

## Section 2

### DRIVING SAFELY

This section covers:

- ✓ Vehicle inspection
- ✓ Basic control of your vehicle
- ✓ Shifting gears
- ✓ Seeing
- ✓ Communicating
- ✓ Space management
- ✓ Controlling your speed
- ✓ Seeing hazards
- ✓ Distracted driving
- ✓ Aggressive drivers/Road rage
- ✓ Night driving & Driver fatigue
- ✓ Driving in fog
- ✓ Winter driving
- ✓ Hot weather driving
- ✓ Railroad-highway crossings
- ✓ Mountain driving
- ✓ Driving emergencies
- ✓ Antilock braking systems
- ✓ Skid control and recovery
- ✓ Accident procedures
- ✓ Fires
- ✓ Alcohol, other drugs, and driving
- ✓ Hazardous materials rules

This section contains knowledge and safe driving information that all commercial drivers should know. You must pass a test on this information to get a CDL. This section does not have specific information on air brakes, combination vehicles, doubles, or passenger vehicles. When preparing for the Vehicle Inspection Test, you must review the material in Section 11 in addition to the information in this section. This section does have basic information on hazardous materials (HazMat) that all drivers should know. If you need a HazMat endorsement, you should study Section 9.

#### 2.1 – Vehicle inspection

##### 2.1.1 – Why inspect

Safety is the most important reason you inspect your vehicle, safety for yourself and for other road users. A vehicle defect found during an inspection could save you problems later. You could have a breakdown on the road that will cost time and dollars, or even worse, a crash caused by the defect.

Federal and state laws require that drivers inspect their vehicles. Federal and state inspectors also may inspect your vehicles. If they judge the vehicle to be unsafe, they will put it "out of service" until it is fixed.

##### 2.1.2 – Types of vehicle inspection

#### Vehicle inspection

A Vehicle inspection will help you find problems that could cause a crash or breakdown.

#### During a trip

For safety you should:

- ✓ Watch gauges for signs of trouble.
- ✓ Use your senses to check for problems (look, listen, smell, feel).
- ✓ Check critical items when you stop:
  - Tires, wheels and rims
  - Brakes
  - Lights and reflectors
  - Brake and electrical connections to trailer
  - Trailer coupling devices
  - Cargo securement devices

#### After-trip inspection and report

You should do an after-trip inspection at the end of the trip, day, or tour of duty on each vehicle you operated. It may include filling out a vehicle condition report listing any problems you find. The inspection report helps a motor carrier know when the vehicle needs repairs.

##### 2.1.3 – What to look for

#### Tire problems

- ✓ Too much or too little air pressure
- ✓ Bad wear. You need at least 4/32-inch tread depth in every major groove on front tires. You need 2/32 inch on other tires. No fabric should show through the tread or sidewall.
- ✓ Cuts or other damage
- ✓ Tread separation
- ✓ Dual tires that come in contact with each other or parts of the vehicle
- ✓ Mismatched sizes
- ✓ Radial and bias-ply tires used together
- ✓ Cut or cracked valve stems
- ✓ Re-grooved, recapped, or retreaded tires on the front wheels of a bus are prohibited

## Wheel and rim problems

- ✓ Damaged rims.
- ✓ Rust around wheel nuts may mean the nuts are loose-check tightness. After a tire has been changed, stop a short while later and re-check tightness of nuts.
- ✓ Missing clamps, spacers, studs, or lugs means danger.
- ✓ Mismatched, bent, or cracked lock rings are dangerous.
- ✓ Wheels or rims that have had welding repairs are not safe.

## Bad brake drums or shoes

- ✓ Cracked drums.
- ✓ Shoes or pads with oil, grease, or brake fluid on them.
- ✓ Shoes worn dangerously thin, missing, or broken.

## Steering system defects

- ✓ Missing nuts, bolts, cotter keys, or other parts.
- ✓ Bent, loose, or broken parts, such as steering column, steering gear box, or tie rods.
- ✓ If power steering equipped, check hoses, pumps, and fluid level; check for leaks.
- ✓ Steering wheel play of more than 10 degrees (approximately 2 inches movement at the rim of a 20-inch steering wheel) can make it hard to steer.

Figure 2.1 illustrates a typical steering system.



Figure 2.1

## Suspension system defects

The suspension system holds up the vehicle and its load. It keeps the axles in place. Therefore, broken suspension parts can be extremely dangerous. Look for:

- ✓ Spring hangers that allow movement of axle from proper position. See Figure 2.2.

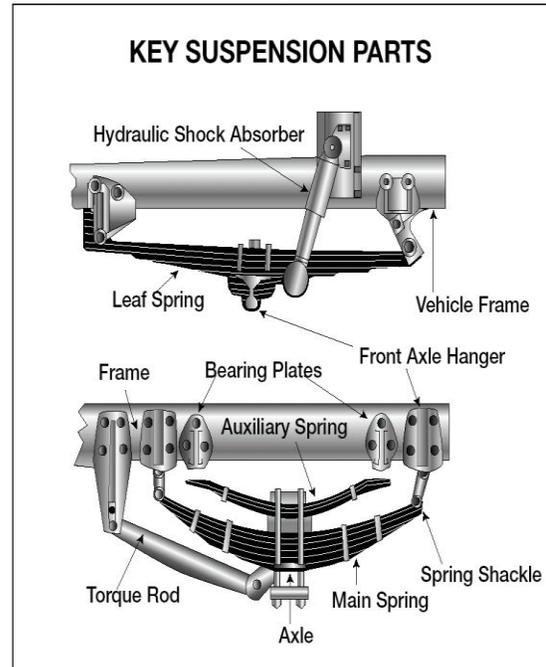


Figure 2.2

- ✓ Cracked or broken spring hangers.
- ✓ Missing or broken leaves in any leaf spring. If one-fourth or more are missing, it will put the vehicle "out of service", but any defect could be dangerous. See Figure 2.3.

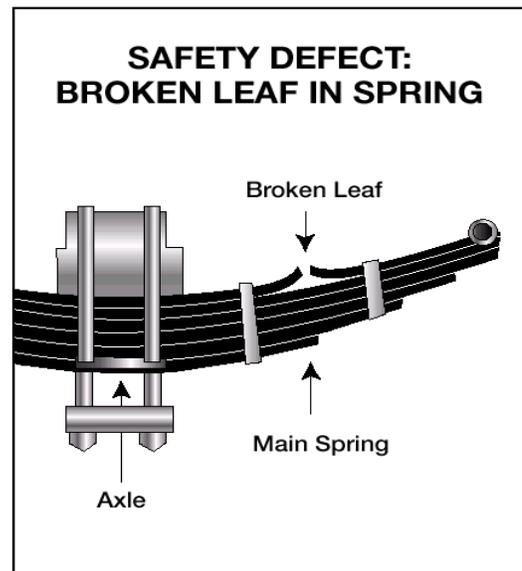


Figure 2.3

- ✓ Broken leaves in a multi-leaf spring or leaves that have shifted so they might hit a tire or other part.
- ✓ Leaking shock absorbers.
- ✓ Torque rod or arm, u-bolts, spring hangers, or other axle positioning parts that are cracked, damaged, or missing.
- ✓ Air suspension systems that are damaged and/or leaking. See Figure 2.4.

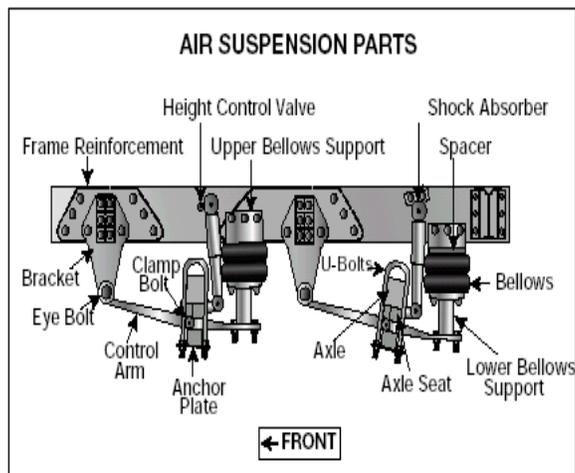


Figure 2.4

- ✓ Any loose, cracked, broken, or missing frame members.

### Exhaust system defects

A broken exhaust system can let poison fumes into the cab or sleeper berth. Look for:

- ✓ Loose, broken, or missing exhaust pipes, mufflers, tailpipes, or vertical stacks.
- ✓ Loose, broken, or missing mounting brackets, clamps, bolts, or nuts.
- ✓ Exhaust system parts rubbing against fuel system parts, tires, or other moving parts of vehicle.
- ✓ Exhaust system parts that are leaking.

### Emergency equipment

Vehicles must be equipped with emergency equipment. Look for:

- ✓ Fire extinguisher(s).
- ✓ Spare electrical fuses (unless equipped with circuit breakers).
- ✓ Warning devices for parked vehicles: three reflective triangles or at least 6 fuses or 3 liquid burning flares).

### Cargo (Trucks)

You must make sure the truck is not overloaded and the cargo is balanced and secured before each trip. If the cargo contains hazardous materials, you must inspect for proper papers and placarding.

#### 2.1.4 – CDL vehicle inspection test

In order to obtain a CDL you will be required to pass a vehicle inspection test. You will be tested to see if you know whether your vehicle is safe to drive. You will be asked to do a vehicle inspection of your vehicle. You must point to/touch and name the item you are inspecting and explain to the examiner what you would inspect and why. The following seven-step inspection method should be useful.

#### 2.1.5 – Seven-step inspection method

##### Method of inspection

You should do a Vehicle inspection the same way each time so you will learn all the steps and be less likely to forget something.

##### Approaching the vehicle

Notice general condition. Look for damage or vehicle leaning to one side. Look under the vehicle for fresh oil, coolant, grease, or fuel leaks. Check the area around the vehicle for hazards to vehicle movement (people, other vehicles, objects, low-hanging wires, limbs, etc.).

##### Vehicle inspection guide

Note: For the purposes of the CDL skills test you will be required to begin the test in the cab of the test vehicle.

##### Step 1: Vehicle overview

##### Review last vehicle inspection report

Drivers may have to make a vehicle inspection report in writing each day. The motor carrier must repair any items in the report that affect safety and certify on the report that repairs were made or were unnecessary. You must sign the report only if defects were noted and certified to be repaired or not needed to be repaired.

##### Step 2: Check engine compartment

##### Check that the parking brakes are on and/or wheels chocked

You may have to raise the hood, tilt the cab (secure loose things so they don't fall and break something), or open the engine compartment door. Check the following:

- ✓ Engine oil level.

- ✓ Coolant level in radiator; condition of hoses.
- ✓ Power steering fluid level; hose condition (if so equipped).
- ✓ Windshield washer fluid level.
- ✓ Battery fluid level, connections and tie downs (battery may be located elsewhere).
- ✓ Automatic transmission fluid level (may require engine to be running).
- ✓ Check belts for tightness and excessive wear (alternator, water pump, air compressor). Learn how much "give" the belts should have when adjusted right and check each one.
- ✓ Leaks in the engine compartment (fuel, coolant, oil, power steering fluid, hydraulic fluid, battery fluid).
- ✓ Cracked, worn electrical wiring insulation.
- ✓ Lower and secure hood, cab, or engine compartment door.

### **Step 3: Start engine and inspect inside the cab**

#### **Get in and start engine**

- ✓ Make sure parking brake is on.
- ✓ Put gearshift in neutral (or "park" if automatic).
- ✓ Start engine; listen for unusual noises.

If equipped, check the Anti-lock Braking System (ABS) indicator lights. Light on dash should come on and then turn off. If it stays on the ABS is not working properly. For trailers only, if the yellow light on the left rear of the trailer stays on, the ABS is not working properly.

#### **Look at the gauges**

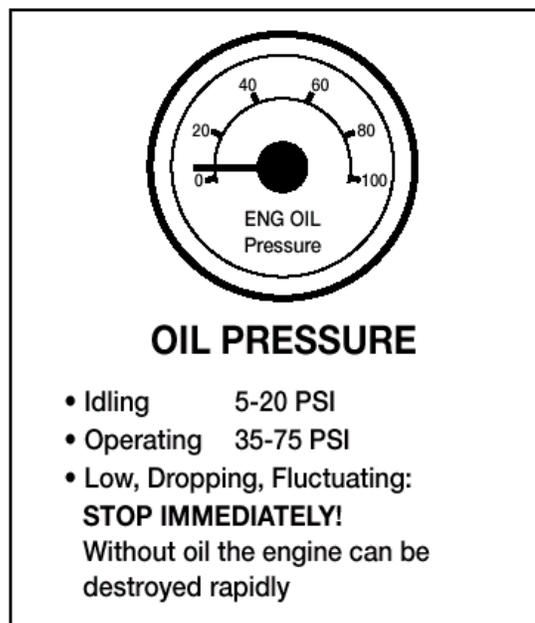
- ✓ Oil pressure. Should come up to normal within seconds after engine is started. See Figure 2.5
- ✓ Air pressure. Pressure should build from 50 to 90 psi within 3 minutes. Build air pressure to governor cut-out (usually around 120 – 140 psi. **Know your vehicle's requirements.**
- ✓ Ammeter and/or voltmeter. Should be in normal range(s).
- ✓ Coolant temperature. Should begin gradual rise to normal operating range.
- ✓ Engine oil temperature. Should begin gradual rise to normal operating range.

- ✓ Warning lights and buzzers. Oil, coolant, charging circuit warning, and antilock brake system lights should go out right away.

#### **Check condition of controls**

Check all of the following for looseness, sticking, damage, or improper setting:

- ✓ Steering wheel.
- ✓ Clutch.
- ✓ Accelerator ("gas pedal").
- ✓ Brake controls:
  - Foot brake.
  - Trailer brake (if vehicle has one).
  - Parking brake.
  - Retarder controls (if vehicle has them).
- ✓ Transmission controls.
- ✓ Interaxle differential lock (if vehicle has one).
- ✓ Horn(s).
- ✓ Windshield wiper/washer.
- ✓ Lights:
  - Headlights.
  - Dimmer switch.
  - Turn signal.
  - Four-way flashers.
  - Parking, clearance, identification, marker switch(es).



**Figure 2.5**

## Check mirrors and windshield

Inspect mirrors and windshield for cracks, dirt, illegal stickers, or other obstructions to seeing clearly. Clean and adjust as necessary.

## Check emergency equipment

- ✓ Check for safety equipment:
  - Spare electrical fuses (unless vehicle has circuit breakers).
  - Three red reflective triangles, 6 fuses or 3 liquid burning flares.
  - Properly charged and rated fire extinguisher.
- ✓ Check for optional items such as:
  - Chains (where winter conditions require).
  - Tire changing equipment.
- ✓ List of emergency phone numbers
- ✓ Accident reporting kit (packet).
- ✓ Check Safety Belt. Check that the safety belt is securely mounted, adjusts; latches properly and is not ripped or frayed.

## Step 4: Turn off engine and check lights

Make sure the parking brake is set, turn off the engine, and take the key with you. Turn on headlights (low beams) and four-way emergency flashers and get out of the vehicle.

## Step 5: Do walk-around inspection

- ✓ Go to front of vehicle and check that low beams are on, and both of the four-way flashers are working.
- ✓ Push dimmer switch and check that high beams work.
- ✓ Turn off headlights and four-way emergency flashers.
- ✓ Turn on parking, clearance, side-marker, and identification lights.
- ✓ Turn on right turn signal and start walk-around inspection.

## General

- ✓ Walk around and inspect.
- ✓ Clean all lights, reflectors, and glass as you go along.

## Left front side

- ✓ Driver's door glass should be clean.
- ✓ Door latches or locks should work properly.

- ✓ Left front wheel:
  - Condition of wheel and rim--missing, bent, broken studs, clamps, lugs, or any signs of misalignment.
  - Condition of tires--properly inflated, valve stem and cap OK, no serious cuts, bulges, or tread wear.
  - Use wrench to test rust-streaked lug nuts, indicating looseness.
  - Hub oil level OK, no leaks.
- ✓ Left front suspension:
  - Condition of spring, spring hangers, shackles, u-bolts.
  - Shock absorber condition.
- ✓ Left front brake:
  - Condition of brake drum or disc.
  - Condition of hoses.

## Front

- ✓ Condition of front axle.
- ✓ Condition of steering system.
  - No loose, worn, bent, damaged or missing parts.
  - Must grab steering mechanism to test for looseness.
- ✓ Condition of windshield.
  - Check for damage and clean if dirty.
  - Check windshield wiper arms for proper spring tension.
  - Check wiper blades for damage, "stiff" rubber, and securement.
- ✓ Lights and reflectors.
  - Parking, clearance, and identification lights clean, operating, and proper color (amber at front).
  - Reflectors clean and proper color (amber at front).
  - Right front turn signal light clean, operating, and proper color (amber or white on signals facing forward).

## Right side

- ✓ Right front: check all items as done on left front.
- ✓ Primary and secondary safety cab locks engaged (if cab-over-engine design).
- ✓ Right fuel tank(s).
  - Securely mounted, not damaged, or leaking.
  - Fuel crossover line secure.
  - Tank(s) contain enough fuel.
  - Cap(s) on and secure.
- ✓ Condition of visible parts.
  - Rear of engine--not leaking.
  - Transmission--not leaking.

- Exhaust system--secure, not leaking, not touching wires, fuel, or air-lines.
  - Frame and cross members--no bends or cracks.
  - Air-lines and electrical wiring--secured against snagging, rubbing, wearing.
  - Spare tire carrier or rack not damaged (if so equipped).
  - Spare tire and/or wheel securely mounted in rack.
  - Spare tire and wheel adequate (proper size, properly inflated).
- ✓ Cargo securement (trucks).
- Cargo properly blocked, braced, tied, chained, etc.
  - Header board adequate, secure (if required).
  - Side boards, stakes strong enough, free of damage, properly set in place (if so equipped).
  - Canvas or tarp (if required) properly secured to prevent tearing, billowing, or blocking of mirrors.
  - If oversize, all required signs (flags, lamps, and reflectors) safely and properly mounted and all required permits in driver's possession.
  - Curbside cargo compartment doors in good condition, securely closed, latched/locked and required security seals in place.

