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Book 7 Objectives

Completing all the activities in Book 7 will assist you in improving your professional driving abilities by:

- Practicing backing maneuvers.
- Describing how to adjust speed and space for winter driving conditions.
- Identifying safe places to pull over during extreme weather conditions.
- Practicing winter driving techniques that are used for shifting on grades.

Plan Time for Learning

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An effective learning approach for some apprentices is to first review the topics and then complete the associated activities. This may take **4 hours** and 30 minutes to complete.

### Improving Backing Skills

**Activity – Practice Backing**

*Note:* For safety, your trainer will need to be with you at all times while practicing backing. There are no exceptions to this rule.

If you need to review steps in backing, refer to Module A, Books 1 and 2.

Remember to spend time talking about backing with your trainer. You should try to get at least 2 of the required 15 backing practice sessions to complete this book.

**What you should do:**

1. **Step 1** For this activity, select a location to get one hour of backing practice. It may take more than one location to complete an hour of practice.

2. **Step 2** Keep track of your backing practice sessions in the table provided.

### Keep Track of Your Backing Practice

<table>
<thead>
<tr>
<th>Date</th>
<th>Start Time</th>
<th>End Time</th>
<th>Where did you get your backing practice?</th>
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2
Step 3  What do you feel you still need to work on in your backing? Set specific goals with your trainer.

Activity – Watch the Highlights of Winter Driving

The driving techniques you use during the winter should be used year-around. This video provides tips and safety measures for winter driving.

What you should do:

Step 1  Watch The Highlights of Winter Driving videotape or DVD.

Step 2  Take notes. You will be asked questions on the Qualcomm quiz and during your check call.

Preparing Your Vehicle for Winter Driving

Most of what it takes to drive safely in winter weather is respect for Mother Nature and a light touch. The key is to maintain traction and have a steady pull on your trailer. But the first thing you need to know to be ready for winter is how to prepare your vehicle.

Take the following actions to prepare your vehicle for winter.

Winter Wise Checklist

Air Dryer

- Check your air dryer to make sure it is working properly.
- Have it serviced if you are getting more than a few drops of water when you drain the air tanks.
If your vehicle has moisture controls such as spitter valves, check to be sure that they are operating properly.

Belts and Hoses
- Check for roughness, cracking and excessive wear.

Brakes
- Check the condition and adjustment of all brakes.
- Get them serviced, if needed. (Note: Unevenly or incorrectly adjusted brakes can cause a skid.)

Chains
- Make sure you have good, usable chains on your truck.
- Take them out and inspect them. (See section, Time to Chain Up for details.)
- Make sure they fit, you have all the pieces, and that they are not damaged.
- Replace them if necessary.
- Know how to put them on. Review the Chain-Up video and do a trial run before the weather gets bad. Your trainer has a copy of this video.

Engine Coolant
- Check level of engine coolant frequently. Winter weather changes make it tough on the cooling system.

Engine Exhaust Systems
- Make sure exhaust connections are tight. This is necessary to keep carbon monoxide or other dangerous gases from leaking into the cab.
Fuel Blends and Additives
- Under normal winter conditions, do not use fuel additives or blend fuel. Fuel stations will sell fuel already blended for their location during cold weather.

Heaters
- Service your auxiliary bunk heater (Webasto or Espar) and make sure it is in good repair.
- Have a bunk warmer mattress pad that is in good working condition.
- Make sure mirror heaters are working.

Lights and Reflectors
- Be sure your lights and reflectors are not dirty, muddy, salty, icy or snowy.
- Check them often during your trip.

Tires
- Make sure all tires, including spare, have good tread. Drive and steer tires should be NO LESS than 2/32" (4/32" for driving on snow). Trailer tires should be no less than 3/32”.
- When going from warm to cold climate, verify tire pressure (when checked cold, maintain pressure at 100 PSI).

Trailer
- Spray the trailer door seals and trailer slider mechanism with a lubricant such as WD-40. This will keep them from freezing.

Wiper Blades
- Replace windshield wiper blades (consider heavy-duty blades).
- Put “winter mix” washer fluid in reservoir.
- Check the reservoir often to make sure it is full and not frozen.
- Carry an extra set of wiper blades.
Wiring and Air Lines

- Remove ice and snow from all wiring and air lines before and during a trip. This is especially important for air lines under the trailer as heavy ice can pull them down so they catch on ground hazards and break.
- Make sure glad hands are always stored properly so water, snow, or ice does not get into air lines.

⚠️ CAUTION: DO NOT put methanol in the glad hands or other parts of the air system to keep it from freezing. Methanol destroys the filter beads in modern air dryers and you wind up getting even more water in your air system.

Go through the C. R. England Winter Driving Kit Checklist (back of this book) to make sure you have what you will need on your truck to drive safely through bad weather.

Preparing Yourself for Winter Driving
Trip Planning for Winter Success

Always expect that weather could delay you. The winter season will put your trip planning skills to the test. Here are some ideas on how to get both yourself and your load to your customer safely and on time.

❖ Do not delay. When you have good driving conditions, make the most of them. The good conditions may not last too long.
❖ Be flexible and communicate with your DM whenever weather delays you.
❖ Use hand and toe holds when you enter and leave the cab. Keep these holds free of ice and snow. If you need to, use a brush to clean them before getting out of the cab.
❖ Be prepared to chain up. It will save you a lot of time if you have practiced the procedure to put on chains.
❖ Make a solid plan before you start the trip of where you will stop for food, fuel and sleep.
❖ Have a truck stop locator guidebook and an Exit Guide. When the weather gets bad, you do not want to have to guess about where you can safely park your rig.
❖ Keep track of what the weather is doing, not only where you are now, but where you are traveling in the next few days.

For Reliable Weather Information:

☑ C.R. England’s weather desk, 800-421-9078
☑ CNN TV station national weather updates on the ½ hour
☑ The Weather Channel (SLC office runs the channel all day)
☑ National Weather Radio Service broadcasts on 162.40 to 162.55 MHz
☑ USA Today newspaper (back page of front section has an excellent weather map)
☑ Weather broadcast banks on CB radio or regular radio
☑ CRE Qualcomm Weatherwatch daily messages
Pay extra attention to planning your route in bad weather. Have a safe back-up route in mind in case your main route is closed by weather or an accident. Look for alternate routes that would go around high mountain passes and discuss possible options with your D.M.

If the weather forecast shows a high risk for storms on your designated route, make sure you plan for driving at slower speeds.

“In Wyoming it only snows once a year and then the rest of the year it just keeps blowing around.”

**Seeing It Coming**

When you see trucks coming towards you with snow and ice on their landing gear, it is a good sign that there is bad weather ahead. Snow collected under windshield wipers or on the grill of an approaching vehicle would be a sign of snow just ahead. If you notice that approaching traffic has fallen off to only a few vehicles or no vehicles, it may be a sign that the road is closed ahead. You will want to check the weather station and start looking for a safe haven.

**When the Snow Starts Coming Down**

When you see the first signs of bad weather, you need to respond with basic caution.
Taking Basic Cautions

☑ Turn your headlights (low beam) and clearance lights on.
☑ Turn on your mirror heaters.
☑ Clean off the dashboard so the defroster vents are clear.
☑ Slow down and adjust your speed to the conditions. Do not overtake and pass other vehicles unless you have to.
☑ Increase your following distance.
☑ Get a feel for the road by having a light, slow touch on acceleration and steering.
☑ Use gentle, light braking or stab braking to make sure your wheels do not lock and cause a skid. Do not brake any harder than you need to.
☑ Gear down gently and make sure you are in the correct gear well ahead of turns, curves or stops. Make turns and take curves as smoothly as possible.
☑ Slow down before curves and then *slightly* accelerate in the curve to pull the trailer through the curve.
☑ Do not let the trailer push you. It is usually loaded and heavier than the tractor.
☑ Watch far enough ahead. This will help you avoid the need to change speeds quickly or avoid panic stopping.

You also need to remember not to use the engine brake on slick roads as it only slows the tractor and not the trailer. This could result in a jackknife. And do not use cruise control either. You cannot respond to changes as quickly when you use it and it may even lead to acceleration during a skid.

