow. Repeat two to three times.

HAND PULL – With elbows at shoulder height, hook hands together in front and pull out. Hold for five seconds, then repeat two to three times.

HAND PUSH – This time, push hands together as described above.

LEG SQUEEZES – Place feet 18 inches apart as you sit. Cross the arms and place left palm on inside of right knee and right palm on inside of left knee. Squeeze legs together and resist with hands. Do once.

LEG SPREADERS – Sit as above. Place right palm on outside of right knee and left palm on outside of left knee. Spread knees apart and resist with hands. Do once.

GROIN STRETCH – Bring your feet up to the seat cushion. Put soles of feet together, hands across them. Pull forward to stretch the groin and back. Lean on your knees, but don't bounce. Hold for 30 seconds. Repeat two to three times.

HAMSTRING STRETCH – Stretch out the left leg. Fold right leg with the foot near inner left thigh. Attempt to grab left ankle and stretch. Relax and hold for 30 seconds. Repeat for other leg. Repeat two to three times.

LOW BACK STRETCHER – Sit sideways with your feet straight out on the cushion. Bend one knee and grasp this leg and pull it toward your chest as you curl your shoulder and head toward the knee. Hold for three to four seconds. Return leg to cushion. Repeat for the other leg. Alternate two to four times for each leg.

CURL UPS – Sit sideways on the seat with knees bent and feet flat on cushion. Lie back as far as possible. With hands behind the head, curl up to a sitting position. Repeat three to four times.

SITTING TUCK – Sit sideways on the cushion, back to the door, with legs bent. Extend legs straight out with heels off the cushion. Return to tuck position. Repeat five to fifteen times.

These exercises can provide some variety during the hours you may be stranded. If there is more than one person in the car it may be interesting to complete the exercises, including moving around the vehicle to get into position. Open the car doors as little as possible so as not to lose any of the accumulated heat during the storm.



Entertainment Materials – A variety of magazines, paperback book, personal tape/CD player, small radio, fresh spare batteries, stationery, pen or pencil.

Entertainment Supplies

Reading materials, a deck of cards, and games can be carried in the car, taking up little space. Other items that will help to spend the time are stationery, pencils, a transistor radio, and fresh batteries. A wind-up alarm clock will be handy to safely limit the time spent sleeping.

Heating and Ventilation

There are several ways to keep warm when you are stalled in a vehicle during a winter storm. The basic one is to **STAY WITH THE CAR**; eliminating concern about the wind chill factor. Other ways are wrapping up in warm clothing, eating and exercising. Eating makes it possible for the body to produce more heat. That heat can then be captured with the use of warm clothing, sleeping bags, etc.

If additional warmth is needed, there are several possibilities with emergency heating devices. However, they must be used with extreme caution. Spilled fuel, a tipped over heater, and combustibles too close to heaters all present a severe fire danger. Your car is your only protection against the wind and cold, you don't want to lose it to a fire! The interior of most cars contains a lot of plastic which will burn amazingly fast.

Carbon monoxide is also an ever-present danger when you depend on combustion for heat. The danger of asphyxiation is a very important consideration when using these heaters in a very confined space such as the interior of a car.



Supplemental Heaters – Roll of toilet paper saturated with antifreeze (ethylene glycol) in large coffee can, multi-wick candle unit, box of kitchen matches. Use these items with extreme care.

Sources of emergency heat

- A lighted candle provides very little heat in the car. Candles may produce up to 75 to 85 BTUs per hour to be used for melting snow to drink.
- A multi-wick candle is claimed to keep the interior of a car comfortable for 24 hours. This product, which could be made at home, consists of a number of wicks in a paraffin/sawdust mixture poured into a shallow pan. It must be used with extreme care since several flames are burning at a time. The heat produced increases with the number of wicks burning.
- A can of Sterno will burn for about an hour depending on the size of flame and the size of the can. The open flame requires that extreme care be given to its use.
- Propane heaters will provide approximately 12,000 BTUs of heat. The open flame makes it a very dangerous heater with extreme risk in a very combustible environment such as a car's interior. The size of the flame affects the burning time and the heat produced.
- Catalytic heaters, used properly, are considered to be quite safe except for the carbon monoxide poisoning risk.
- A roll of toilet paper can be put in a three-pound coffee can with a small amount of ethylene glycol antifreeze for fuel. The toilet paper acts as a wick and the antifreeze burns with a low, clean flame, that produces carbon monoxide!

All heaters that produce heat from combustion produce carbon monoxide, an odorless gas that kills. Carbon monoxide ties up the oxygen carrying capacity of your blood and asphyxiates you; it is a silent killer.

Since these heaters all use oxygen while they operate, always open a window slightly on both sides of the car to prevent asphyxiation and allow for moisture removal. Opening a window on each side of the car allows for fresh air to replace the fouled air from the oxygen-using heater.

Do not sleep with the heater operating. It could asphyxiate you, or tip over and start a fire.

A small, dry chemical fire extinguisher should also be kept with the emergency heater in the car. The extinguisher will be useful if the emergency heater should start a fire and it is caught right away.

Another source of heat is the car's heater. There are several problems with relying on this, however. Leaks in the exhaust system can cause carbon monoxide poisoning if ventilation of the car's interior is not safely managed. The wind can carry exhaust fumes up to the air intake of the heater, causing a build-up of carbon monoxide inside the car. Two other problems associated with using the car's engine and heater are managing the fuel supply and preventing the engine from icing up when it is periodically started, warmed up, and then shut off.