### **Right rear**

- ✓ Condition of wheels and rims--no missing, bent, or broken spacers, studs, clamps, or lugs.
- ✓ Condition of tires--properly inflated, valve stems and caps OK, no serious cuts, bulges, tread wear, tires not rubbing each other, and nothing stuck between them.
- ✓ Tires same type, e.g., not mixed radial and bias types.
- ✓ Tires evenly matched (same sizes).
- ✓ Wheel bearing/seals not leaking.
- ✓ Suspension.
- Condition of spring(s), spring hangers, shackles, and u-bolts.
  - Axle secure.
  - Powered axle(s) not leaking lube (gear oil).
  - Condition of torque rod arms, bushings.
  - Condition of shock absorber(s).
  - If retractable axle equipped, check condition of lift mechanism. If air powered, check for leaks.
  - Condition of air ride components.
- ✓ Brakes.
- Brake adjustment.
  - Condition of brake drum(s) or discs.
  - Condition of hoses--look for any wear due to rubbing.
- ✓ Lights and reflectors.
- Side-marker lights clean, operating, and proper color (red at rear, others amber).

- Side-marker reflectors clean and proper color (red at rear, others amber).

### **Rear**

- ✓ Lights and reflectors.
- Rear clearance and identification lights clean, operating, and proper color (red at rear).
  - Reflectors clean and proper color (red at rear).
  - Taillights clean, operating, and proper color (red at rear).
  - Right rear turn signal operating, and proper color (red, yellow, or amber at rear).
- ✓ License plate(s) present, clean, and secured.
- ✓ Splash guards present, not damaged, properly fastened, not dragging on ground, or rubbing tires.
- ✓ Cargo secure (trucks).
- ✓ Cargo properly blocked, braced, tied, chained, etc.
- ✓ Tailboards up and properly secured.
- ✓ End gates free of damage, properly secured in stake sockets.
- ✓ Canvas or tarp (if required) properly secured to prevent tearing, billowing, or blocking of either the rearview mirrors or rear lights.
- ✓ If over-length, or over-width, make sure all signs and/or additional lights/flags are safely and properly mounted, and all required permits are in driver's possession.
- ✓ Rear doors securely closed, latched/locked.

### **Left side**

- ✓ Check all items as done on right side, plus:
- Battery(ies) (if not mounted in engine compartment).
  - Battery box(es) securely mounted to vehicle.
  - Box has secure cover.
  - Battery(ies) secured against movement.
  - Battery(ies) not broken or leaking.
  - Fluid in battery(ies) at proper level (except maintenance-free type).
  - Cell caps present and securely tightened (except maintenance-free type).
  - Vents in cell caps free of foreign material (except maintenance-free type).

## Step 6: Check signal lights

### Get in and turn off lights

- ✓ Turn off all lights.
- ✓ Turn on stop lights (apply trailer hand brake or have a helper put on the brake pedal).
- ✓ Turn on left turn signal lights.

### Get out and check lights

- ✓ Left front turn signal light clean, operating, and proper color (amber or white on signals facing the front).
- ✓ Left rear turn signal light and both stop lights clean, operating, and proper color (red, yellow, or amber).

### Get in vehicle

- ✓ Turn off lights not needed for driving.
- ✓ Check for all required papers, trip manifests, permits, etc.
- ✓ Secure all loose articles in cab (they might interfere with operation of the controls or hit you in a crash).
- ✓ Start the engine.

## Step 7: Start the engine and check

### Test for hydraulic leaks

If the vehicle has hydraulic brakes, pump the brake pedal three times. Then apply firm pressure to the pedal and hold for five seconds. The pedal should not move. If it does, there may be a leak or other problem. Get it fixed before driving. If the vehicle has air brakes, do the checks described in Sections 5 and 6 of this manual.

### Brake system

#### Test parking brake(s)

- ✓ Fasten safety belt
- ✓ Set parking brake (power unit only).
- ✓ Release trailer parking brake (if applicable).
- ✓ Place vehicle into a low gear.
- ✓ Gently pull forward against parking brake to make sure the parking brake holds.
- ✓ Repeat the same steps for the trailer with trailer parking brake set and power unit parking brakes released (if applicable).

If it doesn't hold vehicle, it is faulty; get it fixed.

### Test service brake stopping action

- ✓ Go about five miles per hour.
- ✓ Push brake pedal firmly
- ✓ "Pulling" to one side or the other can mean brake trouble.
- ✓ Any unusual brake pedal "feel" or delayed stopping action can mean trouble.

If you find anything unsafe during the Vehicle inspection, get it fixed. Federal and state laws forbid operating an unsafe vehicle.

## 2.1.6 – Inspection during a trip

### Check vehicle operation regularly

You should check:

- ✓ Instruments.
- ✓ Air pressure gauge (if you have air brakes).
- ✓ Temperature gauges.
- ✓ Pressure gauges.
- ✓ Ammeter/voltmeter.
- ✓ Mirrors.
- ✓ Tires.
- ✓ Cargo, cargo covers.
- ✓ Lights, etc.

If you see, hear, smell, or feel anything that might mean trouble, check it out.

### Safety inspection

Drivers of trucks and truck tractors when transporting cargo must inspect the securement of the cargo within the first 50 miles of a trip and every 150 miles or every three hours (whichever comes first) after.

## 2.1.7 – After-trip inspection and report

You may have to make a written report each day on the condition of the vehicle(s) you drove. Report anything affecting safety or possibly leading to mechanical breakdown.

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## **Subsection 2.1**

### **Test your knowledge**

The vehicle inspection report tells the motor carrier about problems that may need fixing. Keep a copy of your report in the vehicle for one day. That way, the next driver can learn about any problems you have found.

1. What is the most important reason for doing a vehicle inspection?
2. What things should you check during a trip?
3. Name some key steering system parts.
4. Name some suspension system defects.
5. What three kinds of emergency equipment must you have?
6. What is the minimum tread depth for front tires? For other tires?
7. Name some things you should check on the front of your vehicle during the walk around inspection.
8. What should wheel bearing seals be checked for?
9. How many red reflective triangles should you carry?
10. How do you test hydraulic brakes for leaks?
11. Why put the starter switch key in your pocket during the Vehicle inspection?

These questions may be on your test. If you cannot answer them all, re-read subsection 2.1.

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## **2.2 – Basic control of your vehicle**

To drive a vehicle safely, you must be able to control its speed and direction. Safe operation of a commercial vehicle requires skill in:

- ✓ Accelerating.
- ✓ Steering.
- ✓ Stopping.
- ✓ Backing safely.

Fasten your seatbelt when on the road. Apply the parking brake when you leave your vehicle.

### **2.2.1 – Accelerating**

Do not roll back when you start. You may hit someone behind you. If you have a manual transmission vehicle, partly engage the clutch before you take your right foot off

the brake. Put on the parking brake whenever necessary to keep from rolling back. Release the parking brake only when you have applied enough engine power to keep from rolling back. On a tractor-trailer equipped with a trailer brake hand valve, the hand valve can be applied to keep from rolling back.

Speed up smoothly and gradually so the vehicle does not jerk. Rough acceleration can cause mechanical damage. When pulling a trailer, rough acceleration can damage the coupling.

Speed up very gradually when traction is poor, as in rain or snow. If you use too much power, the drive wheels may spin. You could lose control. If the drive wheels begin to spin, take your foot off the accelerator.

### **2.2.2 – Steering**

Hold the steering wheel firmly with both hands. Your hands should be on opposite sides of the wheel. If you hit a curb or a pothole (chuckhole), the wheel could pull away from your hands unless you have a firm hold.

### **2.2.3 – Stopping**

Push the brake pedal down gradually. The amount of brake pressure you need to stop the vehicle will depend on the speed of the vehicle and how quickly you need to stop. Control the pressure so the vehicle comes to a smooth, safe stop. If you have a manual transmission, push the clutch in when the engine is close to idle.

### **2.2.4 – Backing safely**

Because you cannot see everything behind your vehicle, backing is always dangerous. Avoid backing whenever you can. When you park, try to park so you will be able to pull forward when you leave. When you have to back, here are a few simple safety rules:

- ✓ Start in the proper position.
- ✓ Look at your path.
- ✓ Use mirrors on both sides.
- ✓ Back slowly.
- ✓ Back and turn toward the driver's side whenever possible.
- ✓ Use a helper whenever possible.

These rules are discussed in turn below.

### **Start in the proper position**

Put the vehicle in the best position to allow you to back safely. This position will depend on the type of backing to be done.

## Look at your path

Look at your line of travel before you begin. Get out and walk around the vehicle. Check your clearance to the sides and overhead, in and near the path your vehicle will take.

## Use mirrors on both sides

Check the outside mirrors on both sides frequently. Get out of the vehicle and check your path if you are unsure.

## Back slowly

Always back as slowly as possible. Use the lowest reverse gear. That way you can more easily correct any steering errors. You also can stop quickly if necessary.

## Back and turn toward the driver's side

Back to the driver's side so that you can see better. Backing toward the right side is very dangerous because you cannot see as well. If you back and turn toward the driver's side, you can watch the rear of your vehicle by looking out the side window. Use driver-side backing--even if it means going around the block to put your vehicle in this position. The added safety is worth it.

## Use a helper

Use a helper when you can. There are blind spots you cannot see. That is why a helper is important. The helper should stand near the back of your vehicle where you can see the helper. Before you begin backing, work out a set of hand signals that you both understand. Agree on a signal for "stop."

## 2.3 – Shifting gears

Correct shifting of gears is important. If you cannot get your vehicle into the right gear while driving, you will have less control.

### 2.3.1 – Manual transmissions

#### Basic method for shifting up

Most heavy vehicles with unsynchronized manual transmissions require double clutching to change gears. If equipped with a synchronized manual transmission, double clutching is NOT required. This is the basic method:

- ✓ Release accelerator, push in clutch and shift to neutral at the same time.
- ✓ Release clutch.
- ✓ Let engine and gears slow down to the rpm required for the next gear (this takes practice).

- ✓ Push in clutch and shift to the higher gear at the same time.
- ✓ Release clutch and press accelerator at the same time.

Shifting gears using double clutching requires practice. If you remain too long in neutral, you may have difficulty putting the vehicle into the next gear. If so, do not try to force it. Return to neutral, release clutch, increase engine speed to match road speed, and try again.

#### Knowing when to shift up

There are two ways of knowing when to shift:

1. Use engine speed (rpm)

Study the driver's manual for your vehicle and learn the operating rpm range. Watch your tachometer and shift up when your engine reaches the top of the range. (Some newer vehicles use "progressive" shifting: the rpm at which you shift becomes higher as you move up in the gears. Find out what is right for the vehicle you will operate.)

2. Use road speed (mph)

Learn what speeds each gear is good for. Then, by using the speedometer, you will know when to shift up. With either method, you may learn to use engine sounds to know when to shift.

#### Basic procedures for shifting down

- ✓ Release accelerator, push in clutch, and shift to neutral at the same time.
- ✓ Release clutch.
- ✓ Press accelerator, increase engine and gear speed to the rpm required in the lower gear.
- ✓ Push in clutch and shift to lower gear at the same time.
- ✓ Release clutch and press accelerator at the same time.
- ✓ Downshifting, like upshifting, requires knowing when to shift. Use either the tachometer or the speedometer and downshift at the right rpm or road speed.

Special conditions where you should downshift are:

1. Before starting down a hill

Slow down and shift down to a speed that you can control without using the brakes hard. Otherwise, the brakes can overheat and lose their braking power.

Downshift before starting down the hill. Make sure you are in a low enough gear, usually lower than the gear required to climb the same hill.

## 2. Before Entering a Curve

Slow down to a safe speed, and downshift to the right gear before entering the curve. This lets you use some power through the curve to help the vehicle be more stable while turning. It also allows you to speed up as soon as you are out of the curve.

### **2.3.2 – Multi-speed rear axles and auxiliary transmissions**

Multi-speed rear axles and auxiliary transmissions are used on many vehicles to provide extra gears. You usually control them by a selector knob or switch on the gearshift lever of the main transmission. There are many different shift patterns. Learn the right way to shift gears in the vehicle you will drive.

### **2.3.3 – Automatic transmissions**

Some vehicles have automatic transmissions. You can select a low range to get greater engine braking when going down grades. The lower ranges prevent the transmission from shifting up beyond the selected gear (unless the governor rpm is exceeded). It is very important to use this braking effect when going down grades.

### **2.3.4 – Retarders**

Some vehicles have "retarders." Retarders help slow a vehicle, reducing the need for using your brakes. They reduce brake wear and give you another way to slow down. There are four basic types of retarders (exhaust, engine, hydraulic, and electric). All retarders can be turned on or off by the driver. On some vehicles the retarding power can be adjusted. When turned "on," retarders apply their braking power (to the drive wheels only) whenever you let up on the accelerator pedal all the way. Because these devices can be noisy, be sure you know where their use is permitted.

### **Caution**

When your drive wheels have poor traction, the retarder may cause them to skid. Therefore, you should turn the retarder off whenever the road is wet, icy, or snow covered.

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## **Subsections 2.2 and 2.3 Test your knowledge**

1. Why should you back toward the driver's side?
2. If stopped on a hill, how can you start moving without rolling back?
3. When backing, why is it important to use a helper?
4. What's the most important hand signal that you and the helper should agree on?
5. What are the two special conditions where you should downshift?
6. When should you downshift automatic transmissions?
7. Retarders keep you from skidding when the road is slippery. True or False?
8. What are the two ways to know when to shift?

These questions may be on the test. If you cannot answer them all, re-read subsections 2.2 and 2.3.

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## **2.4 – Seeing**

To be a safe driver you need to know what's going on all around your vehicle. Not looking properly is a major cause of accidents.

### **2.4.1 – Seeing ahead**

All drivers look ahead; but many do not look far enough ahead.

### **Importance of looking far enough ahead**

Because stopping or changing lanes can take a lot of distance, knowing what the traffic is doing on all sides of you is very important. You need to look well ahead to make sure you have room to make these moves safely.

### **How far ahead to look**

Most good drivers look at least 12 to 15 seconds ahead. That means looking ahead the distance you will travel in 12 to 15 seconds. At lower speeds, that's about one block. At highway speeds it's about a quarter of a mile. If you are not looking that far ahead, you may have to stop too quickly or make quick lane changes. Looking 12 to 15 seconds ahead doesn't mean not paying attention to things that are closer. Good drivers shift their attention back and forth, near and far. Figure 2.6 illustrates how far to look ahead.

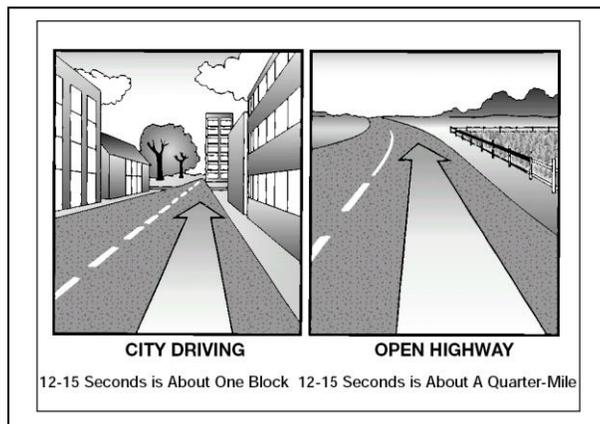


Figure 2.6

## Look for traffic

Look for vehicles coming onto the highway, into your lane, or turning. Watch for brake lights from slowing vehicles. By seeing these things far enough ahead, you can change your speed, or change lanes if necessary to avoid a problem. If a traffic light has been green for a long time it will probably change before you get there. Start slowing down and be ready to stop.

### 2.4.2 – Seeing to the sides and rear

It's important to know what's going on behind and to the sides. Check your mirrors regularly. Check more often in special situations.

## Mirror adjustment

Mirror adjustment should be checked prior to the start of any trip and can only be checked accurately when the trailer(s) are straight. You should check and adjust each mirror to show some part of the vehicle. This will give you a reference point for judging the position of the other images.

## Regular checks

You need to make regular checks of your mirrors to be aware of traffic and to check your vehicle.

## Traffic

Check your mirrors for vehicles on either side and in back of you. In an emergency, you may need to know whether you can make a quick lane change. Use your mirrors to spot overtaking vehicles. There are "blind spots" that your mirrors cannot show you. Check your mirrors regularly to know where other vehicles are around you, and to see if they move into your blind spots.

## Check your vehicle

Use the mirrors to keep an eye on your tires. It is one way to spot a tire fire. If you're carrying open cargo, you can

use the mirrors to check it. Look for loose straps, ropes, or chains. Watch for a flapping or ballooning tarp.

## Special situations

Special situations require more than regular mirror checks. These are lane changes, turns, merges, and tight maneuvers.

## Lane changes

You need to check your mirrors to make sure no one is alongside you or about to pass you. Check your mirrors:

- ✓ Before you change lanes to make sure there is enough room.
- ✓ After you have signaled, to check that no one has moved into your blind spot.
- ✓ Right after you start the lane change, to double-check that your path is clear.
- ✓ After you complete the lane change.

## Turns

In turns, check your mirrors to make sure the rear of your vehicle will not hit anything.

## Merges

When merging, use your mirrors to make sure the gap in traffic is large enough for you to enter safely.

## Tight maneuvers

Any time you are driving in close quarters, check your mirrors often. Make sure you have enough clearance.

## How to use mirrors

Use mirrors correctly by checking them quickly and understanding what you see.

- ✓ When you use your mirrors while driving on the road, check quickly. Look back and forth between the mirrors and the road ahead. Don't focus on the mirrors for too long. Otherwise, you will travel quite a distance without knowing what's happening ahead.

Many large vehicles have curved (convex, "fisheye," "spot," "bug-eye") mirrors that show a wider area than flat mirrors. This is often helpful. But everything appears smaller in a convex mirror than it would if you were looking at it directly. Things also seem farther away than they really are. It is important to realize this and to allow for it. Figure 2.7 shows the field of vision using a convex mirror.

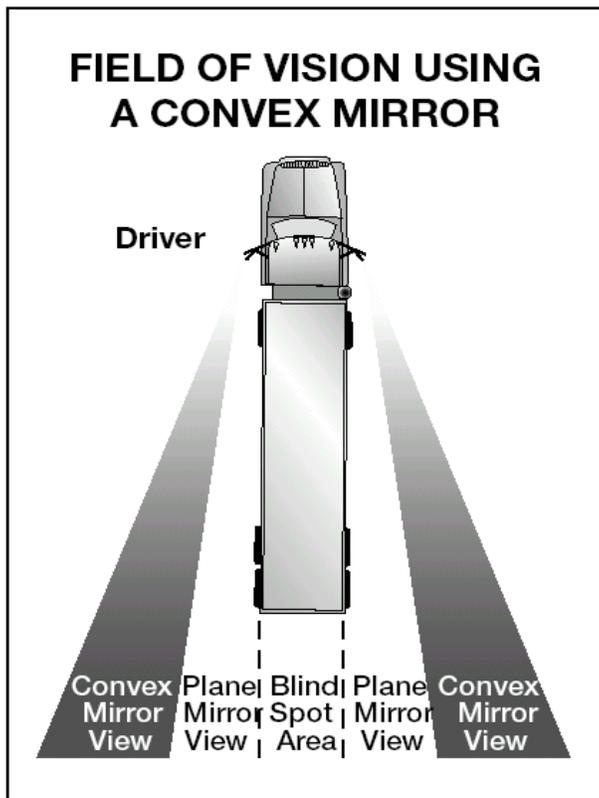


Figure 2.7

## 2.5 – Communicating

### 2.5.1 – Signal your intentions

Other drivers cannot know what you are going to do until you tell them.