Remember to slow down by about a third on wet roads, say from 60 to 40, especially when it first starts to rain. The rain brings out the oil on the road surface, which creates slippery conditions until it is washed away. With snow, slow down to...
around half the normal speed and with ice you need to slow to a crawl and get off the road to a safe haven as soon as possible. When the road has a covering of ice, even chains are not enough.

Sometimes, what looks like a wet road will really be black ice. It is a good idea to have an outside thermometer on your truck. Many trucks have a Driver Message Center display panel mounted on the dashboard above the steering wheel. Pushing the TEMP button will display the outside air temperature. If the temperature is below freezing (32 degrees Fahrenheit), you can expect at least some ice. Roll down your window and check the back of your mirrors to see if they are icy. And, watch for spray from your tires and the tires of other vehicles. If there is no spray, the “water” you are looking at on the road is probably black ice.

If you are not sure what you are seeing is ice, ease off on the throttle and treat it like ice until you know for sure it is not. If you feel your rig moving even a little bit in a direction you are not steering, or, if a gentle steer does not change the direction of the vehicle, then you know you are on ice. Another sure sign is when your tachometer jumps up and down when you are not shifting or clutching. This tells you your drive tires are losing traction and spinning out.

Knowing When to Stop

How do you know when the weather is bad enough that you should pull over? That is the age-old question and there is no foolproof answer. It is a judgment call, every time. You head into weather and you think, “This is OK. With care, the rig can handle it.” Then it starts getting worse and then it clears up a little. It is not a question you ask once, but something you are constantly thinking about in the back of your mind. Some drivers set a minimum speed for themselves, say 30 miles an hour, and if they cannot keep moving safely at that speed, they take it as a clue that it is time to pull over. Still other drivers think of weather as OK, medium, and bad.
When they first come into weather, they start to think ahead and plan for a place where they can stop. When they get there, if it is getting worse, they pull over at least long enough to get weather information they can depend on. If the weather is staying the same or getting a little better, they think ahead for the next safe stopping place and keep going until they reach it.

You need to have the next safe haven constantly in mind so if the weather gets worse you can stop before it gets too bad. You need to be able to see the lane lines and far enough ahead so you can stop if you need to. You also need to have enough traction so you can steer accurately and pull your trailer. When you start to lose these, it is time to find a safe place to pull over.

“Sometimes drivers just don’t realize that their desire to get to their favorite truck stop doesn’t make the road any safer.”

**A Safe Place to Wait It Out**

It is best to find a truck stop or paved rest area to stop and wait out a storm. If you are thinking ahead, this is usually not a problem. However, there are rare times when you break down and you do not have any choice but to stop on a shoulder or a pull out. In those cases, pull as far to the side of the road as you can without going off the pavement or onto a soft, crumbling shoulder.

⚠️ **CAUTION:** For a large truck, pulling over on the side of a highway is always risky, not only for you, but for other vehicles. It causes a distraction and a hazard for other drivers. When a car hits a stopped semi tractor-trailer at highway speeds, it can be fatal. Unfortunately, this...
happens more often than you may think. Even though this kind of an accident may not legally be the fault of the truck driver, it is a tragedy you can and must help prevent. **DO NOT PARK ON THE SHOULDER OF A HIGHWAY UNLESS IT IS AN EMERGENCY!**

Shoulders are seldom wide enough or strong enough to support the weight of a large truck. You could easily sink on one side and the truck could get stuck or tip over.

**Stopping at Truck Stops**
Under normal conditions, we recommend rest areas as a safer, more time efficient place to sleep than at truck stops. However, during severe cold conditions, truck stops offer the safety of a warm shelter and quicker service and repair response if needed.

You will find the activity for this topic, **Identify Safe Havens**, in the back of the book.

**Pulling Over Safely**
Wherever you park, avoid parking in a snowdrift because you cannot be sure what is really underneath the snow. In addition, avoid parking on any kind of a grade. When you know you are approaching your rest area:

### Approaching a Rest Area in Bad Weather

1. Turn on your hazard lights.
2. For about a mile before you stop, put light pressure on your service brakes to dry them out.
3. Slow down and steer gently.
4. When you are parking, if you have driven into snow, roll back and forth in the space to make tracks so it will be easier to pull out when the weather clears.
Approaching a Rest Area cont.

5 Use sand or cat litter in the tracks to help with traction pulling out.

Tires are hotter than the surrounding snow and can melt the snow in the ruts once the vehicle has stopped. This can turn to ice that freezes the tires to the underlying snow. Lay down chains or carpet pieces under front drive tires in the ruts in addition to or instead of sand or cat litter to help with traction getting out.

Once You Are Stopped

1 Before you do anything else, Qualcomm your DM and fill him or her in on the situation.

2 Set both the tractor AND the trailer brakes, in spite of what old timers may recommend. If you have taken the time to dry out your brakes by holding them at a constant, slight pressure for about ½ mile before you stop, your trailer brakes should not freeze. If they do, use the method discussed later on to unfreeze them.

Another safeguard you can take to prevent the trailer brakes from freezing is to let the unit sit for 15 minutes before setting the trailer parking brake. This allows drying and draining to take place. Release the brakes after ½ hour to break any ice that may have formed. Then reset the trailer parking brakes. Make sure the tractor parking brake is set during this time and do this only if you are on level ground.

3 Walk around your vehicle to make sure you are on solid pavement.

⚠️ CAUTION: DO NOT spend more than a few minutes at a time outside your truck cab. Cold and wind can quickly lead to frostbite. If you get stuck, stay in your vehicle until help arrives.

4 Check your tires and fluid levels.
Once You Are Stopped cont.

5. Check lights and reflectors to make sure they are free of snow or ice and can be seen.

6. Check to make sure there is nothing blocking the exhaust so fumes move away from the cab.

7. Check the front grill to make sure it is not clogged up with ice.

8. Get back in the cab; use your cell phone, weather radio, anything you can, to get current, up to date, RELIABLE weather information. Do not count on the chatter over the CB.

9. Connect the reefer jumper cables within a few minutes of stopping. The reefer can help the truck batteries stay charged, but it is not powerful enough to fully charge the truck batteries once they have run down.

Note: There are special jumper cables to connect your reefer battery to your truck battery. DO NOT use standard jumper cables for this purpose as it can result in damage to the reefer unit.

⚠️ CAUTION: DO NOT start your truck engine with the reefer jumper cables connected. It will burn out the fuse on the reefer jumper cables.

Some newer trailers have a charging cable installed directly into the reefer unit and jumper cables are not needed. These units have a red sticker on the front door of the reefer that reads:

“Notice: Unit equipped with tractor battery charging system. To operate this system – turn on the reefer unit and turn the tractor key to “ON.” Do not use jumper cables on these trailers.”

Operating in Severe Cold Conditions

A sustained period of temperatures at +10 degrees F or below describes severe cold. (This refers to actual temperature. Wind chill does not affect fuel
temperature.) Straight #2 diesel fuel begins to have problems flowing at this and lower temperatures. When diesel will not flow, obviously the tractor and reefer will not run. The following steps may be necessary to prevent freeze-ups from occurring. It is important to understand that some of these directions are contrary to normal operating procedure. **These instructions only apply when operating in severe cold conditions.**

**Keep Moving (Only If Safe To Do So)**
Stopping during severe cold conditions is the biggest cause of freeze ups. Fuel flows slower at idle and obviously not at all when the engine is shutoff. Plan your schedules to keep running during the coldest times of day and in the coldest areas. However, do not let this overrule the need to operate safely and legally.

**Additives and Fuel Blends**
Under normal winter conditions, we do not use fuel additives or have drivers blend fuel. Fuel stations will sell fuel already blended for their location during cold weather.

**Fuel Update Messages**
During severe or extreme cold conditions, important instructions will be given in the fuel phone mailbox. Your DM can transfer you to this message box at anytime.

**When to Leave the Truck Running**
Under normal conditions, the policy is for drivers to shut off their trucks when stopped. Under severe cold conditions however (+10 degrees F or below), the tractor should not be shut off. You should leave your truck idling as long as the temperature is below +20 degrees F.

