



Driving For America

STUDENT DRIVER TRAINING MANUAL

CDL Class A



FOR CLASSROOM USE ONLY

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Vehicle Definitions and Safety

Introduction

Suppose you are talking on the telephone, getting directions from your dispatcher. "Okay," he tells you, "there's a little town sort of south of where you are. Go to the plant down there and pick up a load of stuff going to that big city way up north." You are probably going to either laugh or cry, depending on the kind of day you have had.

Now let's change the scene. You are talking on the telephone to the shop. "Well," you tell the shop mechanic, "my truck's thingamajig on the doodad under the whatchamacallit don't jive no more." Your mechanic will probably hang up on you, or worse.

It is important that we know what to call the various parts of a truck so everyone knows what we are describing. Some of the parts will be called by different names in different geographic areas. Even companies within the same area will not always use the same names for parts. That is why you should know the basic function of the various parts. The difference between a part and a system should also be understood.

A part is one piece in a combined group that makes a system work. For example, your electrical system contains different parts, such as a battery, starter and alternator. In this chapter, you need to learn the different names of the parts, which system they fit into and how you relate to them. In later chapters, we will get into more detail on each system and how it relates to the truck. But, before you start spending time around a tractor-trailer rig, it is very important for you to learn about safety in the yard around trucks.

Yard Safety and You

Always keep foremost in your mind - SAFETY. As a Professional Driver, safety is an obligation to yourself and to others. Remember your body is alive only once. Your limbs do not grow back like a lizard's tail. Eyes, fingers, and toes that are lost are lost forever. Trucks are big, heavy, and dangerous. The trucking

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industry is one of the most dangerous industries you can get into. Most trucking injuries do not occur on the road, but in the yard area.

There are two basic rules you need to remember:

1. Look out for yourself.
2. Look out for those around you.

In looking out for yourself, never step out from behind a large object without looking first. Yard personnel sitting high in a truck looking for trailer numbers as they hurry around, might look right over top of someone stepping from behind a large object. They might even have their truck out of gear, coasting, and you cannot hear them.

Also, before you step closer to, in front of, or behind ANY truck, check to see if there is a driver in the cab of that truck. If there is, first make sure the driver sees you. Second, make sure the driver knows what you are going to do before you do it, and, third, make sure you know what the driver is going to do.

If you are going to be working on or around a truck, make sure it cannot move by itself. Also, make sure someone cannot get in the truck and start it or drive off while you are under the truck or working on it. Use wheel blocks, take the keys out, put a sign in the windshield and place a large drum or other object in front of the unit. Even with the best safeguards, someone can make a mistake, as can be seen from the following example.

Several students were lying under a trailer adjusting the brakes. One of the workers, knowing that particular unit was out of service, jumped in the truck to move it to another location. This worker saw all the safeguards that had been put in place, but he thought all the precautions were around the truck to keep it from being driven out on the highway. Assuming everything was okay, he started the truck and drove it to another location.

In this case, some other students saw what was happening. They gave a warning, and the students under the trailer rolled clear as the driver drove off, not even knowing the danger or hearing the warning shouts.

You can learn from this how important it is to look out for other people as well as for yourself. As a driver, you always should walk around the unit before driving off. As a worker in the yard area, you constantly should be on the lookout for dangerous situations.

Proper clothes are mandatory with most trucking companies. If you appear without hard sole shoes, you could be sent home. Loose fitting clothing that gets in your way or that might get caught in turning machinery is not a wise choice. Likewise, a big cowboy hat will only get in your way, but a close fitting cap will keep the dirt and grease out of your hair. Spurs on your boots could hang up on parts of the truck, causing you to fall. For further safety, some people will even take rings, watches and jewelry off. A pair of soft brown jersey gloves helps keep the dirt off your hands and also helps protect your hands.

It is not wise to stand too close to a truck when the driver is dropping or hooking a trailer. Trailers can tip over or the landing gear can collapse, causing the trailer to fall on its nose. Drive lines can snap, sending chunks of metal flying. Also, clutch cables or air lines can snap, causing the driver to lose control of the unit.

When climbing onto the tractor, onto the trailer or into the cab, always practice what is known as the three-point stance. In order to understand the three-point stance, remember that you have two hands and two feet. At all times, three of these should be in firm contact with something solid - either two hands and one foot or two feet and one hand. If you practice this at all times, it could keep you from getting hurt when you slip. Some day when you least expect it, you will slip. Count on it. It will happen. Learn good habits and practice these good habits always. Good habits are hard to break, bones are not.

Doors on trucks have hurt a lot of workers. When opening a cab door, look around. If you are outside of the cab, watch that nothing falls out on your head. Also, make sure that the truck beside you is not starting to pull out. The other truck could catch your door with its side mirror, its trailer, or part of a load sticking out.

When you are inside the cab trying to get out, watch for the same things concerning the truck beside you. In addition, check to see if anyone is walking alongside of your truck. You might open the door and smack them in the head. As you open the door, be careful that the wind does not catch it, jerking it out of your control.

Also, do not delay in shutting the door tight. Do not leave it open even if you are standing right beside it. The wind could catch the door, someone could walk into it, you might bend over and raise back up under it, or another truck could hit it.