Signaling what you intend to do is important for safety. Here are some general rules for signaling.

#### Turns

There are three good rules for using turn signals:

- ✓ Signal early. Signal well before you turn. It is the best way to keep others from trying to pass you.
- ✓ Signal continuously. You need both hands on the wheel to turn safely. Don't cancel the signal until you have completed the turn.
- ✓ Cancel your signal. Don't forget to turn off your turn signal after you've turned (if you don't have self-canceling signals).

#### Lane changes

Put your turn signal on before changing lanes. Change lanes slowly and smoothly. That way a driver you didn't see may have a chance to honk his/her horn or avoid your vehicle.

## Slowing down

Warn drivers behind you when you see you'll need to slow down. A few light taps on the brake pedal -- enough to flash the brake lights -- should warn following drivers. Use the four-way emergency flashers for times when you are driving very slowly or are stopped. Warn other drivers in any of the following situations:

- ✓ **Trouble Ahead.** The size of your vehicle may make it hard for drivers behind you to see hazards ahead. If you see a hazard that will require slowing down, warn the drivers behind by flashing your brake lights.
- ✓ **Tight Turns.** Most car drivers don't know how slowly you have to go to make a tight turn in a large vehicle. Give drivers behind you warning by braking early and slowing gradually.
- ✓ **Stopping on the Road.** Truck and bus drivers sometimes stop in the roadway to unload cargo or passengers, or to stop at a railroad crossing. Warn following drivers by flashing your brake lights. Don't stop suddenly.
- ✓ **Driving Slowly.** Drivers often do not realize how fast they are catching up to a slow vehicle until they are very close. If you must drive slowly, alert following drivers by turning on your emergency flashers if it is legal. (Laws regarding the use of flashers differ from one state to another. Check the laws of the states where you will drive.)

## Don't direct traffic

Some drivers try to help out others by signaling when it is safe to pass. You should not do this. You could cause an accident. You could be blamed, and it could cost you many thousands of dollars.

### 2.5.2 – Communicating your presence

Other drivers may not notice your vehicle even when it's in plain sight. To help prevent accidents, let them know you're there.

#### When passing

Whenever you are about to pass a vehicle, pedestrian, or bicyclist, assume they don't see you. They could suddenly move in front of you. When it is legal, tap the horn lightly or, at night, flash your lights from low to high beam and back. And, drive carefully enough to avoid a crash even if they don't see or hear you.

#### When it's hard to see

At dawn, dusk, in rain, or snow, you need to make yourself easier to see. If you are having trouble seeing other vehicles, other drivers will have trouble seeing you. Turn on your lights. Use the headlights, not just the identification

or clearance lights. Use the low beams; high beams can bother people in the daytime as well as at night.

### When parked at the side of the road

When you pull off the road and stop, be sure to turn on the four-way emergency flashers. This is important at night.

Don't trust the taillights to give warning. Drivers have crashed into the rear of a parked vehicle because they thought it was moving normally.

If you must stop on a road or the shoulder of any road, you must put out your emergency warning devices within ten minutes. Place your warning devices at the following locations:

- ✓ If you must stop on or by a one-way or divided highway, place warning devices 10 feet, 100 feet, and 200 feet toward the approaching traffic. See Figure 2.8.

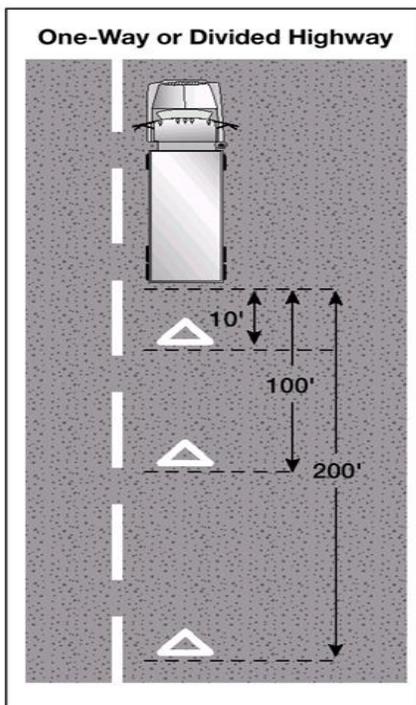


Figure 2.8

- ✓ If you stop on a two-lane road carrying traffic in both directions or on an undivided highway, place warning devices within 10 feet of the front or rear corners to mark the location of the vehicle and 100 feet behind and ahead of the vehicle, on the shoulder or in the lane you stopped in. See Figure 2.9.

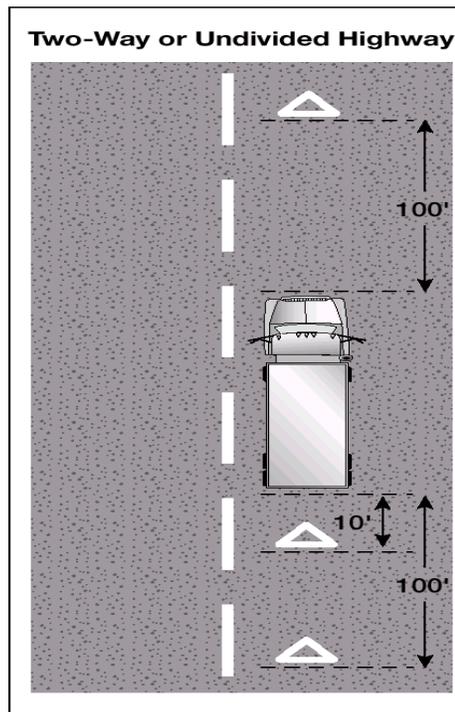


Figure 2.9

- ✓ Back beyond any hill, curve, or other obstruction that prevents other drivers from seeing the vehicle within 500 feet. If line of sight view is obstructed due to hill or curve, move the rear-most triangle to a point back down the road so warning is provided. See Figure 2.10.

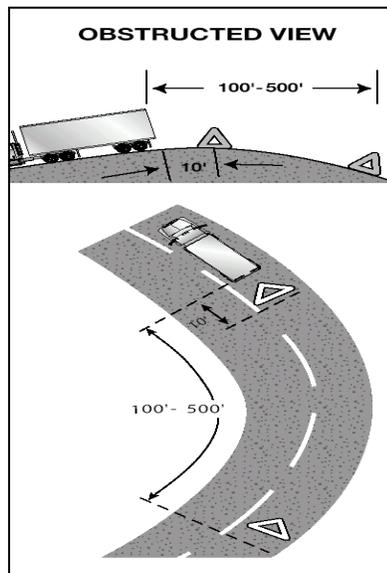


Figure 2.10

When putting out the triangles, hold them between yourself and the oncoming traffic for your own safety. (So other drivers can see you.)

## Use your horn when needed

Your horn can let others know you're there. It can help to avoid a crash. Use your horn when needed. However, it can startle others and could be dangerous when used unnecessarily.

## 2.6 – Controlling speed

Driving too fast is a major cause of fatal crashes. You must adjust your speed depending on driving conditions. These include traction, curves, visibility, traffic, and hills.

### 2.6.1 – Stopping distance

Perception Distance + Reaction Distance + Braking Distance = Total Stopping Distance

#### Perception distance

The distance your vehicle travels, in ideal conditions; from the time your eyes see a hazard until your brain recognizes it. Keep in mind certain mental and physical conditions can affect your perception distance. It can be affected greatly depending on visibility and the hazard itself. The average perception time for an alert driver is 1¼ seconds. At 55 mph this accounts for 142 feet traveled.

#### Reaction distance

The distance you will continue to travel, in ideal conditions; before you physically hit the brakes, in response to a hazard seen ahead. The average driver has a reaction time of ¾ second to 1 second. At 55 mph this accounts for 61 feet traveled.

#### Braking distance

The distance your vehicle will travel, in ideal conditions; while you are braking. At 55 mph on dry pavement with good brakes, it can take about 216 feet.

#### Total stopping distance

The total minimum distance your vehicle has traveled, in ideal conditions; with everything considered, including perception distance, reaction distance and braking distance, until you can bring your vehicle to a complete stop. At 55 mph, your vehicle will travel a minimum of 419 feet. See Figure 2.11.

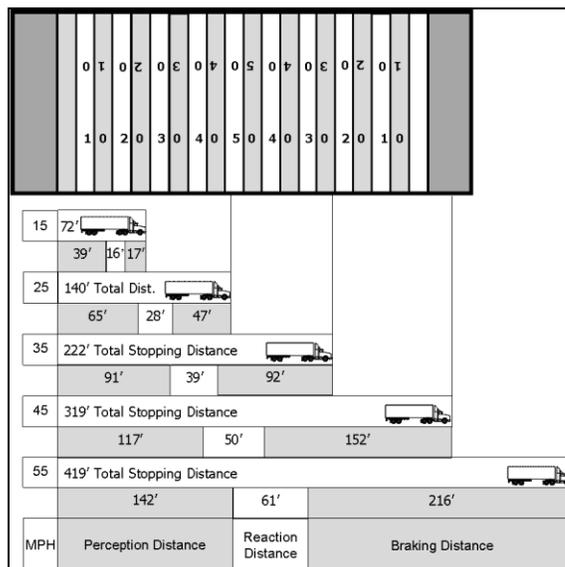


Figure 2.11

### The effect of speed on stopping distance

The faster you drive, the greater the impact or striking power of your vehicle. When you double your speed from 20 to 40 mph the impact is 4 times greater. The braking distance is also 4 times longer. Triple the speed from 20 to 60 mph and the impact and braking distance is 9 times greater. At 60 mph, your stopping distance is greater than the length of a football field. Increase the speed to 80 mph and the impact and braking distance are 16 times greater than at 20 mph. High speeds greatly increase the severity of crashes and stopping distances. By slowing down, you can reduce braking distance.

### The effect of vehicle weight on stopping distance

The heavier the vehicle, the more work the brakes must do to stop it and the more heat they absorb. But the brakes, tires, springs, and shock absorbers on heavy vehicles are designed to work best when the vehicle is fully loaded. Empty trucks require greater stopping distances because an empty vehicle has less traction.

### 2.6.2 – Matching speed to the road surface

You can't steer or brake a vehicle unless you have traction. Traction is friction between the tires and the road. There are some road conditions that reduce traction and call for lower speeds.

#### Slippery surfaces

It will take longer to stop, and it will be harder to turn without skidding, when the road is slippery. Wet roads can double stopping distance. You must drive slower to be able to stop in the same distance as on a dry road. Reduce speed by about one-third (e.g., slow from 55 to about 35 mph) on a wet road. On packed snow, reduce speed by a half, or more. If the surface is icy, reduce

speed to a crawl and stop driving as soon as you can safely do so.

## Identifying slippery surfaces

Sometimes it's hard to know if the road is slippery. Here are some signs of slippery roads:

- ✓ Shaded Areas. Shady parts of the road will remain icy and slippery long after open areas have melted.
- ✓ Bridges. When the temperature drops, bridges will freeze before the road will. Be especially careful when the temperature is close to 32 degrees Fahrenheit.
- ✓ Melting Ice. Slight melting will make ice wet. Wet ice is much more slippery than ice that is not wet.
- ✓ Black Ice. Black ice is a thin layer that is clear enough that you can see the road underneath it. It makes the road look wet. Any time the temperature is below freezing, and the road looks wet, watch out for black ice.
- ✓ Vehicle Icing. An easy way to check for ice is to open the window and feel the front of the mirror, mirror support, or antenna. If there's ice on these, the road surface is probably starting to ice up.
- ✓ Just After Rain Begins. Right after it starts to rain, the water mixes with oil left on the road by vehicles. This makes the road very slippery. If the rain continues, it will wash the oil away.
- ✓ Hydroplaning. In some weather, water or slush collects on the road. When this happens, your vehicle can hydroplane. It's like water skiing--the tires lose their contact with the road and have little or no traction. You may not be able to steer or brake. You can regain control by releasing the accelerator and pushing in the clutch. This will slow your vehicle and let the wheels turn freely. If the vehicle is hydroplaning, do not use the brakes to slow down. If the drive wheels start to skid, push in the clutch to let them turn freely.

It does not take a lot of water to cause hydroplaning. Hydroplaning can occur at speeds as low as 30 mph if there is a lot of water. Hydroplaning is more likely if tire pressure is low, or the tread is worn. (The grooves in a tire carry away the water; if they aren't deep, they don't work well.)

Road surfaces where water can collect can create conditions that cause a vehicle to hydroplane. Watch for clear reflections, tire splashes, and raindrops on the road. These are indications of standing water.

### 2.6.3 – Speed and curves

Drivers must adjust their speed for curves in the road. If you take a curve too fast, two things can happen. The tires can lose their traction and continue straight ahead, so you skid off the road. Or the tires may keep their traction and

the vehicle rolls over. Tests have shown that trucks with a high center of gravity can roll over at the posted speed limit for a curve.

Slow to a safe speed before you enter a curve. Braking in a curve is dangerous because it is easier to lock the wheels and cause a skid. Slow down as needed. Don't ever exceed the posted speed limit for the curve. Be in a gear that will let you accelerate slightly in the curve. This will help you keep control.

### 2.6.4 – Speed and distance ahead

You should always be able to stop within the distance you can see ahead. Fog, rain, or other conditions may require that you slow down to be able to stop in the distance you can see. At night, you can't see as far with low beams as you can with high beams. When you must use low beams, slow down.

### 2.6.5 – Speed and traffic flow

When you're driving in heavy traffic, the safest speed is the speed of other vehicles. Vehicles going the same direction at the same speed are not likely to run into one another. In many states, speed limits are lower for trucks and buses than for cars. It can vary as much as 15 mph. Use extra caution when you change lanes or pass on these roadways. Drive at the speed of the traffic, if you can without going at an illegal or unsafe speed. Keep a safe following distance.

The main reason drivers exceed speed limits is to save time. But anyone trying to drive faster than the speed of traffic will not be able to save much time. The risks involved are not worth it. If you go faster than the speed of other traffic, you'll have to keep passing other vehicles. This increases the chance of a crash, and it is more tiring. Fatigue increases the chance of a crash. Going with the flow of traffic is safer and easier.

### 2.6.6 – Speed on downgrades

Your vehicle's speed will increase on downgrades because of gravity. Your most important objective is to select and maintain a speed that is not too fast for the:

- ✓ Total weight of the vehicle and cargo.
- ✓ Length of the grade.
- ✓ Steepness of the grade.
- ✓ Road conditions.
- ✓ Weather.

If a speed limit is posted, or there is a sign indicating "Maximum Safe Speed," never exceed the speed shown. Also, look for and heed warning signs indicating the length and steepness of the grade. You must use the braking effect of the engine as the principal way of controlling your

speed on downgrades. The braking effect of the engine is greatest when it is near the governed rpms and the transmission is in the lower gears. Save your brakes so you will be able to slow or stop as required by road and traffic conditions. Shift your transmission to a low gear before starting down the grade and use the proper braking techniques.

Please carefully read the section on going down long, steep downgrades safely in "Mountain Driving."

### **2.6.7 – Roadway work zones**

Speeding traffic is the number one cause of injury and death in roadway work zones. Observe the posted speed limits at all times when approaching and driving through a work zone.

Watch your speedometer, and don't allow your speed to creep up as you drive through long sections of road construction. Decrease your speed for adverse weather or road conditions. Decrease your speed even further when a worker is close to the roadway.

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### **Subsections 2.4, 2.5, and 2.6 Test your knowledge**

1. How far ahead does the manual say you should look?
2. What are two main things to look for ahead?
3. What's your most important way to see the sides and rear of your vehicle?
4. What does "communicating" mean in safe driving?
5. Where should you place reflectors when stopped on a divided highway?
6. What three things add up to total stopping distance?
7. If you go twice as fast, will your stopping distance increase by two or four times?
8. Empty trucks have the best braking. True or False?
9. What is hydroplaning?
10. What is "black ice"?

These questions may be on the test. If you can't answer them all, re-read subsections 2.4, 2.5, and 2.6.

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## **2.7 – Managing space**

To be a safe driver, you need space all around your vehicle. When things go wrong, space gives you time to think and to take action.

To have space available when something goes wrong, you need to manage space. While this is true for all drivers, it is very important for large vehicles. They take up more space and they require more space for stopping and turning.

### **2.7.1 – Space ahead**

Of all the space around your vehicle, it is the area ahead of the vehicle--the space you're driving into --that is most important.

#### **The need for space ahead**

You need space ahead in case you must suddenly stop. According to accident reports, the vehicle that trucks and buses most often run into is the one in front of them. The most frequent cause is following too closely. Remember, if the vehicle ahead of you is smaller than yours, it can probably stop faster than you can. You may crash if you are following too closely.

#### **How much space?**

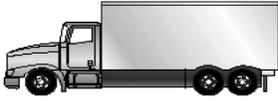
How much space should you keep in front of you? One good rule says you need at least one second for each 10 feet of vehicle length at speeds below 40 mph. At greater speeds, you must add 1 second for safety. For example, if you are driving a 40-foot vehicle, you should leave 4 seconds between you and the vehicle ahead. In a 60-foot rig, you'll need 6 seconds. Over 40 mph, you'd need 5 seconds for a 40-foot vehicle and 7 seconds for a 60-foot vehicle. See Figure 2.12.

To know how much space you have, wait until the vehicle ahead passes a shadow on the road, a pavement marking, or some other clear landmark. Then count off the seconds like this: "one thousand- and-one, one thousand-and-two" and so on, until you reach the same spot. Compare your count with the rule of one second for every ten feet of length.

If you are driving a 40-foot truck and only counted up to 2 seconds, you're too close. Drop back a little and count again until you have 4 seconds of following distance (or 5 seconds, if you're going over 40 mph). After a little practice, you will know how far back you should be. Remember to add 1 second for speeds above 40 mph. Also remember that when the road is slippery, you need much more space to stop.

**HEAVY VEHICLE FORMULA****For timed interval following distance**

- 1 second required for each 10 feet of vehicle length at speeds under 40 MPH
- Above 40 MPH use same formula, then add 1 second for the additional speed



40 foot truck (under 40 MPH) = 4 seconds



50 foot truck (above 40 MPH) = 6 seconds



60 foot truck (under 40 MPH) = 6 seconds

Figure 2.12

**2.7.2 – Space behind**

You can't stop others from following you too closely. But there are things you can do to make it safer.