Severe cold conditions cause problems with diesel fuel. The cloud point for diesel fuel, the point where it starts to gel, is +10 degrees F. Because temperatures can drop quickly, it is best to give yourself a little buffer, especially if you are going into the sleeper. In temperatures above +20 degrees F, the Webasto or Espar bunk heater and a blanket or two are more than enough to keep you nice and warm. If the reefer is not equipped with a tractor battery charging system, you will want to connect your reefer jumper cables to the reefer battery to keep the truck battery charged.
If extended idling is necessary, the idle speed is preset to 1000 RPMs. In tests we have conducted, high idle (1000 RPMs) has raised in-tank fuel temperatures nearly four times over standard idle (500–600 RPMs). High idle also prevents engine damage that occurs during extended low idle. After extended idle, raising RPMs to 1500–1600 for 5–10 minutes before driving the truck will raise the temperature of the fuel in the tank. (Note: Do not idle the truck at 1500–1600 RPMs for extended periods. Extended idle should be at 1000 RPMs.)

### Getting Started After the Blizzard

If you have to wait out a blizzard, take special care on your walk around inspection before getting back on the road. The following is a list of what you need to pay special attention to after waiting out a winter storm.

#### Getting Back On the Road

1. Check your front grill again to make sure snow and ice have not built up. This could block airflow to the engine and cause your engine to overheat, even in cold weather.
2. Brake shoes may freeze to the brake drums if your brakes were warm and damp when you parked.

![Brake Shoe Diagram]

Deal with this situation slow and easy, just like almost everything else in winter driving. Release both the tractor and trailer emergency brakes.

3. Then push on the service brakes. This can put up to 1800 foot-pounds of pressure on the brake drums – a lot more pressure than anyone could manage with a hammer.
4. Push down and release the service brake several times. This should clear the ice.
Getting Back on the Road cont.

⑤ Try moving forward in a small serpentine. Watch your trailer tires as you do this to make sure they are rolling. If they are not, set the emergency brakes again and release. Keep working with applying service and emergency brakes until the ice between the brake drum and lining breaks free.

⑥ In addition, do not forget to check to make sure your 5th wheel is moving freely. They can get stiff or frozen as well and it really causes problems when you are trying to make a turn.

⑦ Once you think you have the brakes loosened up, do a quick rolling brake check. If you are able to move the vehicle forward without problems, bring it up to about 5 miles an hour and press in the clutch.

- If you keep rolling on flat ground, it means all brakes are disengaged, free of ice.
- If you stop rolling when you put in the clutch, one or more of the brakes are still frozen and you have to work them loose.

As you pull back out onto the highway, remember that with all the snow and ice your turns and shifts need to be very smooth.

⚠️ CAUTION: You may have heard old timers talk about getting under their rig and knocking the ice off the brakes with a hammer. However, you cannot knock anything loose when the brakes are set. And do you really want to loosen up brakes that are not set when you are under the trailer? No! This is a very risky practice and is not necessary if you have a little patience and just keep working the brakes.
Safe Winter Driving Techniques

Traction
Maintaining traction is the key to safe winter driving. Traction is the grip between the tire surface and the road surface. The grip between the tires and road surface allows you to control how you move AND stop. The more traction you have the more control you have. Without traction, you have no control. Factors that affect traction are the level of traction, the road surface and the speed of travel.

Levels of Traction
There are three basic levels of traction: static (when you are stopped or sitting still) rolling, and skidding.

Consider static traction as the best traction you can have for a given vehicle. Rate it at 100 percent. In comparison, rolling traction would be rated at 60 percent because when a tire is rolling a smaller portion of it is in contact with the road surface. Less surface contact equals less traction.

When a tire is skidding, it has only about 10% of the grip, or traction it would have if the vehicle were sitting still. So, you can see the effect that motion alone has on traction.

Road Surface
Now layer on top of that the effect the road surface has on traction. Not even dry, flat roads have perfect traction. On average, the best you can realistically hope for is a surface that is about 75 percent of what it could be. If the road is wet, it is down to 50 percent. If there is snow on the road, you are down to 30 percent. Moreover, with ice, you only have about 10 percent.

A rough shift can create loss of traction by interrupting the smooth rolling traction of the drive tires. Missing a shift and coasting (not
pulling your trailer) out of gear is also a big problem, as is shifting at either too high or too low of RPMs.

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<th>Snow</th>
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<td>75%</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>Rolling</td>
<td>60%</td>
<td>45%</td>
<td>30%</td>
<td>18%</td>
</tr>
<tr>
<td>Skidding</td>
<td>10%</td>
<td>7.5%</td>
<td>5%</td>
<td>3%</td>
</tr>
</tbody>
</table>

**Skidding**

When you are rolling on ice, your rig is barely hanging on by one pinky finger and once you start to skid on ice your grip on the road is all but gone.

Always take any turn at a slow speed in a low gear, and with as wide a turning path as is safely possible. By doing this, you keep more of the tire in contact with the road surface; thus increasing traction.

**Speed**

Speed is another factor in traction. As the rig’s speed increases, traction decreases. When traction is poor for any reason, slow down until you have the rig well under control.

To make up for poor traction, you need to decrease your speed and increase your space in winter weather. Slowing down improves your traction. This is why C. R. England speed rules require cutting speed 1/3 on wet roads and 1/2 on slush and snow. Reduced traction also means it will take you much longer to stop on wet or snowy roads. So remember, where you are used to counting 9 seconds to judge following distance on dry roads, you will need to count 13 seconds on wet roads and count 24 seconds on slush and snow.
When the weather is bad, you want to drive like a loner and keep away from the pack.

Leaving more following distance in front of you does not mean you are driving slower. It just means you are driving smarter.

![Tip]

Maintaining proper tire inflation, correct amount of tread, and weight on the drive wheels provides better traction and better control of your rig.

You will find the activity for this topic, Adjusting Following Distance, in the back of the book.

**Double Momentum Shift**

When the roads are slick, you need to drive in a way that will make the most of the traction you have. One way to do this is to avoid double momentum shifts. In other words, two changes in speed or direction at the same time. This would include things like:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking a curve</td>
<td>Speeding up</td>
</tr>
<tr>
<td>Speeding up</td>
<td>Making a turn</td>
</tr>
<tr>
<td>Slowing down</td>
<td>Changing lanes</td>
</tr>
<tr>
<td>Shifting gears</td>
<td>Braking</td>
</tr>
<tr>
<td>Speeding up</td>
<td>Starting a hill</td>
</tr>
</tbody>
</table>

Doing two or more of these things at once puts a real strain on your traction and can throw you into a skid or off to the side of the road very easily. So if you need to make a lane change and there is a curve coming up, make sure you complete the lane change before you take the curve or wait until you are through the curve before you start the lane change.
It is the same with speed. Make sure you slow down before the curve or change lanes before you start up a grade. In bad weather, you should only ask your vehicle to do one thing at a time. But that means you have to constantly be looking and planning. It just keeps coming back to smooth, slow moves and enough time and space to make them.

Managing Grades

Heading Downhill

Before going down a grade in winter, check a couple of things.

<table>
<thead>
<tr>
<th>Before You Go…</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ Even though you checked out the brakes at the beginning of your shift, you should still make a habit of always touching them just before you come over the top of the hill to make sure they are still in good shape.</td>
</tr>
<tr>
<td>✅ Also make sure you have released the Inter-axle Differential Lock (sometimes called the Power Divider) before going down hill. Why? Because a free rolling wheel, one that is not receiving power or braking from the vehicle, cannot slide. Shut the Power Divider off and you will always have a rolling wheel.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When You Go…</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ When driving down a grade in winter, select a speed and a gear that gives you the ability to go slow enough to stay in control and yet have the ability, should you need it, to let off the brakes or even accelerate slightly to pull a sliding trailer back in behind you.</td>
</tr>
<tr>
<td>✅ Plan your shifts and think about what you are doing. Missing a gear, then coasting out of gear and gaining speed on a downgrade or slippery road is extremely dangerous.</td>
</tr>
</tbody>
</table>

The following is an example of what you should consider when driving down a hill.
If you are on a highway where the posted speed limit is 75 mph, you should be driving around 37 mph because of the snow.

If you think there may be ice on the hill, you may want to slow even more.

In this case, you might slow to 25 mph.

Assume, for discussion, that you are in 5th gear.

The important question is where are your RPMs? Are they high in the range or are they low in the range? This is what you need to know when you are going down a grade. Once you are at a safe, manageable speed, then you need to think about whether or not you have torque.

**Torque and Horsepower**

*Torque* is the amount of pull an engine has. Think about a John Deere farm tractor. It does not go very fast, but it has enough torque to pull a stump out of the ground.