If possible, face the vehicle into the wind. The car and its heater are designed to operate safely in this position. Keep the exhaust clear of snow. If the car cannot be moved to face into the wind, open a window slightly on the upwind side, for ventilation. This will tend to pressurize the interior of the vehicle with clean air and keep exhaust fumes out. An open window on the downwind side may actually draw exhaust fumes into the car, causing a build-up of deadly carbon monoxide.

The fuel capacity of the vehicle may be another problem. The average eight cylinder engine, while running at idle, will consume about one gallon of gasoline per hour, while six and four cylinder engines burn less. It is not likely that you will have more than a day's supply of fuel for continuous running of the engine when you become stranded. For example, some will have been used already in attempts to get the vehicle free.

The coldest weather usually follows a blizzard, so you may want to conserve the fuel available for that time. But you will also be faced with the problem of keeping the engine warm enough that it will start when you do need heat. This leads to the suggestion that the engine should be used intermittently to keep you warm.

The frequent starting of the engine will put an extra hard strain on the battery when it is not at its best. Remember, batteries are weaker in cold temperatures. The intermittent starting and stopping of the engine will also allow time for snow to blow and drift into the engine compartment, melt, wetting the engine's electrical system and then freeze. This may make it virtually impossible to start the engine the next time.

Managing the use of the engine for heat can be very difficult at best. It is best to store the necessary clothing, sleeping bags, and food in order to be prepared for the time when the engine cannot be depended upon for heat. Remember, there are those who successfully enjoy winter camping and fare quite well without a lot of additional heat. However, they are definitely prepared for it. You can survive winter blizzards with adequate preparation and wise use of what you pack ahead of time.

What To Do If Caught In A Storm

Expect to spend three days in the car! Therefore, plan to use your resources gradually. Be organized in what you do. Take time to consider each step carefully. **STAY IN THE CAR!** Your chances of survival are much, much better if you do. Call an emergency number on the cellular phone; or periodically call for help with the CB radio if you have one. Use channel 9, the emergency channel on your CB, or other channels where you may hear local conversation. Bad weather may cause freak transmissions and poor reception.

If possible, position the car so it faces into the wind. The car was designed to be warmest when headed in this direction. Be sure that the exhaust is free of snow and check it periodically if you use the engine for heat. Otherwise, **STAY IN THE CAR!**

- Tie a colorful, red preferably, banner on the car antenna. Tie a nylon cord or rope to the car and yourself if you must leave the vehicle for any distance during the storm. This will help to ensure your return.
- Move all of your emergency supplies from the trunk to the interior of the car as soon as you realize you will be staying for a while. Put on the warm clothing NOW, before you get cold. It is easier to stay warm than it is to regain lost warmth. Loosen tight clothing so body heat can circulate. Remove metal jewelry as it can chill you.
- Check your supplies to see what you have to work with and when you can plan on using it. Arrange supplies in order for their use.
- Manage your heating systems carefully. Make sure everyone knows what is to be done and how it is being done.
- Listen to weather reports on the radio. Prepare to send signals for help if road or rescue crews are reported to be in your vicinity. Flashing lights and horns can be effective for a distance if the wind has died down.
- Now, **RELAX AND TAKE IT EASY!** Whatever you were planning on attending or visiting, stop worrying about it — you are not going to get there in time. It must be accepted that you will not be going anywhere for a while, so enjoy the opportunity for some free time.
- A tip from cold weather campers - eat a snack of high calorie food just before sleeping to stimulate your metabolism (heat production). If you awaken due to the cold, eat some more high energy food and add another layer of insulation such as more clothing or a blanket. These campers survive — so can you!

These telephone numbers are available for statewide road and weather information.

Weather reports are also broadcast over the NOAA weather radio network.

Illinois	1-800-865-5394
Indiana	1-800-261-7623
Iowa	1-515-288-1047
Michigan	1-800-381-8477
Minnesota	1-800-542-0220
Montana	1-800-226-7623
North Dakota	1-701-328-7263
Ohio	1-888-264-7623
South Dakota	1-605-773-7515
Wisconsin	1-800-762-3947
Wyoming	1-888-996-7623

These Web sites will connect you with statewide and area weather forecasts and state road maps which show road conditions as affected by weather and construction. Check them before leaving on your trip!

Illinois	http://illiniweather.com/pages/midwest_road_reports.htm
Indiana	www.IN.gov/isp/roadinfo/weather.html
Iowa	www.earthsat.com/iowa/winter.html
Kansas	www.ink.org/public/kdot/divplanning/roadrpt/
Michigan	www.msp.state.mi.us
Minnesota	www.dot.state.mn.us/winter.html
Missouri	www.modot.state.mo.us
Montana	www.montana.edu/msuinfo/gen/wx/
Nebraska	www.dor.state.ne.us/rca/index.htm
North Dakota	www.state.nd.us/dot/rrs_mapc.html
Ohio	www.odotonline.org/otis/winter/
South Dakota	www.sddot.com/Operations/Road_Condition_Report/index.htm
Wisconsin	www.dot.wisconsin.gov/travel/road/winter-roads.htm
Wyoming	www.wyoroad.info/

For more information on this and other topics, see: www.ag.ndsu.nodak.edu