**Stay to the right**

Heavy vehicles are often tailgated when they can't keep up with the speed of traffic. This often happens when you're going uphill. If a heavy load is slowing you down, stay in the right lane if you can. Going uphill, you should not pass another slow vehicle unless you can get around quickly and safely.

**Dealing with tailgaters safely**

In a large vehicle, it's often hard to see whether a vehicle is close behind you. You may be tailgated:

- ✓ When you are traveling slowly. Drivers trapped behind slow vehicles often follow closely.
- ✓ In bad weather. Many car drivers follow large vehicles closely during bad weather, especially when it is hard to see the road ahead.

If you find yourself being tailgated, here are some things you can do to reduce the chances of a crash:

- ✓ Avoid quick changes. If you have to slow down or turn, signal early, and reduce speed very gradually.

- ✓ Increase your following distance. Opening up room in front of you will help you to avoid having to make sudden speed or direction changes. It also makes it easier for the tailgater to get around you.
- ✓ Don't speed up. It's safer to be tailgated at a low speed than a high speed.
- ✓ Avoid tricks. Don't turn on your taillights or flash your brake lights. Follow the suggestions above.

**2.7.3 – Space to the sides**

Commercial vehicles are often wide and take up most of a lane. Safe drivers will manage what little space they have. You can do this by keeping your vehicle centered in your lane and avoid driving alongside others.

**Staying centered in a lane**

You need to keep your vehicle centered in the lane to keep safe clearance on either side. If your vehicle is wide, you have little room to spare.

**Traveling next to others**

There are two dangers in traveling alongside other vehicles:

- ✓ Another driver may change lanes suddenly and turn into you.
- ✓ You may be trapped when you need to change lanes.

Find an open spot where you aren't near other traffic. When traffic is heavy, it may be hard to find an open spot. If you must travel near other vehicles, try to keep as much space as possible between you and them. Also, drop back or pull forward so that you are sure the other driver can see you.

**Strong winds**

Strong winds make it difficult to stay in your lane. The problem is usually worse for lighter vehicles. This problem can be especially bad coming out of tunnels. Don't drive alongside others if you can avoid it.

**2.7.4 – Space overhead**

Hitting overhead objects is a danger. Make sure you always have overhead clearance.

- ✓ Don't assume that the heights posted at bridges and overpasses are correct. Re-paving or packed snow may have reduced the clearances since the heights were posted.
- ✓ The weight of a cargo van changes its height. An empty van is higher than a loaded one. That you got under a bridge when you were loaded does not mean that you can do it when you are empty.

- ✓ If you doubt you have safe space to pass under an object, go slowly. If you aren't sure you can make it, take another route. Warnings are often posted on low bridges or underpasses, but sometimes they are not.
- ✓ Some roads can cause a vehicle to tilt. There can be a problem clearing objects along the edge of the road, such as signs, trees, or bridge supports. Where this is a problem, drive a little closer to the center of the road.
- ✓ Before you back into an area, get out and check for overhanging objects such as trees, branches, or electric wires. It's easy to miss seeing them while you are backing. (Also check for other hazards at the same time.)

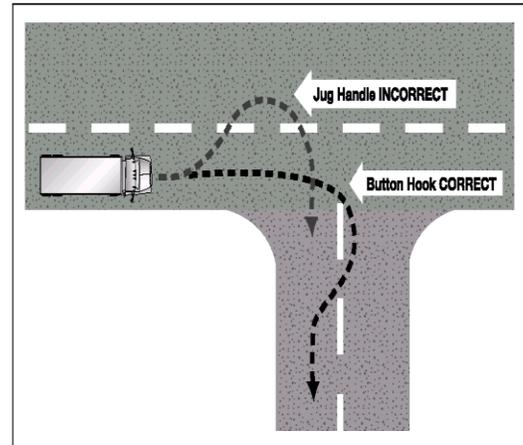


Figure 2.13

### 2.7.5 – Space below

Many drivers forget about the space under their vehicles. That space can be very small when a vehicle is heavily loaded. This is often a problem on dirt roads and in unpaved yards. Don't take a chance on getting hung up. Drainage channels across roads can cause the ends of some vehicles to drag. Cross such depressions carefully. Railroad tracks can also cause problems, particularly when pulling trailers with a low underneath clearance. Don't take a chance on getting hung up halfway across.

### 2.7.6 – Space for turns

The space around a truck or bus is important in turns. Because of wide turning and off-tracking, large vehicles can hit other vehicles or objects during turns.

### Right turns

Here are some rules to help prevent right-turn crashes:

- ✓ Turn slowly to give yourself and others more time to avoid problems.
- ✓ If you are driving a truck or bus that cannot make the right turn without swinging into another lane, turn wide as you complete the turn. Keep the rear of your vehicle close to the curb. This will stop other drivers from passing you on the right.
- ✓ Don't turn wide to the left as you start the turn. A following driver may think you are turning left and try to pass you on the right. You may crash into the other vehicle as you complete your turn.
- ✓ If you must cross into the oncoming lane to make a turn, watch out for vehicles coming toward you. Give them room to go by or to stop. However, don't back up for them, because you might hit someone behind you. See Figure 2.13.

### Left turns

On a left turn, make sure you have reached the center of the intersection before you start the left turn. If you turn too soon, the left side of your vehicle may hit another vehicle because of off-tracking.

If there are two turning lanes, always take the right turn lane. Don't start in the inside lane because you may have to swing right to make the turn. Drivers on your left can be more readily seen. See Figure 2.14.

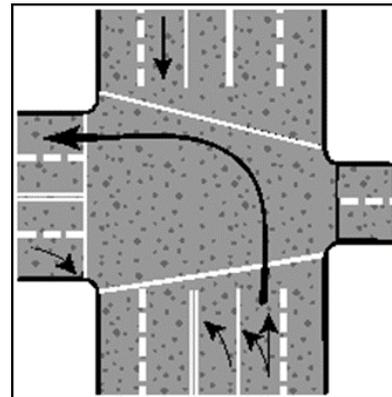


Figure 2.14

### 2.7.7 – Space needed to cross or enter traffic

Be aware of the size and weight of your vehicle when you cross or enter traffic. Here are some important things to keep in mind.

- ✓ Because of slow acceleration and the space large vehicles require, you may need a much larger gap to enter traffic than you would in a car.
- ✓ Acceleration varies with the load. Allow more room if your vehicle is heavily loaded.
- ✓ Before you start across a road, make sure you can get all the way across before traffic reaches you.

## 2.8 – Seeing hazards

## 2.8.1 – Importance of seeing hazards

### What is a hazard?

A hazard is any road condition or other road user (driver, bicyclist, pedestrian) that is a possible danger. For example, a car in front of you is headed toward the freeway exit, but his brake lights come on and he begins braking hard. This could mean that the driver is uncertain about taking the off ramp. He might suddenly return to the highway. This car is a hazard. If the driver of the car cuts in front of you, it is no longer just a hazard; it is an emergency.

### Seeing hazards lets you be prepared

You will have more time to act if you see hazards before they become emergencies. In the example above, you might make a lane change or slow down to prevent a crash if the car suddenly cuts in front of you. Seeing this hazard gives you time to check your mirrors and signal a lane change. Being prepared reduces the danger. A driver who did not see the hazard until the slow car pulled back on the highway in front of him would have to do something very suddenly. Sudden braking or a quick lane change is much more likely to lead to a crash.

### Learning to see hazards

There are often clues that will help you see hazards. The more you drive, the better you can learn to see hazards. This section will talk about hazards that you should be aware of.

## 2.8.2 – Hazardous roads

### Move-over laws

The incidents of law enforcement officers, emergency medical services, fire department personnel and people working on the road are being struck while performing duties at the roadside are increasing at a frightening pace. To lessen the problem, move-over laws have been enacted, which require drivers to slow and change lanes when approaching a roadside incident or emergency vehicle. Signs are posted on roadways in states that have such laws.

When approaching an authorized emergency vehicle stopped on the roadside or a work zone, you should proceed with caution by slowing and yielding the right-of-way by making a lane change into a lane not next to that of the authorized emergency vehicle or work zone if safety and traffic conditions permit. If a lane change is unsafe, slow down and proceed with caution while maintaining a safe speed for traffic conditions.

Slow down and be very careful if you see any of the following road hazards.

### Work zones

When people are working on the road, it is a hazard. There may be narrower lanes, sharp turns, or uneven surfaces. Other drivers are often distracted and drive unsafely. Workers and construction vehicles may get in the way. Drive slowly and carefully near work zones. Use your four-way flashers or brake lights to warn drivers behind you.

### Drop off

Sometimes the pavement drops off sharply near the edge of the road. Driving too near the edge can tilt your vehicle toward the side of the road. This can cause the top of your vehicle to hit roadside objects (signs, tree limbs). Also, it can be hard to steer as you cross the drop off, going off the road, or coming back on.

### Foreign objects

Things that have fallen on the road can be hazards. They can be a danger to your tires and wheel rims. They can damage electrical and brake lines. They can be caught between dual tires and cause severe damage. Some obstacles that appear to be harmless can be very dangerous. For example, cardboard boxes may be empty, but they may also contain some solid or heavy material capable of causing damage. The same is true of paper and cloth sacks. It is important to remain alert for objects of all sorts, so you can see them early enough to avoid them without making sudden, unsafe moves.

### Off ramps/On ramps

Freeway and turnpike exits can be particularly dangerous for commercial vehicles. Off ramps and on ramps often have speed limit signs posted. Remember, these speeds may be safe for automobiles, but may not be safe for larger vehicles or heavily loaded vehicles. Exits that go downhill and turn at the same time can be especially dangerous. The downgrade makes it difficult to reduce speed. Braking and turning at the same time can be a dangerous practice. Make sure you are going slowly enough before you get on the curved part of an off ramp or on ramp.

## 2.8.3 – Drivers who are hazards

In order to protect yourself and others, you must know when other drivers may do something hazardous. Some clues to this type of hazard are discussed below.

### Blocked vision

People who can't see others are a very dangerous hazard. Be alert for drivers whose vision is blocked. Vans, loaded station wagons, and cars with the rear window blocked are examples. Rental trucks should be watched carefully. Their drivers are often not used to the limited vision they have to the sides and rear of the truck. In winter, vehicles

with frosted, ice-covered, or snow-covered windows are hazards.

Vehicles may be partly hidden by blind intersections or alleys. If you only can see the rear or front end of a vehicle but not the driver, then he or she can't see you. Be alert because he/she may back out or enter into your lane. Always be prepared to stop.

### **Delivery trucks can present a hazard**

Packages or vehicle doors often block the driver's vision. Drivers of step vans, postal vehicles, and local delivery vehicles often are in a hurry and may suddenly step out of their vehicle or drive their vehicle into the traffic lane.

### **Parked vehicles can be hazards**

Parked vehicles can be hazards, especially when people start to get out of them. Or, they may suddenly start up and drive into your way. Watch for movement inside the vehicle or movement of the vehicle itself that shows people are inside. Watch for brake lights or backup lights, exhaust, and other clues that a driver is about to move.

Be careful of a stopped bus. Passengers may cross in front of or behind the bus, and they often can't see you.

### **Pedestrians and bicyclists can also be hazards**

Walkers, joggers, and bicyclists may be on the road with their back to the traffic, so they can't see you. Sometimes they wear portable stereos with headsets, so they can't hear you either. This can be dangerous. On rainy days, pedestrians may not see you because of hats or umbrellas. They may be hurrying to get out of the rain and may not pay attention to the traffic.

### **Distractions**

People who are distracted are hazards. Watch for where they are looking. If they are looking elsewhere, they can't see you. But be alert even when they are looking at you. They may believe that they have the right of way.

### **Children**

Children tend to act quickly without checking traffic. Children playing with one another may not look for traffic and are a serious hazard.

### **Talkers**

Drivers or pedestrians talking to one another may not be paying close attention to the traffic.

### **Workers**

People working on or near the roadway are a hazard clue. The work creates a distraction for other drivers and the workers themselves may not see you.

### **Ice cream trucks**

Someone selling ice cream is a hazard clue. Children may be nearby and may not see you.

### **Disabled vehicles**

Drivers changing a tire or fixing an engine often do not pay attention to the danger that roadway traffic is to them. They are often careless. Jacked up wheels or raised hoods are hazard clues.

### **Accidents**

Accidents are particularly hazardous. People involved in the accident may not look for traffic. Passing drivers tend to look at the accident. People often run across the road without looking. Vehicles may slow or stop suddenly.

### **Shoppers**

People in and around shopping areas are often not watching traffic because they are looking for stores or looking into store windows.

### **Confused drivers**

Confused drivers often change direction suddenly or stop without warning. Confusion is common near freeway or turnpike interchanges and major intersections. Tourists unfamiliar with the area can be very hazardous. Clues to tourists include car-top luggage and out-of-state license plates. Unexpected actions (stopping in the middle of a block, changing lanes for no apparent reason, backup lights suddenly going on) are clues to confusion. Hesitation is another clue, including driving very slowly, using brakes often, or stopping in the middle of an intersection. You may also see drivers who are looking at street signs, maps, and house numbers. These drivers may not be paying attention to you.

### **Slow drivers**

Motorists who fail to maintain normal speed are hazards. Seeing slow moving vehicles early can prevent a crash. Some vehicles, by their nature, are slow and seeing them is a hazard clue (mopeds, farm machinery, construction machinery, tractors, etc.). Some of these will have the "slow moving vehicle" symbol to warn you. This is a red triangle with an orange center. Watch for it.

## Drivers signaling a turn may be a hazard

Drivers signaling a turn may slow more than expected or stop. If they are making a tight turn into an alley or driveway, they may go very slowly. If pedestrians or other vehicles block them, they may have to stop on the roadway. Vehicles turning left may have to stop for oncoming vehicles.

## Drivers in a hurry

Drivers may feel your commercial vehicle is preventing them from getting where they want to go on time. Such drivers may pass you without a safe gap in the oncoming traffic, cutting too close in front of you. Drivers entering the road may pull in front of you in order to avoid being stuck behind you, causing you to brake. Be aware of this and watch for drivers who are in a hurry.

## Impaired drivers

Drivers who are sleepy, have had too much to drink, are on drugs, or who are ill are hazards. Some clues to these drivers are:

- ✓ Weaving across the road or drifting from one side to another.
- ✓ Leaving the road (dropping right wheels onto the shoulder or bumping across a curb in a turn).
- ✓ Stopping at the wrong time (stopping at a green light or waiting for too long at a stop).
- ✓ Open window in cold weather.
- ✓ Speeding up or slowing down suddenly, driving too fast or too slow.

Be alert for drunk drivers and sleepy drivers late at night.

## Driver body movement as a clue

Drivers look in the direction they are going to turn. You may sometimes get a clue from a driver's head and body movements that a driver may be going to make a turn, even though the turn signals aren't on. Drivers making over-the-shoulder checks may be going to change lanes. These clues are most easily seen in motorcyclists and bicyclists. Watch other road users and try to tell whether they might do something hazardous.

## Conflicts

You are in conflict when you have to change speed and/or direction to avoid hitting someone. Conflicts occur at intersections where vehicles meet, at merges (such as turnpike on ramps) and where there are needed lane changes (such as the end of a lane, forcing a move to another lane of traffic). Other situations include slow moving or stalled traffic in a traffic lane, and accident scenes. Watch for other drivers who are in conflict

because they are a hazard to you. When they react to this conflict, they may do something that will put them in conflict with you.

## 2.8.4 – Always have a plan

You should always be looking for hazards. Continue to learn to see hazards on the road. However, don't forget why you are looking for the hazards--they may turn into emergencies. You look for the hazards in order to have time to plan a way out of any emergency. When you see a hazard, think about the emergencies that could develop and figure out what you would do. Always be prepared to take action based on your plans. In this way, you will be a prepared, defensive driver who will improve your own safety as well as the safety of all road users.

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## Subsections 2.7 and 2.8

### Test your knowledge

1. How do you find out how many seconds of following distance space you have?
2. If you are driving a 30-foot vehicle at 55 mph, how many seconds of following distance should you allow?
3. You should decrease your following distance if somebody is following you too closely. True or False?
4. If you swing wide to the left before turning right, another driver may try to pass you on the right. True or False?
5. What is a hazard?
6. Why make emergency plans when you see a hazard?

These questions may be on the test. If you can't answer them all, re-read subsections 2.7 and 2.8

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## 2.9 – Distracted driving

A driver distraction is anything that takes your attention away from driving. Whenever you are driving a vehicle and your full attention is not on the driving task, you are putting yourself, your passengers, other vehicles, and pedestrians in danger. Distracted driving can cause collisions, resulting in injury, death or property damage.

Activities inside of the vehicle that can distract your attention include: talking to passengers; adjusting the radio, CD player or climate controls; eating, drinking or smoking; reading maps or other literature; picking up something that fell; talking on a cell phone or CB radio; reading or sending text messages; using any type of telematic or electronic devices (such as navigation systems, pagers, personal digital assistant, computers, etc.); daydreaming or being occupied with other mental distractions; and many others.

Possible distractions that could occur outside a moving vehicle: outside traffic, vehicles or pedestrians; outside events such as police pulling someone over or a crash scene; sunlight/sunset; objects in roadway; road construction; reading billboards or other road advertisements; and many others.

### **2.9.1 – The distracted driving crash problem**

The Large Truck Crash Causation Study (LTCCS) reported that 8 percent of large-truck crashes occurred when Commercial Motor Vehicle (CMV) drivers were externally distracted and 2 percent of large truck crashes occurred when the driver was internally distracted.

Approximately 5,500 people are killed each year on U.S. roadways and an estimated 448,000 are injured in motor vehicle crashes involving distracted driving (NHTSA Traffic Safety Facts: Distracted Driving).

Research indicates that the burden of talking on a cell phone - even if it's hands-free - saps the brain of 39% of the energy it would ordinarily devote to safe driving. Drivers who use a hand-held device are more likely to get into a crash serious enough to cause injury. (NHTSA distracted driving website at [distraction.gov](http://distraction.gov)).

### **2.9.2 – Effects of distracted driving**

Effects of distracted driving include slowed perception, which may cause you to be delayed in perceiving or completely fail to perceive an important traffic event; delayed decision making and improper action, which can cause you to be delayed in taking the proper action or make incorrect inputs to the steering, accelerator or brakes.

### **2.9.3 – Types of distractions**

There are many causes of distraction, all with the potential to increase risk.

- ✓ Physical distraction – one that causes you to take your hands off the wheel or eyes off the road, such as reaching for an object.
- ✓ Mental distraction – activities that take your mind away from the road, such as engaging in conversation with a passenger or thinking about something that happened during the day.
- ✓ Both physical and mental distraction – even greater chance a crash could happen, such as talking on a cell phone; or sending or reading text messages.