*Horsepower* has to do with how fast an engine can go. Racecars have a lot of horsepower, but they do not have much torque. They even have to be pushed out of the pit to get moving.

A truck has both torque and horsepower. At each gear step, you have high torque in the LOW to MID RPMs and high horsepower in the HIGH RPMs. If you are in the high torque range (low to mid RPMs), you have the ability to PULL. So, if the trailer happened to get out of line and you were in high RPMs, the only thing you could do to speed up and get out in front of the trailer would be to upshift. And you would not want to upshift if your trailer is trying to push you off the road. If you push in your clutch to shift at this point, or brake, you lose the pull on your trailer and can make the trailer skid worse.
That is why, when going down a grade, you keep your RPMs in the mid range so you always have the ability to pull when you need it without having to up-shift.

⚠️ CAUTION: Be careful not to go too low in the torque range (below approximately 1000 RPM) when going down hill with a heavy load, as this could also cause a skid. However, some engines have a lower torque range. Make sure you look at the Operator’s Manual for the vehicle you are driving.

**Going Uphill**

In order to understand the proper technique for going up grades on slick roads, you first need to know what causes a drive axle skid. This is the most common type of skid drivers experience when pulling a slick grade. When you understand what CAUSES it, then learning how to PREVENT it will make more sense.

**Causes of a Drive Axle Skid**

If you are driving up a slick hill and your drive tires hit a patch of ice, you will lose traction and your wheels are going to spin until they run out of engine RPMs. This will happen immediately because all of the sudden there is no traction and they are free to run. This causes your drive axles to swing out to one side or the other. This generally goes with the crown of the road, so if you are in the right lane they would spin out to the right and you would begin to jackknife.

**Preventing a Drive Axle Skid**

To prevent that, you need to stay out of the torque range when going up a grade. To stay out of the torque range, keep RPMs high. When going uphill, staying high in the RPM range also helps to keep your engine from overheating by allowing it to breathe.
Remember these techniques by thinking “Up High” and “Down Low.” In other words, going up a grade you want to have high RPMs and going down a grade you want low RPMs.

Here is an example of how this principle would be applied for a particular truck. Remember, the specific miles per hour, gear numbers, and RPMs may be different for your truck. It all depends on the engine and transmission you have. Peterbilts with Caterpillar engines tend to have a lower no-load governed RPM.

For this example, assume your vehicle has a 9–speed transmission and the engine has a “no-load governed RPM” of 2050 with a gear step of 450 RPMs.

- You are in 6th* gear and you are approaching the grade at about 30* miles per hour
- RPMs are just under 1400*, in the torque range
- Since you will be going uphill, you will want to be in the high RPM, power range (Up High, Down Low)
- In order to get into the high RPM power range, you will need to downshift
- To avoid a double momentum shift, you will want to make the downshift before you start up the grade
- Now you are in 5th* gear going about 28* miles per hour and your RPMs are at 1800*
  *Remember that specific gears, road speed, and RPMs will be different for a vehicle with a different no-load governed RPM and/or gear step
- As you are starting up the grade, if none of your wheels are spinning out, engage the Inter-axle Differential (Power Divider)

⚠️ CAUTION: Do not engage the Power Divider when any of the drive axle wheels have lost traction and are spinning out, as it will damage the mechanism. This kind of damage occurs most often when a driver is backing a vehicle and spins out on ice or even gravel and before the wheels stop spinning, he or she engages the Power Divider to get more traction. If you are in this situation, you need to push in the clutch and apply the service brakes to make sure the wheels are stopped before engaging the Power Divider. The confusion comes when drivers think that just because their vehicle is not moving their wheels are stopped.
At first, it may feel funny pulling a grade at high RPMs. You will also notice that this method uses more fuel. However, you are using that extra fuel to prevent an accident. It is a very small price to pay for the benefit.

**Ice Shift**

As you continue up the grade and lose ground speed, you will probably need to downshift. In this situation, you will want to use an Ice Shift. It allows you to downshift without dropping the RPMs into the torque range.

Here is an example of steps to follow to do an Ice Shift. The gear numbers and RPMs in the example are based on a 9–speed transmission where the engine has a “no-load governed RPM” of 2050 with a gear step of 450 RPMs.

*You are in 5th* gear and you are down to 1600* RPMs, so if you are going to stay out of the torque range, you need to do something right away.

**Steps for Ice Shifting**

1. Clutch in and shift into neutral. Now, push on the accelerator to get the RPMs all the way to the top.
2. At the same time, move the gearshift to fourth gear and use your fingertips to gently press the shift lever up against the gear. Do not shove it, just rub it up against the gear and hold it.
3. Keep your foot on the accelerator to keep the RPMs high and your other foot off the clutch. When the truck slows down to where the road speed matches the gear you have selected, it will slip right into gear, smooth as silk.

*Remember that specific gears, road speed, and RPMs will be different for a vehicle with a different no-load governed RPM and/or gear step.

Ice Shifting is not the same thing as floating gears. In an Ice Shift, you do float the gear IN, but you clutch to take it out of gear. Most of the damage to transmissions occurs when drivers fail to clutch OUT of gears. Floating into a gear, when necessary, causes very little damage unless you push and force it into gear. You also have to remember that in an Ice Shift you are keeping your RPMs at the top of the range whereas in a regular downshift you usually come
into gear just above the torque range. On a steep grade, you can even go down two gears with an Ice Shift, if you need to.

Driving Grades in Winter – Quick Review

**Up and Over the Hill**

1. As you approach the upgrade, make sure your drive tires are not spinning out and, if not, switch on your Power Divider.
2. Change lanes, if necessary.
3. Gear down early to avoid any double momentum shifts when you hit the base of the hill.
4. Think “Up High, Down Low” to remind yourself to keep your RPMs high, in the horsepower range, when you are going up hill and low, in the torque range, when you are going down hill.
5. As the hill slows you down, do an Ice Shift, which allows you to keep you RPMs high in the range.
6. Just before you come to the top of the hill, brake a little. This does two things for you; it tests your brakes and it slows your RPMs into the torque range.
7. Now, unless your wheels are spinning out, disengage your Power Divider.
8. As you go down the grade, keep your RPMs low by applying slow, gentle pressure to your brakes.
9. And, once again, avoid sudden steering changes or double momentum shifts.

You will find the activity for this topic, Practice Winter Driving Techniques for Grades, as well as procedures for ice shifting and trailer axle skid recovery in the back of the book.
Hydroplaning

Hydroplaning is like waterskiing with your truck because your tires have lost their contact with the road. When you hydroplane, you need to get off the accelerator and push in the clutch. This will slow you down and let all the wheels turn freely. When the tires are turning freely, they have a better chance of grabbing the road surface. Once you feel the traction coming back, you can stab brake to slow and then accelerate *slightly* to pull the trailer and keep it from swinging around.

<table>
<thead>
<tr>
<th>Recovering from a Hydroplane</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Off accelerator</td>
</tr>
<tr>
<td>② Push in the clutch</td>
</tr>
<tr>
<td>③ When you feel traction, stab brake</td>
</tr>
<tr>
<td>④ Release clutch and accelerate <em>slightly</em> to pull trailer</td>
</tr>
</tbody>
</table>

Managing Skids

When a driver starts to skid, a natural reaction is to hit the brake. In this case, acting on the first reaction is the worst thing to do. Skids are the result of asking your vehicle to do more than it has the traction to do. There are four main types of skids and they correspond to the three main axles on the combination vehicle. They are:

- All wheel skids
- Front wheel skids
- Trailer axle skids
- Drive axle skids or jackknives

It is important to learn about what causes each of these types of skids because the ways to prevent them and correct them, when possible, are different for each type. **When it comes to skids, the ability to prevent them is much more important than the ability to correct them.** In situations where the speed is
too great and the space is too small, no amount of skill will be enough. The key
to preventing skids is to keep ALL your tires in contact with the road and
rolling at the same speed as the others.

Unlike most other things in winter driving, in a skid recovery situation you have
to act FAST.

**All Wheel Skid**

In an all wheel skid, all wheels are locked up and sliding.

**Common causes:**

- Driving too fast for conditions.
- Over braking. This is simply applying more pressure to the brakes than your vehicle and tire traction can handle safely based on your load, speed, and road conditions.

In this, as in other types of skids, you need to remember the maxim that **“A rolling wheel cannot slide.”** This means a free rolling wheel. In a situation where you are over braking and start to skid you need to respond in a way that will allow your wheels to roll freely.

---

**Recovering from an All Wheel Skid**

1. Take your foot off the brake since that was part of what caused the skid.
2. Do not accelerate because that would force motion on the wheels.
3. Push in the clutch in order to allow your wheels to roll freely.

*Recovering from an All Wheel Skid cont.*
④ Do not try to change direction or shift gears while you are sliding.
⑤ When you feel the tires getting a little traction, gently stab brake to regain control without locking up the brakes again.
⑥ Allow time for the brakes to release between stabs so that the tires can roll freely enough to continue to gain traction.
⑦ Now make a gentle downshift to match road speed as you take your foot off the clutch.

**Trailer Axle Skid**

Sometimes called a trailer jackknife, this is where the trailer wheels lock up and start to slide around sideways trying to overtake the tractor. Because they have lost their traction, skidding wheels have no resistance and will always travel faster and try to get in front of turning wheels. That is why it is so important to get off the brakes to unlock the wheels allowing the trailer tires to roll again.

**Common causes:**

- Over braking
- Improperly adjusted trailer brakes
- Unbalanced, empty or lightly loaded trailer
**Recovering from a Trailer Axle Skid**

1. Get off the brakes immediately.

2. After you get off the brakes, you may need to accelerate *slightly* to provide the torque needed to pull the trailer back in line. If you are keeping your RPMs in the torque range when going downhill, you will be able to do this without having to shift.

3. Once the vehicle is under control, gently stab brake to slow. Be careful when you do this not to lock the trailer brakes as this could lead to another trailer axle skid.

4. It is important to check your mirrors frequently to keep an eye on your trailer so you catch trailer swing as soon as it starts. Once a trailer axle skid goes too far, it is almost impossible to pull.

**Note:** Do not accelerate more than 2–3 mph, just enough to put some pull on the trailer. You cannot “out run” a trailer axle skid by going faster. Significant acceleration could actually result in a worse skid.

**Front Wheel Skid**

This is the horrible experience of turning the steering wheel and having the truck ignore you as it continues to move straight ahead.
Common causes:
- Driving too fast for conditions (this is the core cause of just about any skid).
- Over steering. This is applying more directional force than your vehicle and tire traction can handle safely based on your load, speed, and road conditions. In other words, you are probably cranking the wheel too hard.

**Recovering from a Front Wheel Skid**

1. Get off the accelerator.
2. Stab brake to slow the vehicle.
3. Turn the steer tires back in the direction of the skid so they can start to roll instead of sliding sideways. (This is your only chance to get traction back to those tires to regain steering control.
4. Continue to stab brake to slow the vehicle until you have full steering traction.
5. Gently steer in the direction you need to go.

This is why it is so important to approach turns, ramps, and curves slowly in bad weather. If you are going too fast, not only could it throw you into a skid like this, but the speed will also eat up any space you might have had to recover.

**Drive Axle Skid or Jackknife**

This is where the drive axle wheels lock up and start to skid. You read about this type of skid earlier in the section on managing grades.
Common causes:
- Over acceleration
- Over braking
- Jerky downshifting on a slick surface

Recovering from a Drive Axle Skid

1. Push in your clutch.
2. Get off the brake and accelerator.
3. Look in your left mirror ONLY (you don’t have time to look in both mirrors and if you do not see your trailer in your left mirror you can be pretty sure it is coming around on the right).
4. Steer and counter steer to gain control.
5. When you have the truck back in front of your trailer, use light stab braking to slow the vehicle.

“Good drivers don’t get good at pulling out of skids. Good drivers are good at avoiding them.”

Even the best driver in the world could not pull out of three jackknives in a row. And, when you are overconfident and lose your sense of caution, you are going to wind up in one skid too many.

⚠️ CAUTION: When bobtailing, most of the tractor’s weight is on the steering tires, carrying the weight of the engine. Since there is nothing pushing down on the drive tires, the unit has very poor braking characteristics. If you lock the drive tires, the rear of the tractor skids and passes the steering tires. Though the steering tires do not move, the unit will go completely out of control.
Other Winter Driving Tips

Bridges and Overpasses
Because bridges and overpasses do not have dirt under them to keep the surface warm, they tend to ice up even if the rest of the road is not icy. So as a precaution, ease off the accelerator just enough to drop about 50 RPMs when you go over a bridge or overpass. This way you are not as likely to spin out and yet you are still pulling on your trailer. This is often called “floating a bridge.”

Effects of the Time of Day
About an hour after the sun comes up in the morning, the snow and ice on the road can begin to melt creating a layer of water on top of a layer of ice. This is the worst possible kind of road surface to drive on so you have to be extremely cautious. This can also happen in very sunny spots on a mostly shaded road. In the evening, when the temperature drops, the slush and melt off from the day freezes into black ice and it can be extremely dangerous as well.

Effects of the Angle of the Sun
Pay attention to the angle of the sun and the time of day because they can affect road conditions.

When you are going up and down hills, the angle of the sun could mean that the hill is dry on one side, but icy on the side that is still in the shadows. You could be going up a hill on mostly dry road and then hit ice as soon as you come over the top or at the base of a hill in a shaded valley.
You need to think of driving in winter like being in a low budget horror movie. You need to expect that over every hill and around every corner something will be there to try to surprise you; a patch of ice, a snowplow, a stalled vehicle, or a 5–point buck deer. However, if you stay alert, know what to expect, and give yourself time and space to respond, it is no longer frightening.

**Visibility**

Do not drive with your side rear view mirrors blocked. All lights and reflectors should also be free of ice, snow and mud. Stop and clean them when you need to, this may be often. Some states will issue citations for dirty or icy windshields.

**Time to Chain Up**

It is usually a good clue that you need to chain up when you see bright yellow, flashing signs over the road that say, “Chains Required.” If you are not alert enough to notice them, a nice officer will pull you over and give you a $400.00 reminder. Most truck stops keep up with chain requirements during bad weather and the CB channels are typically full of chatter on the topic. If you are aware of what is going on around you, it is tough to miss the signs of a mandatory chain up.

**Note:** When you have entered a DOT-Highway patrol “Chains Required Area”, you will be required to have the proper number of chains on your vehicle. In addition, when the chain laws are in effect, you will be required to have the chains properly installed on your vehicle before you can proceed.

On the other hand, there are times when you need to chain up before a warning is issued. You may run into a storm and need to chain up to get to a safe haven. Usually you get a good warning before the storm. The bottom line is you use
chains when you cannot move safely without them and it is still safe enough to move at all.

If you know you are going to have to chain up, it is better to chain up sooner rather than chain up later. Even if this means you have to go slower for a few miles before the restricted area, it is still worth it. The closer you get to the pass, the harder it is to find an available, good place to do your chain up.

Most important, you need to find some place that is flat and protected from traffic. Many hills that frequently require chains in the winter will have safe pullouts to allow for chaining up. If you ever do have to chain up close to traffic, make sure you face traffic while you are working and wear something reflective, especially if it is dark.

*When they see two flakes fall together on Donner, they put the chain law into effect. And when three flakes fall together, they close the pass.*

**When You Chain Up:**

- Turn on flashers
- Set all parking brakes on vehicle
- Position red triangles
- Be cautious of your footing
- Watch for other traffic
- Work facing traffic
When You Chain Up:

- Have an escape route away from the path of drivers that may not see you

About Chains

There are two types of chains:
- Singles or Two Rails (A)
- Doubles, Duel or Three Rails (B)

Chain Parts

- Cross Links extend across the width of the tire and are attached to the Side Rails
- Two types of cross chains:
  1. Ordinary or Conventional
  2. Reinforced (This type is best for heavy wet snow or frozen snow pack.)
- Cams, Hooks, Fastener
  1. Hooks and fasteners connect one end of the chain rail to the other end to hold the chain onto the tire.
  2. Cams tighten the chain around the tire.
Tools Needed

You will need the following tools to chain up:

- Rain or snow gear
- Barrel nuts
- Ground cover
- T-handle cam tool
- Hammer
- Gloves
- Flashlight (head mount or stand alone is best)
- 18–24 Rubber tarp straps or bungee cords (14 to 16 inches long)
- Adjustable pliers or small crescent wrench
- Fifth wheel puller
- Large flat blade screwdriver
- Tie wire
Procedure to Chain Up

**Step 1** Remove chains from the box or bag and spread them out on the ground next to the tire/tires.
- Singles – street side down
- Doubles – street side up

**Step 2** Inspect chains for:
A) Claws facing different directions
B) Twisted, broken or bent rails
C) Broken, bent or twisted cams and hooks
D) Worn or broken cross links

**Step 3** Open all cams. Put the side of the chain with the cams facing away from the tire.

**Step 4** If you are using a three railer on the outside wheel, fold the chain so the center rail is closest to you and the two outside rails are closest to the truck.
Step 5  Grasp chains by the center rail (the rail closest to you).