### **2.9.4 – Cell/Mobile phones**

49 CFR Part 383, 384, 390, 391 and 392 of the Federal Motor Carrier Safety Regulations (FMCSRs) and the Hazardous Materials Regulations (HMR) restricts the use of hand-held mobile telephones by drivers of commercial motor vehicles (CMVs); and implements new driver

disqualification sanctions for drivers of CMVs who fail to comply with this Federal restriction; or who have multiple convictions for violating a State or local law or ordinance on motor vehicle traffic control that restricts the use of hand-held mobile telephones. Additionally, motor carriers are prohibited from requiring or allowing drivers of CMVs to use hand-held mobile telephones.

The use of hand-held mobile telephones means, “using at least one hand to hold a mobile telephone to conduct a voice communication; “dialing a mobile telephone by pressing more than a single button”; or “moving from a seated driving position while restrained by a seat belt to reach for a mobile telephone”. If you choose to use a mobile phone while operating a CMV, you may only use a hands-free mobile phone that is located close to you and that can be operated in compliance with the rule to conduct a voice communication.

Your CDL will be disqualified after two or more convictions of any state law on hand-held mobile telephone use while operating a CMV. Disqualification is 60 days for the second offense within 3 years and 120 days for three or more offenses within 3 years. In addition, the first and each subsequent violation of such a prohibition are subject to civil penalties imposed on such drivers, in an amount up to \$2,750. Motor carriers must not allow nor require drivers to use a hand-held mobile telephone while driving. Employers may also be subject to civil penalties in an amount up to \$11,000. There is an emergency exception that allows you to use your hand-held mobile telephones if necessary to communicate with law enforcement officials or other emergency services.

Research shows that the odds of being involved in a safety-critical event (e.g., crash, near-crash, unintentional lane deviation) is 6 times greater for CMV drivers who engage in dialing a mobile telephone while driving than for those who do not. Dialing drivers took their eyes off the forward roadway for an average of 3.8 seconds. At 55 mph (or 80.7 feet per second), this equates to a driver traveling 306 feet, the approximate length of a football field, without looking at the roadway.

Your primary responsibility is to operate a motor vehicle safely. To do this, you must focus your full attention on the driving task.

Note that hands-free devices are no less likely than hand-held cell phones to cause you to become distracted. Attention is diverted from the driving task while using either device.

### **2.9.5 – Texting**

49 CFR Part 383, 384, 390, 391, 392, the Federal Motor Carrier Safety Regulations (FMCSR) prohibits texting by commercial motor vehicle (CMV) drivers while operating in interstate commerce; and implements new driver disqualification sanctions for drivers of CMVs who fail to comply with this Federal prohibition; or who have multiple

convictions for violating a State or local law or ordinance on motor vehicle traffic control that prohibits texting while driving. Additionally, motor carriers are prohibited from requiring or allowing their drivers to engage in texting while driving.

Texting means manually entering text into, or reading text from, an electronic device. This includes, but is not limited to, short message service, e-mailing, instant messaging, a command or request to access a World Wide Web page, or engaging in any other form of electronic text retrieval or entry, for present or future communication.

Electronic device includes, but is not limited to, a cellular telephone; personal digital assistant; pager; computer; or any other device used to enter, write, send, receive, or read text.

Your CDL will be disqualified after two or more convictions of any state law on texting while operating a CMV. Disqualification is 60 days for the second offense within 3 years and 120 days for three or more offenses within 3 years. In addition, the first and each subsequent violation of such a prohibition are subject to civil penalties imposed on such drivers, in an amount up to \$2,750. No motor carrier shall allow or require its drivers to engage in texting while driving. There is an emergency exception that allows you text if necessary to communicate with law enforcement officials or other emergency services.

Evidence suggests that text messaging is even riskier than talking on a cell phone because it requires you to look at a small screen and manipulate the keypad with one's hands. Texting is the most alarming distraction because it involves both physical and mental distraction simultaneously.

Research shows that the odds of being involved in a safety-critical event (e.g., crash, near-crash, unintentional lane deviation) is 23.2 times greater for CMV drivers who engage in texting while driving than for those who do not. Sending or receiving text takes your eyes from the road for an average of 4.6 seconds. At 55 mph, you would travel 371 feet, or the length of an entire football field – *without looking at the roadway*.

### **2.9.6 – Don't drive distracted**

Your goal should be to eliminate all in-vehicle distractions before driving begins. Accomplishing this goal can be done by:

- ✓ Assessing all potential in-vehicle distractions before driving
- ✓ Developing a preventative plan to reduce/eliminate possible distractions
- ✓ Expecting distractions to occur
- ✓ Discussing possible scenarios before getting behind the wheel

Based on the assessment of potential distractions, you can formulate a preventative plan to reduce/eliminate possible distractions. If drivers react a half-second slower because of distractions, crashes double. Some tips to follow so you won't become distracted:

- ✓ Turn off all communication devices.
- ✓ If you must use a mobile phone, make sure it is within close proximity, that it is operable while you are restrained, use an earpiece or the speaker phone function, use voice-activated dialing; or use the hands-free feature. Drivers are not in compliance if they unsafely reach for a mobile phone, even if they intend to use the hands-free function.
- ✓ Do not type or read a text message on a mobile device while driving.
- ✓ Familiarize yourself with your vehicle's features and equipment, before you get behind the wheel.
- ✓ Adjust all vehicle controls and mirrors to your preferences prior to driving.
- ✓ Pre-program radio stations and pre-load your favorite CDs.
- ✓ Clear the vehicle of any unnecessary objects and secure cargo.
- ✓ Review maps, program the GPS and plan your route before you begin driving.
- ✓ Don't attempt to read or write while you drive.
- ✓ Avoid smoking, eating and drinking while you drive. Leave early to allow yourself time to stop to eat.
- ✓ Don't engage in complex or emotionally intense conversations with other occupants.
- ✓ Secure commitment from other occupants to behave responsibly and to support the driver in reducing distractions.

### **2.9.7 – Watch out for other distracted drivers**

You need to be able to recognize other drivers who are engaged in any form of driving distraction. Not recognizing other distracted drivers can prevent you from perceiving or reacting correctly in time to prevent a crash. Watch for:

- ✓ Vehicles that may drift over the lane divider lines or within their own lane.
- ✓ Vehicles traveling at inconsistent speeds.
- ✓ Drivers who are preoccupied with maps, food, cigarettes, cell phones, or other objects.
- ✓ Drivers who appear to be involved in conversations with their passengers.

Give a distracted driver plenty of room and maintain your safe following distance. Be very careful when passing a driver who seems to be distracted. The other driver may not be aware of your presence, and they may drift in front of you.

## **2.10 – Aggressive drivers/Road rage**

### **2.10.1 – What is it?**

Aggressive driving and road rage is not a new problem. However, in today's world, where heavy and slow-moving traffic and tight schedules are the norm, more and more drivers are taking out their anger and frustration in their vehicles.

Crowded roads leave little room for error, leading to suspicion and hostility among drivers and encouraging them to take personally the mistakes of other drivers.

Aggressive driving is the act of operating a motor vehicle in a selfish, bold, or pushy manner, without regard for the rights or safety of others (i.e. changing lanes frequently and abruptly without notice).

Road rage is operating a motor vehicle with the intent of doing harm to others or physically assaulting a driver or their vehicle.

### **2.10.2 – Don't be an aggressive driver**

How you feel before you even start your vehicle has a lot to do with how stress will affect you while driving.

- ✓ Reduce your stress before and while you drive. Listen to "easy listening" music.
- ✓ Give the drive your full attention. Don't allow yourself to become distracted by talking on your cell phone, eating, etc.
- ✓ Be realistic about your travel time. Expect delays because of traffic, construction, or bad weather and make allowances.
- ✓ If you're going to be later than you expected – deal with it. Take a deep breath and accept the delay.
- ✓ Give other drivers the benefit of the doubt. Try to imagine why he or she is driving that way. Whatever their reason, it has nothing to do with you.
- ✓ Slow down and keep your following distance reasonable.
- ✓ Don't drive slowly in the left lane of traffic.
- ✓ Avoid gestures. Keep your hands on the wheel. Avoid making any gestures that might anger another driver, even seemingly harmless expressions of irritation like shaking your head.

- ✓ Be a cautious and courteous driver. If another driver seems eager to get in front of you, say, "Be my guest." This response will soon become a habit and you won't be as offended by other drivers' actions.

### **2.10.3 – What you should do when confronted by an aggressive driver**

- ✓ First and foremost, make every attempt to get out of their way.
- ✓ Put your pride in the back seat. Do not challenge them by speeding up or attempting to hold-your-own in your travel lane.
- ✓ Avoid eye contact.
- ✓ Ignore gestures and refuse to react to them.
- ✓ Report aggressive drivers to the appropriate authorities by providing a vehicle description, license number, location and, if possible, direction of travel.
- ✓ If you have a cell phone, and can do it safely, call the police.
- ✓ If an aggressive driver is involved in a crash farther down the road, stop a safe distance from the crash scene, wait for the police to arrive, and report the driving behavior that you witnessed.

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### **Subsections 2.9 and 2.10 Test your knowledge**

1. What are some tips to follow so you won't become a distracted driver?
2. How do you use in-vehicle communications equipment cautiously?
3. How do you recognize a distracted driver?
4. What is the difference between aggressive driving and road rage?
5. What should you do when confronted with an aggressive driver?
6. What are some things you can do to reduce your stress before and while you drive?

These questions may be on the test. If you can't answer them all, re-read subsections 2.9 and 2.10.

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## 2.11 – Driving at night

### 2.11.1 – It's more dangerous

You are at greater risk when you drive at night. Drivers cannot see hazards as quickly as in daylight, so they have less time to respond. Drivers caught by surprise are less able to avoid a crash. The problems of night driving involve the driver, the roadway, and the vehicle.

### 2.11.2 – Driver factors

#### Vision

Good vision is critical for safe driving. Your control of the brake, accelerator, and steering wheel is based on what you see. If you cannot see clearly, you will have trouble identifying traffic and roadway conditions, spotting potential trouble or responding to problems in a timely manner.

Because seeing well is so critical to safe driving, you should have your eyes checked regularly by an eye specialist. You may never know you have poor vision unless your eyes are tested. If you need to wear glasses or contact lenses for driving, remember to:

- ✓ Always wear them when driving, even if driving short distances. If your driver license says corrective lenses are required, it is illegal to move a vehicle without using corrective lenses.
- ✓ Keep an extra set of corrective lenses in your vehicle. If your normal corrective lenses are broken or lost, you can use the spare lenses to drive safely.
- ✓ Avoid using dark or tinted corrective lenses at night, even if you think they help with glare. Tinted lenses cut down the light that you need to see clearly under night driving conditions.

#### Glare

Drivers can be blinded for a short time by bright light. It can take several seconds to recover from glare. Even two seconds of glare blindness can be dangerous. A vehicle going 55 mph will travel more than half the distance of a football field during that time.

#### Fatigue and lack of alertness

Fatigue is physical or mental tiredness that can be caused by physical or mental strain, repetitive tasks, illness or lack of sleep. Just like alcohol and drugs, it impairs your vision and judgment.

Fatigue causes errors related to speed and distance, increases your risk of being in a crash, causes you to not see and react to hazards as quickly; and affects your ability to make critical decisions. When you are fatigued, you could fall asleep behind the wheel and crash, injuring or killing yourself or others.

Fatigued or drowsy driving is one of the leading causes of traffic collisions. NHTSA estimates that 100,000 police-reported crashes a year are the result of drowsy driving. According to the National Sleep Foundation's Sleep in America poll, 60% of Americans have driven while feeling sleepy and more than one third (36 percent or 103 million people) admit to having actually fallen asleep at the wheel. Drivers may experience short bursts of sleep lasting only a few seconds or fall asleep for longer periods of time. Either way, the chance of a collision increases dramatically.

#### At-risk groups

The risk of having a crash due to drowsy driving is not uniformly distributed across the population. Crashes tend to occur at times when sleepiness is most pronounced, for example, during the night and in the mid-afternoon. Most people are less alert at night, especially after midnight. This is particularly true if you have been driving for a long time. Thus, individuals who drive at night are much more likely to have fall-asleep crashes.

Research has identified young males, shift workers, commercial drivers, especially long-haul drivers and people with untreated sleep disorders or with short-term or chronic sleep deprivation as being at increased risk for having a fall-asleep crash. At least 15% of all heavy truck crashes involve fatigue.

A congressionally mandated study of 80 long-haul truck drivers in the United States and Canada found that drivers averaged less than 5 hours of sleep per day. (Federal Motor Carrier Safety Administration, 1996) It is no surprise then that the National Transportation Safety Board (NTSB) reported that drowsy driving was probably the cause of more than half of crashes leading to a truck driver's death. (NTSB, 1990) For each truck driver fatality, another three to four people are killed. (NHTSA, 1994)

#### Warning signs of fatigue

According to the National Sleep Foundation's Sleep in America poll, 60% of Americans have driven while feeling sleepy and 36% admit to actually having fallen asleep at the wheel in the past year. However, many people cannot tell if or when they are about to fall asleep. Here are some signs that should tell you to stop and rest:

- ✓ Difficulty focusing, frequent blinking or heavy eyelids
- ✓ Yawning repeatedly or rubbing eyes
- ✓ Daydreaming or wandering/disconnected thoughts
- ✓ Trouble remembering the last few miles driven; missing exits or traffic signs
- ✓ Trouble keeping head up
- ✓ Drifting from your lane, following too closely or hitting a shoulder rumble strip

- ✓ Feeling restless and irritable

When you are tired, trying to “push on” is far more dangerous than most drivers think. It is a major cause of fatal accidents. If you notice any signs of fatigue, stop driving and go to sleep for the night or take a 15 – 20 minute nap.

### **Are you at risk?**

Before you drive, consider whether you are:

- ✓ Sleep-deprived or fatigued (6 hours of sleep or less triples your risk)
- ✓ Suffering from sleep loss (insomnia), poor quality sleep, or a sleep debt
- ✓ Driving long distances without proper rest breaks
- ✓ Driving through the night, mid-afternoon or when you would normally be asleep. Many heavy motor vehicle accidents occur between midnight and 6 a.m.
- ✓ Taking sedating medications (antidepressants, cold tablets, antihistamines)
- ✓ Working more than 60 hours a week (increases your risk by 40%)
- ✓ Working more than one job, and your main job involves shift work
- ✓ Driving alone or on a long, rural, dark or boring road
- ✓ Flying, changing time zone

### **Preventing drowsiness before a trip**

- ✓ Get adequate sleep – adults need 8 to 9 hours to maintain alertness
- ✓ Prepare route carefully to identify total distance, stopping points and other logistic considerations
- ✓ Schedule trips for the hours you are normally awake, not the middle of the night
- ✓ Drive with a passenger
- ✓ Avoid medications that cause drowsiness
- ✓ Consult your physician if you suffer from daytime sleepiness, have difficulty sleeping at night or take frequent naps
- ✓ Incorporate exercise into your daily life to give you more energy.

### **Maintaining alertness while driving**

- ✓ Protect yourself from glare and eyestrain with sunglasses
- ✓ Keep cool by opening the window or using the air conditioner
- ✓ Avoid heavy foods
- ✓ Be aware of down time during the day
- ✓ Have another person ride with you, and take turns driving
- ✓ Take periodic breaks – about every 100 miles or 2 hours during long trips
- ✓ Stop driving and get some rest or take a nap
- ✓ Caffeine consumption can increase awareness for a few hours, but do not drink too much. It will eventually wear off. Do not rely on caffeine to prevent fatigue
- ✓ Avoid drugs. While they may keep you awake for a while, they won't make you alert.

If you are drowsy, the only safe cure is to get off the road and get some sleep. If you don't, you risk your life and the lives of others.

### **2.11.3 – Roadway factors**

#### **Poor lighting**

In the daytime there is usually enough light to see well. This is not true at night. Some areas may have bright streetlights, but many areas will have poor lighting. On most roads you will probably have to depend entirely on your headlights.

Less light means you will not be able to see hazards as well as in daytime. Road users who do not have lights are hard to see. There are many accidents at night involving pedestrians, joggers, bicyclists, and animals.

Even when there are lights, the road scene can be confusing. Traffic signals and hazards can be hard to see against a background of signs, shop windows, and other lights.

Drive slower when lighting is poor or confusing.

Drive slowly enough to be sure you can stop in the distance you can see ahead.

#### **Drunk drivers**

Drunk drivers and drivers under the influence of drugs are a hazard to themselves and to you. Be especially alert

around the closing times for bars and taverns. Watch for drivers who have trouble staying in their lane or maintaining speed, who stop without reason, or show other signs of being under the influence of alcohol or drugs.

### 2.11.4 – Vehicle factors

#### Headlights

At night your headlights will usually be the main source of light for you to see by and for others to see you. You can't see nearly as much with your headlights as you see in the daytime. With low beams you can see ahead about 250 feet and with high beams about 350-500 feet. You must adjust your speed to keep your stopping distance within your sight distance. This means going slowly enough to be able to stop within the range of your headlights. Otherwise, by the time you see a hazard, you will not have time to stop.

Night driving can be more dangerous if you have problems with your headlights. Dirty headlights may give only half the light they should. This cuts down your ability to see and makes it harder for others to see you. Make sure your lights are clean and working. Headlights can be out of adjustment. If they don't point in the right direction, they won't give you a good view and they can blind other drivers. Have a qualified person make sure they are adjusted properly.

#### Other lights

In order for you to be seen easily, the following must be clean and working properly:

- ✓ Reflectors.
- ✓ Marker lights.
- ✓ Clearance lights.
- ✓ Taillights.
- ✓ Identification lights.

#### Turn signals and brake lights

At night your turn signals and brake lights are even more important for telling other drivers what you intend to do. Make sure you have clean, working turn signals and stop lights.

#### Windshield and mirrors

It is more important at night than in the daytime to have a clean windshield and clean mirrors. Bright lights at night can cause dirt on your windshield or mirrors to create a glare of its own, blocking your view. Most people have experienced driving toward the sun just as it has risen or is about to set and found that they can barely see through a windshield that seemed to look OK in the middle of the

day. Clean your windshield on the inside and outside for safe driving at night.

### 2.11.5 – Night driving procedures

#### Vehicle procedures

Make sure you are rested and alert. If you are drowsy, sleep before you drive! Even a nap can save your life or the lives of others. If you wear eyeglasses, make sure they are clean and unscratched. Don't wear sunglasses at night. Do a complete Vehicle inspection of your vehicle. Pay attention to checking all lights and reflectors, and cleaning those you can reach.

#### Avoid blinding others

Glare from your headlights can cause problems for drivers coming toward you. They can also bother drivers going in the same direction you are when your lights shine in their rearview mirrors. Dim your lights before they cause glare for other drivers. Dim your lights within 500 feet of an oncoming vehicle and when following another vehicle within 500 feet.

#### Avoid glare from oncoming vehicles

Do not look directly at lights of oncoming vehicles. Look slightly to the right at a right lane or edge marking, if available. If other drivers don't put their low beams on, don't try to "get back at them" by putting your own high beams on. This increases glare for oncoming drivers and increases the chance of a crash.

#### Use high beams when you can

Some drivers make the mistake of always using low beams. This seriously cuts down on their ability to see ahead. Use high beams when it is safe and legal to do so. Use them when you are not within 500 feet of an approaching vehicle. Also, don't let the inside of your cab get too bright. This makes it harder to see outside. Keep the interior light off and adjust your instrument lights as low as you can to still be able to read the gauges.

#### If you get sleepy, stop at the nearest safe place.

People often don't realize how close they are to falling asleep even when their eyelids are falling shut. If you can safely do so, look at yourself in a mirror. If you look sleepy, or you just feel sleepy, stop driving! You are in a very dangerous condition. The only safe cure is to sleep.

### 2.12 – Driving in fog

Fog can occur at any time. Fog on highways can be extremely dangerous. Fog is often unexpected, and visibility can deteriorate rapidly. You should watch for

foggy conditions and be ready to reduce your speed. Do not assume that the fog will thin out after you enter it.

The best advice for driving in fog is don't. It is preferable that you pull off the road into a rest area or truck stop until visibility is better. If you must drive, be sure to consider the following:

- ✓ Obey all fog-related warning signs.
- ✓ Slow down before you enter fog.
- ✓ Use low-beam headlights and fog lights for best visibility even in daytime and be alert for other drivers who may have forgotten to turn on their lights.
- ✓ Turn on your 4-way flashers. This will give vehicles approaching you from behind a quicker opportunity to notice your vehicle.
- ✓ Watch for vehicles on the side of the roadway. Seeing taillights or headlights in front of you may not be a true indication of where the road is ahead of you. The vehicle may not be on the road at all.
- ✓ Use roadside highway reflectors as guides to determine how the road may curve ahead of you.
- ✓ Listen for traffic you cannot see.
- ✓ Avoid passing other vehicles.
- ✓ Don't stop along the side of the road, unless absolutely necessary.

## **2.13 – Driving in winter**

### **2.13.1 – Vehicle checks**

Make sure your vehicle is ready before driving in winter weather. You should make a regular Vehicle inspection, paying extra attention to the following items.

#### **Coolant level and antifreeze amount**

Make sure the cooling system is full and there is enough antifreeze in the system to protect against freezing. This can be checked with a special coolant tester.

#### **Defrosting and heating equipment**

Make sure the defrosters work. They are needed for safe driving. Make sure the heater is working, and that you know how to operate it. If you use other heaters and expect to need them (e.g., mirror heaters, battery box heaters, fuel tank heaters), check their operation.

#### **Wipers and washers**

Make sure the windshield wiper blades are in good condition. Make sure the wiper blades press against the window hard enough to wipe the windshield clean,

otherwise they may not sweep off snow properly. Make sure the windshield washer works and there is washing fluid in the washer reservoir.

Use windshield washer antifreeze to prevent freezing of the washer liquid. If you can't see well enough while driving (for example, if your wipers fail), stop safely and fix the problem.

#### **Tires**

Make sure you have enough tread on your tires. The drive tires must provide traction to push the rig over wet pavement and through snow. The steering tires must have traction to steer the vehicle. Enough tread is especially important in winter conditions. You must have at least 4/32-inch tread depth in every major groove on front tires and at least 2/32 inch on other tires. More would be better. Use a gauge to determine if you have enough tread for safe driving.

#### **Tire chains**

You may find yourself in conditions where you can't drive without chains, even to get to a place of safety. Carry the right number of chains and extra cross-links. Make sure they will fit your drive tires. Check the chains for broken hooks, worn or broken cross-links, and bent or broken side chains. Learn how to put the chains on before you need to do it in snow and ice.

#### **Lights and reflectors**

Make sure the lights and reflectors are clean. Lights and reflectors are especially important during bad weather. Check from time to time during bad weather to make sure they are clean and working properly.

#### **Windows and mirrors**

Remove any ice, snow, etc., from the windshield, windows, and mirrors before starting. Use a windshield scraper, snow brush, and windshield defroster as necessary.

#### **Hand holds, steps, and deck plates**

Remove all ice and snow from hand holds, steps, and deck plates. This will reduce the danger of slipping.

#### **Radiator shutters and winterfront**

Remove ice from the radiator shutters. Make sure the winterfront is not closed too tightly. If the shutters freeze shut or the winterfront is closed too much, the engine may overheat and stop.

#### **Exhaust system**

Exhaust system leaks are especially dangerous when cab ventilation may be poor (windows rolled up, etc.). Loose connections could permit poisonous carbon monoxide to

leak into your vehicle. Carbon monoxide gas will cause you to be sleepy. In large enough amounts it can kill you. Check the exhaust system for loose parts and for sounds and signs of leaks.

## 2.13.2 – Driving

### Slippery surfaces

Drive slowly and smoothly on slippery roads. If it is very slippery, you shouldn't drive at all. Stop at the first safe place.

### Start gently and slowly

When first starting, get the feel of the road. Don't hurry.

### Check for ice

Check for ice on the road, especially bridges and overpasses. A lack of spray from other vehicles indicates ice has formed on the road. Also, check your mirrors and wiper blades for ice. If they have ice, the road most likely will be icy as well.

### Adjust turning and braking to conditions

Make turns as gently as possible. Don't brake any harder than necessary, and don't use the engine brake or speed retarder. (They can cause the driving wheels to skid on slippery surfaces.)

### Adjust speed to conditions

Don't pass slower vehicles unless necessary. Go slowly and watch far enough ahead to keep a steady speed. Avoid having to slow down and speed up. Take curves at slower speeds and don't brake while in curves. Be aware that as the temperature rises to the point where ice begins to melt, the road becomes even more slippery. Slow down more.

### Adjust space to conditions

Don't drive alongside other vehicles. Keep a longer following distance. When you see a traffic jam ahead, slow down or stop to wait for it to clear. Try hard to anticipate stops early and slow down gradually. Watch for snowplows, as well as salt and sand trucks, and give them plenty of room.

### Wet brakes

When driving in heavy rain or deep standing water, your brakes will get wet. Water in the brakes can cause the brakes to be weak, to apply unevenly, or to grab. This can cause lack of braking power, wheel lockups, pulling to one side or the other, and jackknife if you pull a trailer.

Avoid driving through deep puddles or flowing water if possible. If not, you should:

- ✓ Slow down and place transmission in a low gear.
- ✓ Gently put on the brakes. This presses linings against brake drums or discs and keeps mud, silt, sand, and water from getting in.
- ✓ Increase engine rpm and cross the water while keeping light pressure on the brakes.
- ✓ When out of the water, maintain light pressure on the brakes for a short distance to heat them up and dry them out.
- ✓ Make a test stop when safe to do so. Check behind to make sure no one is following, then apply the brakes to be sure they work well. If not, dry them out further as described above. (CAUTION: Do not apply too much brake pressure and accelerator at the same time, or you can overheat brake drums and linings.)

## 2.14 – Driving in very hot weather

### 2.14.1 – Vehicle checks

Do a normal vehicle inspection but pay special attention to the following items.

#### Tires

Check the tire mounting and air pressure. Inspect the tires every two hours or every 100 miles when driving in very hot weather. Air pressure increases with temperature. Do not let air out or the pressure will be too low when the tires cool off. If a tire is too hot to touch, remain stopped until the tire cools off. Otherwise the tire may blow out or catch fire.

#### Engine oil

The engine oil helps keep the engine cool, as well as lubricating it. Make sure there is enough engine oil. If you have an oil temperature gauge, make sure the temperature is within the proper range while you are driving.

#### Engine coolant

Before starting out, make sure the engine cooling system has enough water and antifreeze according to the engine manufacturer's directions. (Antifreeze helps the engine under hot conditions as well as cold conditions.) When driving, check the water temperature or coolant temperature gauge from time to time. Make sure that it remains in the normal range. If the gauge goes above the highest safe temperature, there may be something wrong that could lead to engine failure and possibly fire. Stop driving as soon as safely possible and try to find out what is wrong.

Some vehicles have sight glasses, see-through coolant overflow containers, or coolant recovery containers. These permit you to check the coolant level while the engine is hot. If the container is not part of the pressurized system, the cap can be safely removed and coolant added, even when the engine is at operating temperature.

Never remove the radiator cap or any part of the pressurized system until the system has cooled. Steam and boiling water can spray under pressure and cause severe burns. If you can touch the radiator cap with your bare hand, it is probably cool enough to open.

If coolant has to be added to a system without a recovery tank or overflow tank, follow these steps:

- ✓ Shut engine off.
- ✓ Wait until engine has cooled.
- ✓ Protect hands (use gloves or a thick cloth).
- ✓ Turn radiator cap slowly to the first stop, which releases the pressure seal.
- ✓ Step back while pressure is released from cooling system.
- ✓ When all pressure has been released, press down on the cap and turn it further to remove it.
- ✓ Visually check level of coolant and add more coolant if necessary.
- ✓ Replace cap and turn all the way to the closed position.

## **Engine belts**

Learn how to check v-belt tightness on your vehicle by pressing on the belts. Loose belts will not turn the water pump and/or fan properly. This will result in overheating. Also, check belts for cracking or other signs of wear.

**Hoses.** Make sure coolant hoses are in good condition. A broken hose while driving can lead to engine failure and even fire.

### **2.14.2 – Driving**

#### **Watch for bleeding tar**

Tar in the road pavement frequently rises to the surface in very hot weather. Spots where tar "bleeds" to the surface are very slippery.

#### **Go slowly enough to prevent overheating**

High speeds create more heat for tires and the engine. In desert conditions the heat may build up to the point where it is dangerous. The heat will increase chances of tire failure or even fire, and engine failure.

## **Subsections 2.11, 2.12, 2.13, and 2.14 test your knowledge**

1. You should use low beams whenever you can. True or False?
2. What should you do before you drive if you are drowsy?
3. What effects can wet brakes cause? How can you avoid these problems?
4. You should let air out of hot tires so the pressure goes back to normal. True or False?
5. You can safely remove the radiator cap as long as the engine isn't overheated. True or False?

These questions may be on the test. If you can't answer all of them, re-read subsections 2.11, 2.12, 2.13, and 2.14.

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## **2.15 – Railroad-highway crossings**

Railroad-highway grade crossings are a special kind of intersection where the roadway crosses train tracks. These crossings are always dangerous. Every such crossing must be approached with the expectation that a train is coming. It is extremely difficult to judge the distance of the train from the crossing as well as the speed of an approaching train.

### **2.15.1 – Types of crossings**

#### **Passive crossings**

This type of crossing does not have any type of traffic control device. The decision to stop or proceed rests entirely in your hands. Passive crossings require you to recognize the crossing, search for any train using the tracks and decide if there is sufficient clear space to cross safely.

#### **Active crossings**

This type of crossing has a traffic control device installed at the crossing to regulate traffic at the crossing. These active devices include flashing red lights, with or without bells and flashing red lights with bells and gates.

### **2.15.2 – Warning signs and devices**

#### **Advance warning signs**

The round, black-on-yellow warning sign is placed ahead of a public railroad-highway crossing. The advance warning sign tells you to slow down, look and listen for the train, and be prepared to stop at the tracks if a train is coming. All passenger and hazmat carrying vehicles are required to stop. See Figure 2.15.



Figure 2.15

### Pavement markings

Pavement markings mean the same as the advance warning sign. They consist of an "X" with the letters "RR" and a no-passing marking on two-lane roads. See Figure 2.16.



Figure 2.16

There is also a no passing zone sign on two-lane roads. There may be a white stop line painted on the pavement before the railroad tracks. The front of the school bus must remain behind this line while stopped at the crossing.

### Cross-buck signs

This sign marks the grade crossing. It requires you to yield the right-of-way to the train. If there is no white stop line painted on the pavement, vehicles that are required to stop must stop no closer than 15 feet or more than 50 feet from the nearest rail of the nearest track. When the road crosses over more than one track, a sign below the cross-buck indicates the number of tracks. See Figure 2.17.

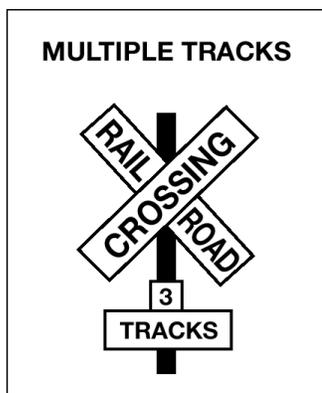


Figure 2.17

### Flashing red light signals

At many highway-rail grade crossings, the cross-buck sign has flashing red lights and bells. When the lights begin to flash, stop! A train is approaching. You are required to yield the right-of-way to the train. If there is more than one track, make sure all tracks are clear before crossing. See Figure 2.18.

### Gates

Many railroad-highway crossings have gates with flashing red lights and bells. Stop when the lights begin to flash and before the gate lowers across the road lane. Remain stopped until the gates go up and the lights have stopped flashing. Proceed when it is safe. See Figure 2.18.

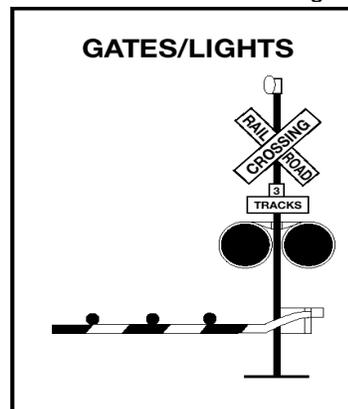


Figure 2.18

### 2.15.3 – Driving procedures

#### Never race a train to a crossing

Never attempt to race a train to a crossing. It is extremely difficult to judge the speed of an approaching train.

#### Reduce speed

Speed must be reduced in accordance with your ability to see approaching trains in any direction, and speed must be held to a point which will permit you to stop short of the tracks in case a stop is necessary.

#### Don't expect to hear a train

Trains may not or are prohibited from sounding horns when approaching some crossings. Public crossings where trains do not sound horns should be identified by signs. Noise inside your vehicle may, also prevent you from hearing the train horn until the train is dangerously close to the crossing.

#### Don't rely on signals

You should not rely solely upon the presence of warning signals, gates, or flagmen to warn of the approach of trains. Be especially alert at crossings that do not have gates or flashing red light signals.

## **Double tracks require a double check**

Remember that a train on one track may hide a train on the other track. Look both ways before crossing. After one train has cleared a crossing, be sure no other trains are near before starting across the tracks.

## **Yard areas and grade crossings in cities and towns**

Yard areas and grade crossings in cities and towns are just as dangerous as rural grade crossings. Approach them with as much caution.

### **2.15.4 – Stopping safely at railroad- highway crossings**

A full stop is required at grade crossings whenever:

- ✓ The nature of the cargo makes a stop mandatory under state or federal regulations.
- ✓ Such a stop is otherwise required by law.

When stopping be sure to:

- ✓ Check for traffic behind you while stopping gradually. Use a pullout lane, if available.
- ✓ Turn on your four-way emergency flashers.

### **2.15.5 – Crossing the tracks**

Railroad crossings with steep approaches can cause your unit to hang up on the tracks. Never permit traffic conditions to trap you in a position where you have to stop on the tracks. Be sure you can get all the way across the tracks before you start across. It takes a typical tractor-trailer unit at least 14 seconds to clear a single track and more than 15 seconds to clear a double track.

Do not shift gears while crossing railroad tracks.

### **2.15.6 – Special situations**

Be Aware! These trailers can get stuck on raised crossings:

- ✓ Low slung units (lowboy, car carrier, moving van, possum-belly livestock trailer).
- ✓ Single-axle tractor pulling a long trailer with its landing gear set to accommodate a tandem-axle tractor.

If for any reason you get stuck on the tracks, get out of the vehicle and away from the tracks. Check for the blue-and-white emergency notification sign posted near the crossing. It includes the name of the railroad, the railroad's emergency contact number, and the USDOT National Crossing Inventory Number, if posted. Call the

Railroad's emergency contact number (800 number) listed on the blue sign or dial 911.

## **2.16 – Mountain driving**

In mountain driving, gravity plays a major role. On any upgrade, gravity slows you down. The steeper the grade, the longer the grade, and/or the heavier the load--the more you will have to use lower gears to climb hills or mountains.

In coming down long, steep downgrades, gravity causes the speed of your vehicle to increase. You must select an appropriate safe speed, then use a low gear, and proper braking techniques. You should plan ahead and obtain information about any long, steep grades along your planned route of travel. If possible, talk to other drivers who are familiar with the grades to find out what speeds are safe.

You must go slowly enough so your brakes can hold you back without getting too hot. If the brakes become too hot, they may start to "fade." This means you have to apply them harder and harder to get the same stopping power. If you continue to use the brakes hard, they can keep fading until you cannot slow down or stop at all.

### **2.16.1 – Select a "safe" speed**

Your most important consideration is to select a speed that is not too fast for the:

- ✓ Total weight of the vehicle and cargo.
- ✓ Length of the grade.
- ✓ Steepness of the grade.
- ✓ Road conditions.
- ✓ Weather.

If a speed limit is posted, or there is a sign indicating "Maximum Safe Speed," never exceed the speed shown. Also, look for and heed warning signs indicating the length and steepness of the grade.

You must use the braking effect of the engine as the principal way of controlling your speed. The braking effect of the engine is greatest when it is near the governed rpms and the transmission is in the lower gears. Save your brakes so you will be able to slow or stop as required by road and traffic conditions.

### **2.16.2 – Select the right gear before starting down the grade**

Shift the transmission to a low gear before starting down the grade. Do not try to downshift after your speed has already built up. You will not be able to shift into a lower gear. You may not even be able to get back into any gear

and all engine braking effect will be lost. Forcing an automatic transmission into a lower gear at high speed could damage the transmission and also lead to loss of all engine braking effect.

With older trucks, a rule for choosing gears is to use the same gear going down a hill that you would need to climb the hill. However, new trucks have low friction parts and streamlined shapes for fuel economy. They may also have more powerful engines. This means they can go up hills in higher gears and have less friction and air drag to hold them back going down hills. For that reason, drivers of modern trucks may have to use lower gears going down a hill than would be required to go up the hill. You should know what is right for your vehicle.