Step 6  Lift the outer top side rail and flip over the inside tire. (Make sure the cams are on the outside if only one rail has them).

Step 7  To complete the unfolding, the chains should lay evenly over the dual group and hang evenly on both ends.

Step 8  Tuck the end of the chain that does not have the hook fastener under the tire as much as possible.

Step 9  Carefully move the vehicle just enough to roll onto the chains (approximately 24”) but not so far that the other end of the chain falls off the tires.

Step 10 The order in which the side rails are hooked is important. Use the following directions for hooking up the rails.

### Hooking Up Rails

1. **Center Rail:** Hook up 1st because it is the hardest to reach and most important. Its adjustment has the greatest effect on the tightness of the inner and outer side rails.

2. **Inside Rail:** Hook up 2nd because hooking and tightening the outside rail increases pressure on the inside rail.
Outside Rail: Hook up 3rd because it is the easiest to hook and adjust with the cams.

Excess Links: hook up 4th to secure excess links over the end link and hook before closing.

Step 11  Use the “T” bar to turn the cams into their locked position.

If not all cams will lock, unlock them all and try to hook chains onto the next link and repeat.

Step 12  Attach rubber straps or bungee cords. Do this by stretching two rubber straps across the distance of a chained tire as shown in the photo. Attach rubber straps on the side rails between the cross-links (never on the cross-link or the chain may break). Make sure hooks and fasteners face out.

To secure loose tails, you may also use bungee cords.

Step 13  Drive a short distance (1/4 to 1/2 mile) and stop. Check and retighten as needed.

Step 14  Inspect by looking for space under the rail. As you begin to drive, listen for chains flopping or slapping.

When driving with chains installed, it is a good idea to stop about every 10 to 15 miles to re-check your chains.
Procedure to Remove Chains

**Step 1**  Remove rubber straps

**Step 2**  Release cams

**Step 3**  Unhook inner, outer and center rails

**Step 4**  Pull chains to side

**Step 5**  Move vehicle forward off the remainder of the chain so you can pick the chain up.

**Step 6**  Put chains back in chain box or bags. Use tie wire to tie the ends of the chains together before putting them away. This prevents them from being tangled.

Frequently Asked Questions about Chains

**Q:**  When will chains be issued and where can I pick them up?

**A:**  C. R. England company trucks should be equipped with chains year round. If for some reason your truck does not have chains, go to the Maintenance Shop after September 1st to pick them up. Whether your chains are new or old, make sure you lay them out and check that they are in good repair before leaving the yard.

**Q:**  C.R. England trucks are equipped with how many sets of chains?

**A:**  Two sets of singles and one set of doubles

**Q:**  What will the bags look like?

**A:**  Each truck is issued two bags marked “D” for DOUBLES and two bags marked “S” for SINGLES

**Q:**  What should independent contractors know about chains?

**A:**  Independent contractors only pay for tractor chains not trailer chains

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- Price for chains purchased from the Parts Department is about $250.00
- Estimated price if purchased over the road is $300 to $500
- Chains can be purchased through the Parts Department at extension 3225

**Q:** When should I use chains?

**A:**
- When required by state and local law
- To get over a dangerous section of the road
- To get off the road and to a safe place
- No more than one mile past the removal notification point

**Q:** Who notifies drivers of a chain requirement being in effect?

**A:** State and local police, weigh stations (DOT Officials), truck stop Highway Information Board (HIB), and highway signs provide drivers with information about the need to put on chains. If you have questions about chaining in a particular area, call the State Road Information number found in most atlases.

**Q:** Where should I chain up?

**A:**
- In a safe location before entering hazardous conditions
- On a level surface
- In a proper chain up area
- In a truck stop parking lot

**Q:** When you chain up, why wouldn’t you unhook the tractor from the trailer?

**A:**
- Main reason, it is not safe
- Landing gear pad may slide
- May not be able to get back under the trailer with the truck
- Trailer may slide off the road or down a hill

**Q:** How does a truck with chains on react?

**A:** Chains are most useful on heavy, wet snow or frozen snow pack. They are of limited use on black ice. And, once you are back on roads that do not have snow, remove the chains as soon as safely possible. A truck may slip and slide on bare concrete from the loss of surface traction if chains are left on the tires.
Q: **What is the maximum truck speed with chains on the tires?**
A:
- 35 mph on snow
- 25 mph or less on ice
- 15 mph on wet or dry roads
- Never drive with chains on wet or dry roads for more than one mile

Q: **Where do I get more rubber straps or exchange damaged chains?**
A. Obtain replacement chains from the Parts Room in the Maintenance Shop. Buy straps at truck stops, discount shops, or automotive stores.

Q: **To prevent back injury, what is the best way to pick up chains?**
A. Use the strength of your legs to do the lifting. Get in a squatting position, grab the chain and push up with your legs. Do not lift using your back muscles. Keep your spine straight while you lift.

Q: **How can I prevent damage to my vehicle and chains?**
A:
- Always hook side rails with rubber straps.
- Make sure all claws on the cross links are facing out, away from the tires.
- If you end up with more than one link extra on the end, double over and secure with fasteners or straps.

Q: **Do you put chains on steer tires?**
A. No, chains are only put on the drive tires and trailer tires.

Q: **What is the recommended pattern for putting chains on a vehicle?**
A:
- Duel chains on both sets of front drive axle tires
- Single chains on both outside rear drive axle tires
- Single chains on both outside rear trailer tires
This specific pattern is required in the State of California. It will also meet or exceed the requirement in any other state.

**Keeping Winter Driving Skills Fresh**

It would be very easy to get sloppy and out of good winter driving habits over the summer months. To keep this from happening, use winter driving techniques all year round. It makes you a better driver any time of the year if you:

- Pull your trailer through turns, curves and lane changes
- Avoid shifting while making a turn
- Add extra following distance
- Avoid double momentum shifts
- Accelerate, shift, stop and brake smoothly

Being constantly aware of conditions and surroundings and responding accordingly to stay in total control of your vehicle at all times is the surest sign of a truly Professional Driver.

**Winter Driving Kit Checklist**

**Note:** If your truck’s Webasto or Espar auxiliary heater is not working, contact Emergency Road Service.

**Personal Items**

- Heavy coat: waterproof and reflective
- Insulated coveralls: waterproof and reflective
- 2 pairs of gloves: warm and waterproof
  - TIP: Wear waterproof gloves over a pair of warmer gloves
- Winter shoes/boots with good traction
- Extra set of warm clothing, socks and shoes
- Extra blankets
- Water and high calorie, nonperishable food for 3 days (dried or canned meats, crackers, canned fruit, peanut butter, hard candy)
Professional Apprentice Driver Series - Module C

- Can opener
- Personal items
- First Aid Kit

**Tools**

- Jumper cables
  - TIP: Also get a set of small jumper cables from the shop that will go from the trailer refrigeration unit to the tractor battery *
- Fuel filter wrench
- Small shovel
- Ice scraper
- Flashlight and extra batteries
  - TIP: Get a flashlight that you can set on the ground and point in different directions so you can use both hands to work and still see AND be seen
- Assortment of hand tools (hammer, pliers, screwdrivers, wire cutters, wrenches)
- Multipurpose wire
- Ground tarp
- 18–24 bungee cords, 14”–16” long to tighten chains

**Parts & Supplies**

- Tire chains *
- Extra fuel filter *
- 5th wheel grease (small amount – packets)
- Extra fuses **+
- Headlight and extra bulb **+
- Extra set of snow/ice windshield wiper blades
- RAIN-X (for exterior glass surfaces)
- FOG-X (for interior glass surfaces)
- Kitty litter, rock salt, or sand for traction
- 1 gallon antifreeze +
- 1 gallon winter mix windshield washer fluid +
- 1 gallon engine oil +
- Candles and waterproof matches
- Towel or paper towels to wipe windows
- Can of WD–40 lubricant spray
* Items available from the SLC Parts Room at NO cost to company drivers
** Items available from the SLC Parts Room AT COST
+ Items available from the SLC Shop at no charge to company drivers

Dangerous Grades

The grades on interstates and highways listed on the following pages can be risky to all trucks at any time if truck speed is not controlled properly. These areas become more dangerous when winter weather conditions are present and extreme caution should be used while traveling both up and down these grades.

<table>
<thead>
<tr>
<th>Arizona</th>
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<tbody>
<tr>
<td>(Large Area)</td>
<td></td>
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<tr>
<td>Located: I-17 southbound between Flagstaff and Phoenix, AZ. *6% grades.</td>
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<table>
<thead>
<tr>
<th>California</th>
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<tbody>
<tr>
<td>Alpine</td>
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<tr>
<td>Located: I-8 in Alpine, CA to I-8 in Live Oak Springs, CA *When traveling westbound, this is a 6% grade and then becomes a 5% grade. The risk area extends about 6 miles.</td>
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<tr>
<td>Baker Pass</td>
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<tr>
<td>Located: I-15 20 miles inside CA. from NV to I-15 for 10 miles further into CA. *5–6% grade for about 10 miles.</td>
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<tr>
<td>Coachella</td>
<td></td>
</tr>
<tr>
<td>Located: I-10 12 miles east of Indio, CA. *5% grade that starts 12 miles east of Indio, CA.</td>
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<tr>
<td>Donner Pass</td>
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<tr>
<td>Located: I-80 in Reno, NV to Emigrant Gap, CA. *There are two dangerous sections of grade. The first runs from Reno, NV to Yuba, CA with a 5% grade for 10 miles and the second is a 6% grade that runs from Yuba, CA to Emigrant Gap, CA for 10 miles.</td>
<td></td>
</tr>
<tr>
<td>Grapevine</td>
<td></td>
</tr>
<tr>
<td>Located: I-5 in Castaic, CA to I-5 at Wheeler Ridge, CA *Winding 5% grade for about 30 miles.</td>
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<tr>
<td>Needles</td>
<td></td>
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<tr>
<td>Located: I-40 near Needles, CA. *5% grade starting10 miles west of Needles, CA. It continues until you enter into Needles.</td>
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</tbody>
</table>
### Tehachapi Pass
Located: SR-58 five miles outside Tehachapi to SR-58 five miles past Tehachapi  *6% grade for about 10 miles.

### Colorado
#### Vail
Located: I-70 at mm-171 through Vail  *5% downgrade that starts heading east on mm-171 through mm-190.

#### Eisenhower Tunnel
Located: I-70 westbound about 5 miles prior to entering Denver, CO  *5% downgrade.

#### Loveland Pass
Location: Highway 6 from Georgetown, CO into Dillon, CO  *This is the Eisenhower Tunnel southern bypass for Hazardous Materials, overweight or over-width loads, it is about a 15 mile stretch at a 5–6% grade.

### Idaho
#### Fourth of July Pass
Located: I-90 between Kellogg and Coeur d’Alene, ID  *6% East/West grade.

### Montana
#### Lookout Pass
Located: I-90 between Saltese, MT and Silverton, ID  *6% East/West grade.

### New Mexico
#### Raton Pass
Located: I-25 from the Colorado border to Albuquerque, NM for approximately 20 miles  *5 to 7% North/South grade.

### North Carolina
#### Black Mountain
Located: I-40 from Ashville, NC to Ridgecrest, NC  *6% grade that is often heavy with fog.

### Oregon
#### Siskiyou
Located: I-5 north to Ashland, OR  *6% grade.

#### Cabbage
Located: I-84 from Meacham, OR to mm-216  *A dangerous, winding 6% grade that is often heavy with fog.
<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3-Mile Hill</strong></td>
<td>Located: I-84 from Ontario, OR northbound *6% grade for about 3 miles.</td>
</tr>
<tr>
<td><strong>Pennsylvania</strong></td>
<td></td>
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<tr>
<td>Snow Shoe</td>
<td>Located: I-80 in PA from about mm-130 to mm-140 *5% East/West grade.</td>
</tr>
<tr>
<td><strong>Utah</strong></td>
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<tr>
<td>Parley’s Canyon</td>
<td>Located: I-80 from Summit Park into Salt Lake City, UT *6% grade for about 10 miles.</td>
</tr>
<tr>
<td><strong>Tennessee</strong></td>
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</tr>
<tr>
<td>Eagle Mountain</td>
<td>Located: I-24 from mm-135 into Chattanooga, TN *6% grade, often covered with fog.</td>
</tr>
<tr>
<td><strong>Virginia</strong></td>
<td></td>
</tr>
<tr>
<td>(Large Area)</td>
<td>Located: I-77 from the I-81 junction southbound about 15 miles *6% North/South grade.</td>
</tr>
<tr>
<td>Yancey Mills</td>
<td>Located: I-64 from Waynesboro, VA to <strong>Charlottesville, VA</strong> *5% grade for about 5 miles.</td>
</tr>
<tr>
<td>Marion Area</td>
<td>Located: I-81 Marion, VA to Chilhowie, VA *5% grade.</td>
</tr>
<tr>
<td><strong>Washington</strong></td>
<td></td>
</tr>
<tr>
<td>Snoqualmie Pass</td>
<td>Located: I-90 from Seattle, WA to Ellensburg, WA *Very steep 7% grade, often covered with fog.</td>
</tr>
<tr>
<td><strong>Yakima</strong></td>
<td>Located: I-82 from Southward into Yakima for approximately 4 miles *4% grade that is often covered with fog.</td>
</tr>
<tr>
<td><strong>West Virginia</strong></td>
<td></td>
</tr>
<tr>
<td>Sandstone Mountain</td>
<td>Located: I-64, 4 miles East of Beckley, WV. *7% grade.</td>
</tr>
</tbody>
</table>
Book Quiz

Activity – Take a Quiz Using the Qualcomm

What you should do:

Once you have completed the activities for this book, you are required to take a quiz using Qualcomm Macro 49. You will be answering about 15 questions on the quiz. Plan to spend about ½-hour logged on Line 4, On Duty, to take this quiz.

After you receive a passing score on all the book quizzes in the module, make the module Check Call to your TC.

Quiz Questions

Form # 06C07B  Be sure you type a zero and not the letter “O” for all characters that appear to be a zero.

Date: _________  Time: _________

Confirmation Number: ________________

1. The best way to get ice to break free from frozen brakes is to ________.
   A) use a blow dryer on the brake linings
   B) use a small hand torch on the brake shoes
   C) use a hammer to knock the ice loose from the brake drums
   D) apply and release the service brakes repeatedly

Comment: Correct answer is D. D = .20 then .32; Diff = .87

Comment: Location in Book 7: Getting Started After the Blizzard
Page 19 - 21
2. **What is the difference between floating gears on a downshift and an Ice Shift?**

   A) In an Ice Shift you float in, but clutch out of gear.
   B) In an Ice Shift, RPMs are kept at the top of the horsepower range. In a regular downshift, you come into gear in the torque range.
   C) In reality, there is no difference between the two methods.
   D) Both A and B are correct.