### 2.16.3 – Brake fading or failure

Brakes are designed so brake shoes or pads rub against the brake drum or disks to slow the vehicle. Braking creates heat, but brakes are designed to take a lot of heat. However, brakes can fade or fail from excessive heat caused by using them too much and not relying on the engine braking effect.

Brake fade is also affected by adjustment. To safely control a vehicle, every brake must do its share of the work. Brakes out of adjustment will stop doing their share before those that are in adjustment. The other brakes can then overheat and fade, and there will not be enough braking available to control the vehicle. Brakes can get out of adjustment quickly, especially when they are used a lot; also, brake linings wear faster when they are hot. Therefore, brake adjustment must be checked frequently.

### 2.16.4 – Proper braking technique

#### Remember:

The use of brakes on a long and/or steep downgrade is only a supplement to the braking effect of the engine. Once the vehicle is in the proper low gear, the following are the proper braking techniques:

1. Apply the brakes just hard enough to feel a definite slowdown.
2. When your speed has been reduced to approximately five mph below your "safe" speed, release the brakes. (This brake application should last for about three seconds.)
3. When your speed has increased to your "safe" speed, repeat steps 1 and 2.

For example, if your "safe" speed is 40 mph, you would not apply the brakes until your speed reaches 40 mph. You now apply the brakes hard enough to gradually reduce your speed to 35 mph and then release the brakes. Repeat this as often as necessary until you have reached the end of the downgrade.

Escape ramps have been built on many steep mountain downgrades. Escape ramps are made to stop runaway vehicles safely without injuring drivers and passengers. Escape ramps use a long bed of loose, soft material to slow a runaway vehicle, sometimes in combination with an upgrade. Know escape ramp locations on your route. Signs show drivers where ramp are located. Escape ramps save lives, equipment and cargo.

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## Subsections 2.15 and 2.16

### Test your knowledge

1. What factors determine your selection of a "safe" speed when going down a long, steep downgrade?
2. Why should you be in the proper gear before starting down a hill?
3. Describe the proper braking technique when going down a long, steep downgrade.
4. What type of vehicles can get stuck on a railroad-highway crossing?
5. How long does it take for a typical tractor-trailer unit to clear a double track?

These questions may be on the test. If you can't answer them all, re-read subsections 2.15 and 2.16.

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## 2.17 – Driving emergencies

Traffic emergencies occur when two vehicles are about to collide. Vehicle emergencies occur when tires, brakes, or other critical parts fail. Following the safety practices in this manual can help prevent emergencies. But if an emergency does happen, your chances of avoiding a crash depend upon how well you take action. Actions you can take are discussed below.

### 2.17.1 – Steering to avoid a crash

Stopping is not always the safest thing to do in an emergency. When you don't have enough room to stop, you may have to steer away from what's ahead. Remember, you can almost always turn to miss an obstacle more quickly than you can stop. (However, top-heavy vehicles and tractors with multiple trailers may flip over.)

### Keep both hands on the steering wheel

In order to turn quickly, you must have a firm grip on the steering wheel with both hands. The best way to have both hands on the wheel, if there is an emergency, is to keep them there all the time.

## **How to turn quickly and safely**

A quick turn can be made safely, if it's done the right way. Here are some points that safe drivers use:

- ✓ Do not apply the brake while you are turning. It's very easy to lock your wheels while turning. If that happens, you may skid out of control.
- ✓ Do not turn any more than needed to clear whatever is in your way. The more sharply you turn, the greater the chances of a skid or rollover.
  
- ✓ Be prepared to "counter-steer," that is, to turn the wheel back in the other direction, once you've passed whatever was in your path. Unless you are prepared to counter-steer, you won't be able to do it quickly enough. You should think of emergency steering and counter-steering as two parts of one driving action.

## **Where to steer**

If an oncoming driver has drifted into your lane, a move to your right is best. If that driver realizes what has happened, the natural response will be to return to his or her own lane.

If something is blocking your path, the best direction to steer will depend on the situation.

- ✓ If you have been using your mirrors, you'll know which lane is empty and can be safely used.
  
- ✓ If the shoulder is clear, going right may be best. No one is likely to be driving on the shoulder, but someone may be passing you on the left. You will know if you have been using your mirrors.
  
- ✓ If you are blocked on both sides, a move to the right may be best. At least you won't force anyone into an opposing traffic lane and a possible head-on collision.

## **Leaving the road**

In some emergencies, you may have to drive off the road. It may be less risky than facing a collision with another vehicle.

Most shoulders are strong enough to support the weight of a large vehicle and, therefore, offer an available escape route. Here are some guidelines, if you do leave the road.

## **Avoid braking**

If possible, avoid using the brakes until your speed has dropped to about 20 mph. Then brake very gently to avoid skidding on a loose surface.

## **Keep one set of wheels on the pavement, if possible**

This helps to maintain control.

## **Stay on the shoulder**

If the shoulder is clear, stay on it until your vehicle has come to a stop. Signal and check your mirrors before pulling back onto the road.

## **Returning to the road**

If you are forced to return to the road before you can stop, use the following procedure:

- ✓ Hold the wheel tightly and turn sharply enough to get right back on the road safely. Don't try to edge gradually back on the road. If you do, your tires might grab unexpectedly, and you could lose control.
  
- ✓ When both front tires are on the paved surface, counter-steer immediately. The two turns should be made as a single "steer-counter-steer" move.

### **2.17.2 – How to stop quickly and safely**

If somebody suddenly pulls out in front of you, your natural response is to hit the brakes. This is a good response if there's enough distance to stop, and you use the brakes correctly.

You should brake in a way that will keep your vehicle in a straight line and allow you to turn if it becomes necessary. You can use the "controlled braking" method or the "stab braking" method.

## **Controlled braking**

With this method, you apply the brakes as hard as you can without locking the wheels. Keep steering wheel movements very small while doing this. If you need to make a larger steering adjustment or if the wheels lock, release the brakes. Re-apply the brakes as soon as you can.

## **Stab braking**

With this method, you apply your brakes all the way and release brakes when wheels lock up. As soon as the wheels start rolling, apply the brakes fully again. (It can take up to one second for the wheels to start rolling after you release the brakes. If you re-apply the brakes before the wheels start rolling, the vehicle won't straighten out.)

## **Don't jam on the brakes**

Emergency braking does not mean pushing down on the brake pedal as hard as you can. That will only keep the wheels locked up and cause a skid. If the wheels are skidding, you cannot control the vehicle.

### **2.17.3 – Brake failure**

Brakes kept in good condition rarely fail. Most hydraulic brake failures occur for one of two reasons: (Air brakes are discussed in Section 5.)

- ✓ Loss of hydraulic pressure.
- ✓ Brake fade on long hills.

## Loss of hydraulic pressure

When the system won't build up pressure, the brake pedal will feel spongy or go to the floor. Here are some things you can do.

### Downshift

Putting the vehicle into a lower gear will help to slow the vehicle.

### Pump the brakes

Sometimes pumping the brake pedal will generate enough hydraulic pressure to stop the vehicle.

### Use the parking brake.

The parking or emergency brake is separate from the hydraulic brake system. Therefore, it can be used to slow the vehicle. However, be sure to press the release button or pull the release lever at the same time you use the emergency brake so you can adjust the brake pressure and keep the wheels from locking up.

### Find an escape route

While slowing the vehicle, look for an escape route--an open field, side-street, or escape ramp. Turning uphill is a good way to slow and stop the vehicle. Make sure the vehicle does not start rolling backward after you stop. Put it in low gear, apply the parking brake, and, if necessary, roll back into some obstacle that will stop the vehicle.

### Brake failure on downgrades

Going slow enough and braking properly will almost always prevent brake failure on long downgrades. Once the brakes have failed, however, you are going to have to look outside your vehicle for something to stop it.

Your best hope is an escape ramp. If there is one, there'll be signs telling you about it. Use it. Ramps are usually located a few miles from the top of the downgrade. Every year, hundreds of drivers avoid injury to themselves or damage to their vehicles by using escape ramps. Some escape ramps use soft gravel that resists the motion of the vehicle and brings it to a stop. Others turn uphill, using the hill to stop the vehicle and soft gravel to hold it in place.

Any driver who loses brakes going downhill should use an escape ramp if it's available. If you don't use it, your chances of having a serious crash may be much greater.

If no escape ramp is available, take the least hazardous escape route you can--such as an open field or a side road that flattens out or turns uphill. Make the move as soon as you know your brakes don't work. The longer you wait, the faster the vehicle will go, and the harder it will be to stop.

## 2.17.4 – Tire failure

### Recognize tire failure

Quickly knowing you have a tire failure will let you have more time to react. Having just a few extra seconds to remember what it is you're supposed to do can help you.

The major signs of tire failure are:

- ✓ Sound. The loud "bang" of a blowout is an easily recognized sign. Because it can take a few seconds for your vehicle to react, you might think it was some other vehicle. But any time you hear a tire blow, you'd be safest to assume it is yours.
- ✓ Vibration. If the vehicle thumps or vibrates heavily, it may be a sign that one of the tires has gone flat. With a rear tire, that may be the only sign you get.
- ✓ Feel. If the steering feels "heavy," it is probably a sign that one of the front tires has failed. Sometimes, failure of a rear tire will cause the vehicle to slide back and forth or "fishtail." However, dual rear tires usually prevent this.

### Respond to tire failure

When a tire fails, your vehicle is in danger. You must immediately:

- ✓ Hold the Steering Wheel Firmly. If a front tire fails, it can twist the steering wheel out of your hand. The only way to prevent this is to keep a firm grip on the steering wheel with both hands at all times.
- ✓ Stay off the Brake. It's natural to want to brake in an emergency. However, braking when a tire has failed could cause loss of control. Unless you're about to run into something, stay off the brake until the vehicle has slowed down. Then brake very gently, pull off the road, and stop.
- ✓ Check the Tires. After you've come to a stop, get out and check all the tires. Do this even if the vehicle seems to be handling all right. If one of your dual tires goes, the only way you may know it is by getting out and looking at it.

## 2.18 – Antilock Braking Systems (ABS)

ABS is a computerized system that keeps your wheels from locking up during hard brake applications.

ABS is an addition to your normal brakes. It does not decrease or increase your normal braking capability. ABS only activates when wheels are about to lock up.

ABS does not necessarily shorten your stopping distance, but it does help you keep the vehicle under control during hard braking.

### **2.18.1 – How Antilock Braking Systems work**

Sensors detect potential wheel lock up. An electronic control unit (ECU) will then decrease brake pressure to avoid wheel lockup. Brake pressure is adjusted to provide the maximum braking without danger of lockup.

ABS works far faster than the driver can respond to potential wheel lockup. At all other times the brake system will operate normally.

### **2.18.2 – Vehicles required to have Antilock Braking Systems**

The Department of Transportation requires that ABS be on:

- ✓ Truck tractors with air brakes built on or after March 1, 1997.
- ✓ Other air brake vehicles, (trucks, buses, trailers, and converter dollies) built on or after March 1, 1998.
- ✓ Hydraulically braked trucks and buses with a gross vehicle weight rating of 10,000 lbs or more built on or after March 1, 1999.

Many commercial vehicles built before these dates have been voluntarily equipped with ABS.

### **2.18.3 – How to know if your vehicle is equipped with ABS**

Tractors, trucks, and buses will have yellow ABS malfunction lamps on the instrument panel.

Trailers will have yellow ABS malfunction lamps on the left side, either on the front or rear corner.

Dollies manufactured on or after March 1, 1998, are required to have a lamp on the left side.

As a system check on newer vehicles, the malfunction lamp comes on at start-up for a bulb check, and then goes out quickly. On older systems, the lamp could stay on until you are driving over five mph.

If the lamp stays on after the bulb check, or goes on once you are under way, you may have lost ABS control.

In the case of towed units manufactured before it was required by the Department of Transportation, it may be difficult to tell if the unit is equipped with ABS. Look under the vehicle for the ECU and wheel speed sensor wires coming from the back of the brakes.

### **2.18.4 – How ABS helps you**

When you brake hard on slippery surfaces in a vehicle without ABS, your wheels may lock up. When your steering wheels lock up, you lose steering control. When your other wheels lock up, you may skid, jackknife, or even spin the vehicle.

ABS helps you avoid wheel lock up and maintain control. You may or may not be able to stop faster with ABS, but you should be able to steer around an obstacle while braking, and avoid skids caused by over braking.

### **2.18.5 – ABS on the tractor only or only on the trailer**

Having ABS on only the tractor, only the trailer, or even on only one axle, still gives you more control over the vehicle during braking. Brake normally.

When only the tractor has ABS, you should be able to maintain steering control, and there is less chance of jackknifing. But keep your eye on the trailer and let up on the brakes (if you can safely do so) if it begins to swing out.

When only the trailer has ABS, the trailer is less likely to swing out, but if you lose steering control or start a tractor jackknife, let up on the brakes (if you can safely do so) until you regain control.

### **2.18.6 – Braking with ABS**

When you drive a vehicle with ABS, you should brake as you always have. In other words:

- ✓ Use only the braking force necessary to stop safely and stay in control.
- ✓ Brake the same way, regardless of whether you have ABS on the bus, tractor, the trailer, or both.
- ✓ As you slow down, monitor your tractor and trailer and back off the brakes (if it is safe to do so) to stay in control.

There is only one exception to this procedure. If you drive a straight truck or combination with working ABS on all axles, in an emergency stop, you can fully apply the brakes.

### **2.18.7 – Braking if ABS is not working**

Without ABS you still have normal brake functions. Drive and brake as you always have.

Vehicles with ABS have yellow malfunction lamps to tell you if something isn't working.

As a system check on newer vehicles, the malfunction lamp comes on at start-up for a bulb check and then goes

out quickly. On older systems, the lamp could stay on until you are driving over five mph.

If the lamp stays on after the bulb check, or goes on once you are under way, you may have lost ABS control on one or more wheels.

Remember, if your ABS malfunctions, you still have regular brakes. Drive normally, but get the system serviced soon.

### **2.18.8 – Safety reminders**

- ✓ ABS won't allow you to drive faster, follow more closely, or drive less carefully.
- ✓ ABS won't prevent power or turning skids—ABS should prevent brake-induced skids or jackknives, but not those caused by spinning the drive wheels or going too fast in a turn.
- ✓ ABS won't necessarily shorten stopping distance. ABS will help maintain vehicle control, but not always shorten stopping distance.
- ✓ ABS won't increase or decrease ultimate stopping power—ABS is an "add-on" to your normal brakes, not a replacement for them.
- ✓ ABS won't change the way you normally brake. Under normal brake conditions, your vehicle will stop as it always stopped. ABS only comes into play when a wheel would normally have locked up because of over braking.
- ✓ ABS won't compensate for bad brakes or poor brake maintenance.
- ✓ Remember: The best vehicle safety feature is still a safe driver.
- ✓ Remember: Drive so you never need to use your ABS.
- ✓ Remember: If you need it, ABS could help to prevent a serious crash.

## **2.19 – Skid control and recovery**

A skid happens whenever the tires lose their grip on the road. This is caused in one of four ways:

- ✓ Over-braking. Braking too hard and locking up the wheels. Skids also can occur when using the speed retarder when the road is slippery.
- ✓ Over-steering. Turning the wheels more sharply than the vehicle can turn.
- ✓ Over-acceleration. Supplying too much power to the drive wheels, causing them to spin.
- ✓ Driving Too Fast. Most serious skids result from driving too fast for road conditions. Drivers who adjust

their driving to conditions don't over-accelerate and don't have to over-brake or over-steer from too much speed.

### **2.19.1 – Drive-wheel skids**

By far the most common skid is one in which the rear wheels lose traction through excessive braking or acceleration. Skids caused by acceleration usually happen on ice or snow. Taking your foot off the accelerator can easily stop them. (If it is very slippery, push the clutch in. Otherwise, the engine can keep the wheels from rolling freely and regaining traction.)

Rear wheel braking skids occur when the rear drive wheels lock. Because locked wheels have less traction than rolling wheels, the rear wheels usually slide sideways in an attempt to "catch up" with the front wheels. In a bus or straight truck, the vehicle will slide sideways in a "spin out." With vehicles towing trailers, a drive-wheel skid can let the trailer push the towing vehicle sideways, causing a sudden jackknife. See Figure 2.19.

### **2.19.2 – Correcting a drive-wheel braking skid**

Do the following to correct a drive-wheel braking skid:

- ✓ Stop Braking. This will let the rear wheels roll again and keep the rear wheels from sliding.
- ✓ Counter-steer. As a vehicle turns back on course, it has a tendency to keep on turning. Unless you turn the steering wheel quickly the other way, you may find yourself skidding in the opposite direction.

Learning to stay off the brake, turn the steering wheel quickly, push in the clutch, and counter-steer in a skid takes a lot of practice. The best place to get this practice is on a large driving range or "skid pad."

### **2.19.3 – Front-wheel skids**

Driving too fast for conditions causes most front-wheel skids. Other causes include lack of tread on the front tires and cargo loaded so not enough weight is on the front axle. In a front-wheel skid, the front end tends to go in a straight line regardless of how much you turn the steering wheel. On a very slippery surface, you may not be able to steer around a curve or turn.

When a front-wheel skid occurs, the only way to stop the skid is to let the vehicle slow down. Stop turning and/or braking so hard. Slow down as quickly as possible without skidding.

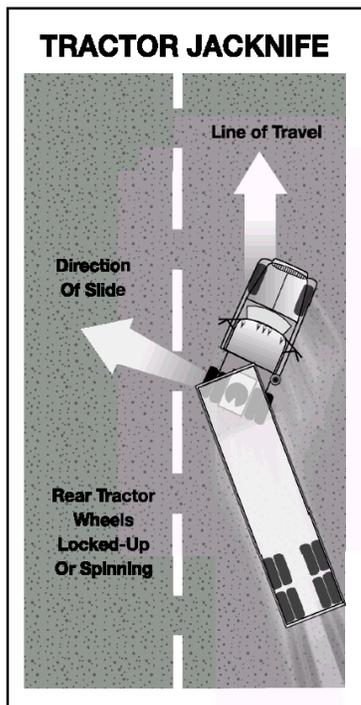


Figure 2.19

### Subsections 2.17, 2.18, and 2.19 Test your knowledge

1. Stopping is not always the safest thing to do in an emergency. True or False?
2. What are some advantages of going right instead of left around an obstacle?
3. What is an "escape ramp?"
4. If a tire blows out, you should put the brakes on hard to stop quickly. True or False?
5. How do you know if your vehicle has antilock brakes?
6. What is the proper braking technique when driving a vehicle with antilock brakes?
7. How do antilock brakes help you?

These questions may be on the test. If you can't answer them all, re-read subsections 2.17, 2.18, and 2.19.