3. **Which of the following is the correct method for "floating a bridge"?**

   A) approach the bridge cautiously, remove foot from accelerator, and steer straight
   B) ease off the accelerator 50 RPMs prior to the bridge and pull the trailer over the bridge
   C) downshift one gear to maintain high RPMs (in the horsepower range) while crossing the bridge
   D) take the truck out of gear or push in the clutch to roll over the bridge without acceleration

4. **What are the FIRST two things you need to do in order to recover from hydroplaning?**

   A) get off the accelerator and then push in the clutch
   B) stab brake and then push in the clutch
   C) get off the accelerator and then stab brake
   D) slow down and then stab brake
5. **In wet and snowy weather, where do you want to keep your RPMs when going up and down grades?**

   A) keep RPMs low, in the torque range, when going up or down hills in wet or snowy weather  
   B) keep RPMs high, in the horsepower range, when going up or down hills in wet or snowy weather  
   C) keep RPMs high, in the horsepower range, when going up hill and low, in the torque range, when going down hill in wet or snowy weather  
   D) keep RPMs low, in the torque range, when going up hill and high, in the horsepower range, when going down hill in wet or snowy weather

6. **The Inter-axle Differential Lock (Power Divider) should NOT be engaged when ________.**

   A) any of the drive axle wheels have lost traction and are spinning  
   B) the vehicle is moving  
   C) going uphill on slick roads  
   D) running the engine at high RPMs (horsepower range)

7. **Why should your dashboard be clear and free of clutter when traveling in cold weather?**

   A) it is a federal law  
   B) to make sure defroster vents are clear and hot air can circulate freely  
   C) to avoid adding to the problem of reflection and glare coming off snow covered ground  
   D) all of the above

8. **You should leave the truck idling when the outside air (ambient) temperature goes below ______ degrees Fahrenheit?**

   A) -10  
   B) +20  
   C) +32  
   D) +40
9. If you are driving on snowy roads and the road is posted at 65 mph, you should reduce your speed to approximately _____ mph?

A) 60  
B) 55  
C) 32  
D) 16

10. The percentage of traction the tires on your vehicle have when stopped and on dry road is dry road is 75 percent. What is the percent of traction the tires have when skidding on ice?

A) 50 percent  
B) 10 percent  
C) 1 percent  
D) It depends on the speed of the vehicle when it begins to skid.

11. Which of the following statements about keeping your brakes from freezing is FALSE?

A) spray de-icer on your brakes before you run into slush and snow  
B) put slight pressure on your brakes for about 1 mile to dry them out before pulling over  
C) make sure to drain water from air system storage tanks every time you stop for fuel and at the end of each drive shift  
D) release trailer brakes and re-set after 30 minutes to brake any ice that is forming

12. How can you tell the difference between wet, shiny roads and black ice?

A) there is ice on the back of the mirrors  
B) while driving in winter conditions, there is no spray coming off the wheels of other vehicles  
C) the tachometer jumps up and down without shifting or clutching  
D) all of the above
13. **One of the rules for winter driving is to avoid double momentum shifts. Which of the following is an example of double momentum shift?**

A) only asking your vehicle to do one thing at a time  
B) an Ice Shift  
C) shifting during a turn  
D) slowing before entering a curve and then accelerating slightly to pull the trailer through the curve

**Module Completion Call**

**Activity – Make a Call to Your TC**

*What you should do:*

When you have completed all the activities in Books 5, 6 and 7, call your TC. You will be asked a few questions to find out how your experience over the road is going.

**Practice Activities for Winter Driving**

**Activity – Adjusting Following Distance**

At normal highway speeds on dry roads, 9 seconds is the recommended following distance for a 72-foot semi tractor-trailer. As weather and road conditions get worse, you need to adjust your speed and following distance (space) to make up for the reduced visibility (sight) and poor traction. For wet roads, you need to expand your following distance to 13 seconds and 24 seconds is recommended for slush and snow.

*What you should do:*

In this activity, you will practice counting off following distance at various speeds as if you were driving on wet roads or on slush and snow.

*Step 1* Pick a fixed object in the distance (an overpass, road sign, etc.).
Step 2  When the vehicle ahead of you passes the object, start to count seconds.
  o One, one–thousand
  o Two, one–thousand
  o Three, one–thousand, etc.

Step 3  Stop counting when you pass the object.

Step 4  Adjust your following distance so that you are following no more than 9 seconds behind the vehicle in front of you.

Step 5  Now increase your following distance to 13 seconds, as you would for wet roads.

Step 6  Now increase your following distance to 24 seconds, as you would for snow.

**What you should notice:**

♦ Longer following distances are easier to maintain at slower speeds. That is because the faster you are going the more space you need to stop.

♦ Those 24 seconds is a LOT of following distance. You may not even be able to see a car that is that far ahead of you. But if you have ever seen a 20–car pile-up on slick roads, you may understand why you need that much space. Remember that on snow it takes you much longer to stop because you have less traction and you have to stop gently to avoid going into a skid.

**Activity – Practice Winter Driving Techniques for Grades**

**What you should do:**

As you are going up and down 3 grades, drive as if you were taking the grades in slick weather. If you can, have someone coach you through the steps once or twice and then you call them out as you do them two more times. Include an Ice Shift in your practice.

Step 1  As you approach the upgrade, make sure your drive tires are not spinning out and, if not, switch on your Power Divider (also called Inter-axle Differential Lock). *(Note: Engaging the Power Divider*
when drive tires are spinning out may cause damage to the mechanism.)

**Step 2** Change lanes, if necessary, and then gear down early to avoid any double momentum shifts when you hit the base of the hill.

**Step 3** Think “Up High, Down Low” to remind yourself to keep your RPMs high (in the horsepower range) when you are going up hill and low (in the torque range) when you are going down hill.

**Step 4** As the hill slows you down, do an Ice Shift, which allows you to downshift without dropping the RPMs into the torque range.

### Procedures for Ice Shifting

1. When your RPMs start to drop, clutch in, put the truck in neutral, and then take your foot off the clutch.
2. Now push on the accelerator to get the RPMs all the way to the top of the no-load governed speed.
3. At the same time, move the gearshift down to the next gear and use your fingertips to gently press up against the gear. Do not shove it. Just rub it up against the gate and hold it.
4. Keep your foot on the accelerator to keep the RPMs high.
5. When the truck slows down to where the road speed matches the gear you have selected, the gearshift lever will slip into place, smooth as silk, completing your downshift.

**Step 5** Just before you crest the hill, brake a little. This does two things for you; it tests your brakes and it lowers your RPMs into the torque range. You may want to slow even more if you need to downshift to be in the proper gear for the downgrade.

**Step 6** Now, unless your wheels are spinning out, disengage your Power Divider.
Step 7 As you go down the grade, keep your RPMs low by applying slow, gentle pressure to your brakes. You need to allow yourself the RPMs and space you might need to pull your trailer back in line without having to shift.

Step 8 And once again, avoid sudden steering changes or other double momentum shifts.

Step 9 Part way down the grade, respond as if your trailer axle tires started to skid and you saw the rear of your trailer drifting out of your lane to the left.

### Trailer Axle Skid Recovery

1. Get off the brakes.

2. Accelerate *slightly* (2–3 mph) to provide the torque needed to pull the trailer back in line.

   *(Note: Do not accelerate more than a couple of mph. You cannot “outrun” a skid by going faster. If you accelerate too much, you will need to shift and this double momentum shift can throw you into another type of skid.)*

3. Once the trailer is back behind you, gently stab brake to slow to a comfortable speed and get your RPMs back down into the torque range.

### Activity – Identify Safe Havens

On stretches of road where winter blizzards are common, it is a good idea to always have a safe place to pull over in mind. With an 80,000 pound, 72 foot long vehicle, it can sometimes be a challenge to find a safe haven to wait out a storm. You should get in the habit of watching for paved pullouts and rest areas that would be safe places to park your vehicle in the event of an emergency or if you need to stop for a nap or to check a mechanical problem. Pulling over on the shoulder of the highway can be unsafe for both you and other vehicles. Something that happens all too frequently is for large trucks to be hit by other vehicles when they are parked on a shoulder or in an emergency.
lane. As well, a soft shoulder can result in a stuck truck or could even lead to a rollover.

**What you should do:**

This activity will help you get in the habit of watching for and making notes on safe places to park your vehicle so you will be able to find a safe haven when you need one.

**Step 1**  Towards the end of your next driving shift, start watching for safe havens.

**Step 2**  When you have been relieved from driving, write down the ones you remember in the chart below.

**Step 3**  Stay up for a while and write down any others that you see.

<table>
<thead>
<tr>
<th>Highway</th>
<th>Direction of Travel</th>
<th>Mile Marker</th>
<th>Type of Stop</th>
<th>Room to Chain-up?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Make it a habit to notice and keep a record of safe havens on a page you tape into your atlas or in a notebook.

**Comments and Suggestions**

We welcome your suggestions for improvements and additions to this book. If you find any mistakes, such as typos or incorrect numbers or incorrect statements, please notify us. We want to get it right for everyone. Please forward suggestions or comments to:

Email: drivermanual@crengland.com

or

Qualcomm extension: 3556