## 2.20 – Accident procedures

When you're in an accident and not seriously hurt, you need to act to prevent further damage or injury. The basic steps to be taken at any accident are to:

- ✓ Protect the area.
- ✓ Notify authorities.
- ✓ Care for the injured.

### 2.20.1 – Protect the area

The first thing to do at an accident scene is to keep another accident from happening in the same spot. To protect the accident area:

- ✓ If your vehicle is involved in the accident, try to get it to the side of the road. This will help prevent another accident and allow traffic to move.
- ✓ If you're stopping to help, park away from the accident. The area immediately around the accident will be needed for emergency vehicles.
- ✓ Put on your flashers.
- ✓ Set out reflective triangles to warn other traffic. Make sure other drivers can see them in time to avoid the accident.

### 2.20.2 – Notify authorities

If you have a cell phone or CB, call for assistance before you get out of your vehicle. If not, wait until after the accident scene has been properly protected, then phone or send someone to phone the police. Try to determine where you are so you can give the exact location.

### 2.20.3 – Care for the injured

If a qualified person is at the accident and helping the injured, stay out of the way unless asked to assist. Otherwise, do the best you can to help any injured parties. Here are some simple steps to follow in giving assistance:

- ✓ Don't move a severely injured person unless the danger of fire or passing traffic makes it necessary.
- ✓ Stop heavy bleeding by applying direct pressure to the wound.
- ✓ Keep the injured person warm.

## 2.21 – Fires

Truck fires can cause damage and injury. Learn the causes of fires and how to prevent them. Know what to do to extinguish fires.

### 2.21.1 – Causes of fire

The following are some causes of vehicle fires:

- ✓ After Accidents. Spilled fuel, improper use of flares.
- ✓ Tires. Under-inflated tires and duals that touch.
- ✓ Electrical System. Short circuits due to damaged insulation, loose connections.
- ✓ Fuel. Driver smoking, improper fueling, loose fuel connections.

- ✓ Cargo. Flammable cargo improperly sealed or loaded cargo, poor ventilation.

### 2.21.2 – Fire prevention

Pay attention to the following:

- ✓ Vehicle Inspection. Make a complete inspection of the electrical, fuel, and exhaust systems, tires, and cargo. Be sure to check that the fire extinguisher is charged.
- ✓ En Route Inspection. Check the tires, wheels, and truck body for signs of heat whenever you stop during a trip.
- ✓ Follow Safe Procedures. Follow correct safety procedures for fueling the vehicle, using brakes, handling flares, and other activities that can cause a fire.
- ✓ Monitoring. Check the instruments and gauges often for signs of overheating and use the mirrors to look for signs of smoke from tires or the vehicle.
- ✓ Caution. Use normal caution in handling anything flammable.

### 2.21.3 – Fire fighting

Knowing how to fight fires is important. Drivers who didn't know what to do have made fires worse. Know how the fire extinguisher works. Study the instructions printed on the extinguisher before you need it. Here are some procedures to follow in case of fire.

#### Pull off the road

The first step is to get the vehicle off the road and stop. In doing so:

- ✓ Park in an open area, away from buildings, trees, brush, other vehicles, or anything that might catch fire.
- ✓ Don't pull into a service station!
- ✓ Notify emergency services of your problem and your location.

#### Keep the fire from spreading

Before trying to put out the fire, make sure that it doesn't spread any further.

- ✓ With an engine fire, turn off the engine as soon as you can. Don't open the hood if you can avoid it. Shoot foam through louvers, radiator, or from the vehicle's underside.
- ✓ For a cargo fire in a van or box trailer, keep the doors shut, especially if your cargo contains hazardous materials. Opening the van doors will supply the fire with oxygen and can cause it to burn very fast.

#### Extinguish the fire

Here are some rules to follow in putting out a fire:

- ✓ When using the extinguisher, stay as far away from the fire as possible.
- ✓ Aim at the source or base of the fire, not up in the flames.

#### Use the right fire extinguisher

Figures 2.20 and 2.21 detail the type of fire extinguisher to use by class of fire.

- ✓ The B:C type fire extinguisher is designed to work on electrical fires and burning liquids.
- ✓ The A:B:C type is designed to work on burning wood, paper, and cloth as well.
- ✓ Water can be used on wood, paper, or cloth, but don't use water on an electrical fire (can cause shock) or a gasoline fire (it will spread the flames).
- ✓ A burning tire must be cooled. Lots of water may be required.
- ✓ If you're not sure what to use, especially on a hazardous materials fire, wait for firefighters.
- ✓ Position yourself upwind. Let the wind carry the extinguisher to the fire.
- ✓ Continue until whatever was burning has been cooled. Absence of smoke or flame does not mean the fire cannot restart.

Class/Type of Fires	
Class	Type
A	<b>Wood, paper, ordinary combustibles</b> Extinguish by Cooling and Quenching Using Water or Dry Chemicals
B	<b>Gasoline, oil, grease, other greasy liquids</b> Extinguish by Smothering, Cooling or Heat Shielding using carbon Dioxide or Dry Chemicals
C	<b>Electrical equipment fires</b> Extinguish with Non-conducting Agents such as Carbon Dioxide or Dry Chemicals. <b>DO NOT USE WATER.</b>
D	<b>Fires in combustible metals</b> Extinguish by Using Specialized Extinguishing Powders

Figure 2.20

Class of Fire/Type of Extinguisher	
Class of Fire	Fire Extinguisher Type
B or C	Regular Dry Chemical

<b>A, B, C, or D</b>	Multi-Purpose Dry Chemical
<b>D</b>	Purple K Dry Chemical
<b>B or C</b>	KCL Dry Chemical
<b>D</b>	Dry Powder Special Compound
<b>B or C</b>	Carbon Dioxide (Dry)
<b>B or C</b>	Halogenated Agent (Gas)
<b>A</b>	Water
<b>A</b>	Water With Anti-Freeze
<b>A or B</b>	Water, Loaded Steam Style
<b>B, On Some A</b>	Foam

Figure 2.21

**Subsections 2.20 and 2.21  
Test your knowledge**

1. What are some things to do at an accident scene to prevent another accident?
2. Name two causes of tire fires.
3. What kinds of fires is a B:C extinguisher not good for?
4. When using your extinguisher, should you get as close as possible to the fire?
5. Name some causes of vehicle fires.

These questions may be on the test. If you can't answer them all, re-read subsections 2.20 and 2.21.

**2.22 – Alcohol, other drugs, and driving**

**2.22.1 – Alcohol and driving**

Drinking alcohol and then driving is very dangerous and a serious problem. People who drink alcohol are involved in traffic accidents resulting in over 20,000 deaths every year. Alcohol impairs muscle coordination, reaction time, depth perception, and night vision. It also affects the parts of the brain that control judgment and inhibition. For some people, one drink is all it takes to show signs of impairment.

**How alcohol works**

Alcohol goes directly into the blood stream and is carried to the brain. After passing through the brain, a small percentage is removed in urine, perspiration, and by breathing, while the rest is carried to the liver. The liver can only process one-third an ounce of alcohol per hour, which is considerably less than the alcohol in a standard drink. This is a fixed rate, so only time, not black coffee or a cold shower, will sober you up. If you have drinks faster than your body can get rid of them, you will have more alcohol in your body, and your driving will be more affected. The Blood Alcohol Concentration (BAC)

commonly measures the amount of alcohol in your body. See Figure 2.22.

All of the following drinks contain the same amount of alcohol:

- ✓ A 12-ounce glass of 5% beer.
- ✓ A 5-ounce glass of 12% wine.

What is a drink?									
It is the alcohol in drinks that affects human performance. It doesn't make any difference whether that alcohol comes from "a couple of beers," or from two glasses of wine, or two shots of hard liquor.									
Drinks	Body Weight in Pounds								Effects
	100	120	140	160	180	200	220	240	
Approximate Blood Alcohol Content									
0	.00	.00	.00	.00	.00	.00	.00	.00	Only Safe Driving Limit
1	.04	.03	.03	.02	.02	.02	.02	.02	Impairment Begins
2	.08	.06	.05	.05	.04	.04	.03	.03	Driving Skills Significantly Affected Criminal Penalties
3	.11	.09	.08	.07	.06	.06	.05	.05	
4	.15	.12	.11	.09	.08	.08	.07	.06	
5	.19	.16	.13	.12	.11	.09	.09	.08	
6	.23	.19	.16	.14	.13	.11	.10	.09	Legally Intoxicated Criminal Penalties
7	.26	.22	.19	.16	.15	.13	.12	.11	
8	.30	.25	.21	.19	.17	.15	.14	.13	
9	.34	.28	.24	.21	.19	.17	.15	.14	
10	.38	.31	.27	.23	.21	.19	.17	.16	
Subtract .01% for each 40 minutes of drinking. One drink is 1.5 oz. of 80 proof liquor, 12 oz. of beer, or 5 oz. of table wine.									

- ✓ A 1 1/2-ounce shot of 80 proof liquor.

Figure 2.22

**What determines Blood Alcohol Concentration?**

BAC is determined by the amount of alcohol you drink (more alcohol means higher BAC), how fast you drink

(faster drinking means higher BAC), and your weight (a small person doesn't have to drink as much to reach the same BAC).

### Alcohol and the brain

Alcohol affects more and more of the brain as BAC builds up. The first part of the brain affected controls judgment and self-control. One of the bad things about this is it can keep drinkers from knowing they are getting drunk. And, of course, good judgment and self-control are absolutely necessary for safe driving.

As BAC continues to build up, muscle control, vision, and coordination are affected more and more. Effects on driving may include:

- ✓ Straddling lanes.
- ✓ Quick, jerky starts.
- ✓ Not signaling, failure to use lights.
- ✓ Running stop signs and red lights.
- ✓ Improper passing (See Figure 2.23).

These effects mean increased chances of a crash and chances of losing your driver's license. Accident statistics show that the chance of a crash is much greater for drivers who have been drinking than for drivers who have not.

### How alcohol affects driving

All drivers are affected by drinking alcohol. Alcohol affects judgment, vision, coordination, and reaction time. It causes serious driving errors, such as:

- ✓ Increased reaction time to hazards.
- ✓ Driving too fast or too slow.
- ✓ Driving in the wrong lane.
- ✓ Running over the curb.
- ✓ Weaving.

Effects of Increasing Blood Alcohol Content		
Blood Alcohol Content is the amount of alcohol in your blood recorded in milligrams of alcohol per 100 milliliters of blood. Your BAC depends on the amount of blood (which increases with weight) and the amount of alcohol you consume over time (how fast you drink). The faster you drink, the higher your BAC, as the liver can only handle about one drink per hour—the rest builds up in your blood.		
BAC	Effects on body	Effects on driving condition
0.02	Mellow feeling, slight body warmth.	Less inhibited.
0.05	Noticeable relaxation.	Less alert, less self-focused, coordination impairment begins.
0.08	Definite impairment in coordination & judgment	Drunk driving limit, impaired coordination & judgment.
0.10*	Noisy, possible embarrassing behavior, mood swings.	Reduction in reaction time.
0.15	Impaired balance & movement, clearly drunk.	<b>Unable to drive.</b>
0.30	Many lose consciousness.	
0.40	Most lose consciousness, some die.	
0.50	Breathing stops, many die.	
*BAC of .10 means that 1/10 of 1 % (or 1/1000) of your total blood content is alcohol.		

Figure 2.23

### 2.22.2 – Other drugs

Besides alcohol, other legal and illegal drugs are being used more often. Laws prohibit possession or use of many drugs while on duty. They prohibit being under the influence of any "controlled substance," amphetamines (including "pep pills," "uppers," and "bennies"), narcotics, or any other substance, which can make the driver unsafe. This could include a variety of prescription and over-the-counter drugs (cold medicines), which may make the driver drowsy or otherwise affect safe driving ability. However, possession and use of a drug given to a driver by a doctor is permitted if the doctor informs the driver that it will not affect safe driving ability.

Pay attention to warning labels for legitimate drugs and medicines, and to doctor's orders regarding possible effects. Stay away from illegal drugs.

Don't use any drug that hides fatigue--the only cure for fatigue is rest. Alcohol can make the effects of other drugs much worse. The safest rule is don't mix drugs with driving at all.

Use of drugs can lead to traffic accidents resulting in death, injury, and property damage. Furthermore, it can lead to arrest, fines, and jail sentences. It can also mean the end of a person's driving career.

### 2.22.3 – Illness

Once in a while, you may become so ill that you cannot operate a motor vehicle safely. If this happens to you, you must not drive. However, in case of an emergency, you may drive to the nearest place where you can safely stop.

## 2.23 – Hazardous materials rules for all commercial drivers

All drivers should know something about hazardous materials. You must be able to recognize hazardous cargo, and you must know whether or not you can haul it without having a hazardous materials endorsement on your CDL license.

### 2.23.1 – What are hazardous materials?

Hazardous materials are products that pose a risk to health, safety, and property during transportation. See Figure 2.24.

Hazard Class Definitions		
Class	Class Name	Example
1	Explosives	Ammunition, Dynamite, Fireworks
2	Gases	Propane, Oxygen, Helium
3	Flammable	Gasoline, Acetone
4	Flammable solids	Matches, Fuses
5	Oxidizers	Ammonium Nitrate, Hydrogen peroxide
6	Poisons	Pesticides, Arsenic
7	Radioactive	Uranium, Plutonium
8	Corrosives	Hydrochloric Acid, Battery fluid
9	Miscellaneous hazardous materials	Formaldehyde, Asbestos
None	ORM-D (Other regulated material-domestic)	Hair Spray or Charcoal
None	Combustible liquids	Fuel Oils, Lighter fluid

Figure 2.24

### 2.23.2 – Why are there rules?

You must follow the many rules about transporting hazardous materials. The intent of the rules is to:

- ✓ Contain the product.
- ✓ Communicate the risk.
- ✓ Ensure safe drivers and equipment.

## To contain the product

Many hazardous products can injure or kill on contact. To protect drivers and others from contact, the rules tell shippers how to package safely. Similar rules tell drivers how to load, transport, and unload bulk tanks. These are containment rules.

## To communicate the risk

The shipper uses a shipping paper and diamond shaped hazard labels to warn dockworkers and drivers of the risk.

After an accident or hazardous material spill or leak, you may be injured and unable to communicate the hazards of the materials you are transporting. Firefighters and police can prevent or reduce the amount of damage or injury at the scene if they know what hazardous materials are being transported. Your life, and the lives of others, may depend on quickly locating the hazardous materials shipping papers. For that reason, you must identify shipping papers related to hazardous materials or keep them on top of other shipping papers. You must also keep shipping papers:

- ✓ In a pouch on the driver's door, or
- ✓ In clear view within reach while driving, or
- ✓ On the driver's seat when out of the vehicle.

### 2.23.3 – Lists of regulated products

#### Placards

Placards are used to warn others of hazardous materials. Placards are signs put on the outside of a vehicle that identify the hazard class of the cargo. A placarded vehicle must have at least four identical placards. They are put on the front, rear, and both sides.

Placards must be readable from all four directions. They must be at least 9.8" (250mm) inches square, turned upright on a point, in a diamond shape. Cargo tanks and other bulk packaging display the identification number of their contents on placards or orange panels.

#### Identification numbers

Identification numbers are a four-digit code used by first responders to identify hazardous materials. An identification number may be used to identify more than one chemical on shipping papers. The identification number will be preceded by the letters "NA" or "UN". The US DOT Emergency Response Guidebook (ERG) lists the chemicals and the identification numbers assigned to them.

Not all vehicles carrying hazardous materials need to have placards. The rules about placards are given in Section 9 of this manual. You can drive a vehicle that carries

hazardous materials if it does not require placards. If it requires placards, you cannot drive it unless your driver license has the hazardous materials endorsement. See Figure 2.25.

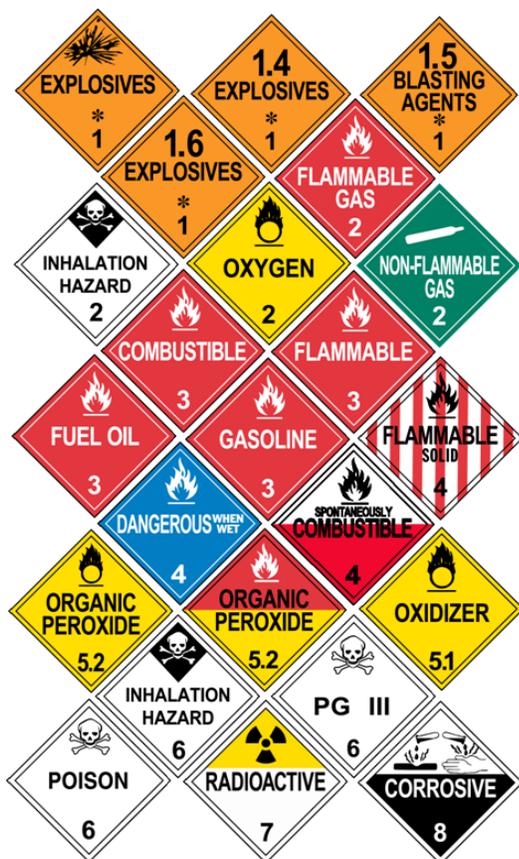


Figure 2.25

The rules require all drivers of placarded vehicles to learn how to safely load and transport hazardous products. They must have a commercial driver license with the hazardous materials endorsement. To get the required endorsement, you must pass a written test on material found in Section 9 of this manual.

A tank endorsement is required for any commercial vehicle that is designed to transport any liquid or gaseous materials in a tank or tanks having an individual rated capacity of more than 119 gallons and an aggregate capacity of 1,000 gallons or more that is either permanently or temporarily attached to the vehicle or chassis. The liquid or gas does not have to be a hazardous material.

Drivers who need the hazardous materials endorsement must learn the placard rules. If you do not know if your vehicle needs placards, ask your employer. Never drive a vehicle needing placards unless you have the hazardous materials endorsement. To do so is a crime. When stopped, you will be cited, and you will not be allowed to drive your truck. It will cost you time and money. A failure to placard when needed may risk your life and others if you have an accident. Emergency help will not know of your hazardous cargo.

Hazardous materials drivers must also know which products they can load together, and which they cannot. These rules are also in Section 9. Before loading a truck with more than one type of product, you must know if it is safe to load them together. If you do not know, ask your employer and consult the regulations.

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**Subsections 2.22 and 2.23**  
**Test your knowledge**

1. Common medicines for colds can make you sleepy. True or False?
2. Coffee and a little fresh air will help a drinker sober up. True or False?
3. What is a hazardous materials placard?
4. Why are placards used?

These questions may be on the test. If you can't answer them all, re-read subsections 2.22 and 2.23.

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