Trailer doors can be killers. Don't ever open a trailer door that is bulging outward. Get some help. Sometimes backing into a dock, then pushing against the back of the trailer door with a forklift will allow the door to be opened. Even these precautions might not keep the freight from falling out on you. If you are loaded with 1,000-lb. rolls of paper, the situation could be very dangerous.

Even when there is no outward indication of problems, always open that trailer door slowly, keeping a firm grip on it. A load of tissue paper that is stacked to the roof of your trailer could knock you out by falling on your head as you open the door. A sudden burst of wind can exert a terrible amount of force on a large trailer door. Watch that the wind does not catch it.

Before swinging the trailer door around to the side of the trailer to latch it open watch that you don't swing it into someone as they are walking or driving by. Always make sure the door is latched well. A gust of wind could pull the door loose as you are walking away, or as you are backing into the dock. When closing the trailer door, make sure it is latched at the top as well as the bollorn.

Some activities have no place at all in a truck yard. Horse play and practical jokes are a good way to hurt someone and you can be fired on the spot at most trucking companies. A Professional Driver is always safety minded.

The Tractor

The tractor is the power unit that pulls the trailer. The trailer is what the freight is loaded onto. The tractor, of course, is the more complicated of the two. The tractor can be unhooked from the trailer and hooked onto another trailer. Or, the tractor can be hooked to more than one trailer at a time. The tractor, we might say, is the main part of a tractor-trailer unit

When we are checking out a tractor as students or as drivers, the first thing we need to do is make sure the unit is not going to roll while we are looking it over. Now is the time to take the proper precautions we have talked about in the previous section.

As we approach the tractor from the front, let's look at the steering system first (see figure 4-1). The RUBBER TIRES (A) are on the ground. The tires are mounted on STEEL RIMS (B). In the center of the rims, we can see that the FRONT AXLE (C) stretches from one side to the other. The STEERING RING KNUCKLES (D) are attached to both ends of the front axle. The steering ring knuckles are a part of the SPINDLE (E) and allow the spindle to turn, which steers the truck. The wheels rotate around the spindles. The spindle has an arm sticking out on the back side of it called the STEERING ARM (F), with a small tube stretching across to the other steering arm. It is called the TIE ROD (G) (or cross tube).

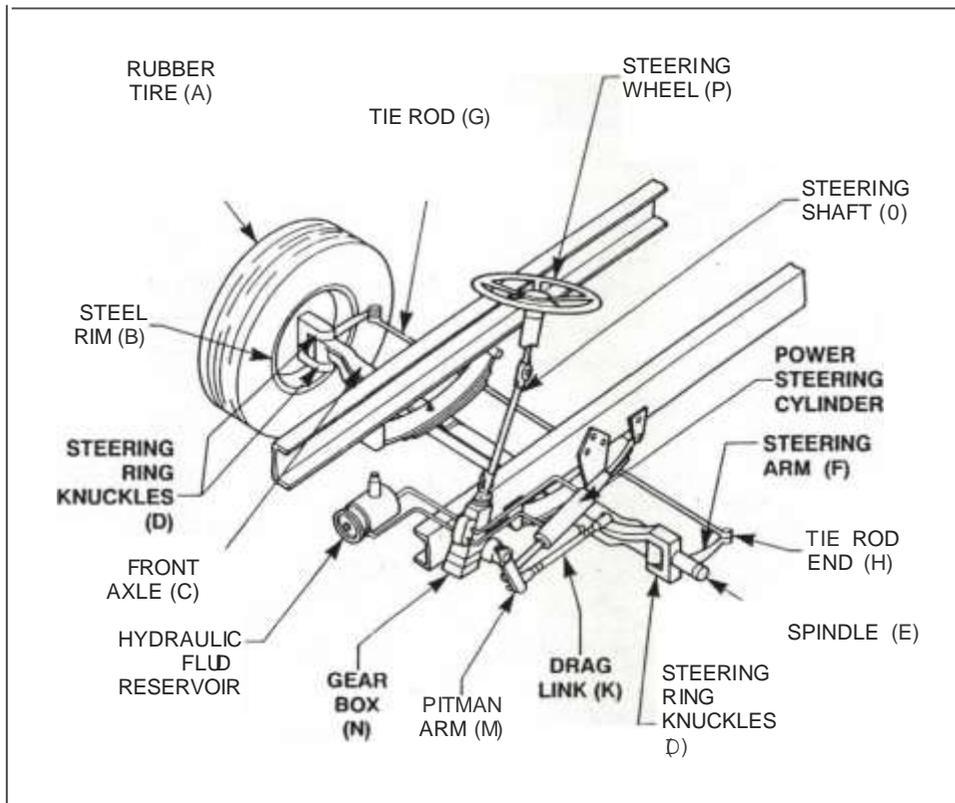


Figure 4-1. The Steering System is composed of rubber tire (A), steel rim (B), front axle (C), steering ring knuckles (D), spindle, (E) steering arm (F), tie rod (or cross-tube) (G), tie rod end (H), drag link (K), pitman arm (M), gear box (N), steering shaft (O), steering wheel (P).

On each end of the tie rod, there is a joint called the TIEROD END (H). On the driver's side, the spindle has another arm sticking out with a small tube called the DRAG LINK (K). The arm on the spindle stretches to the PITMAN ARM (M). The pitman arm is connected to the STEERING GEAR BOX (N). From the steering gear box, the STEERING WHEEL SHAFT (O) stretches up into the cab where the STEERING WHEEL (P) is connected.

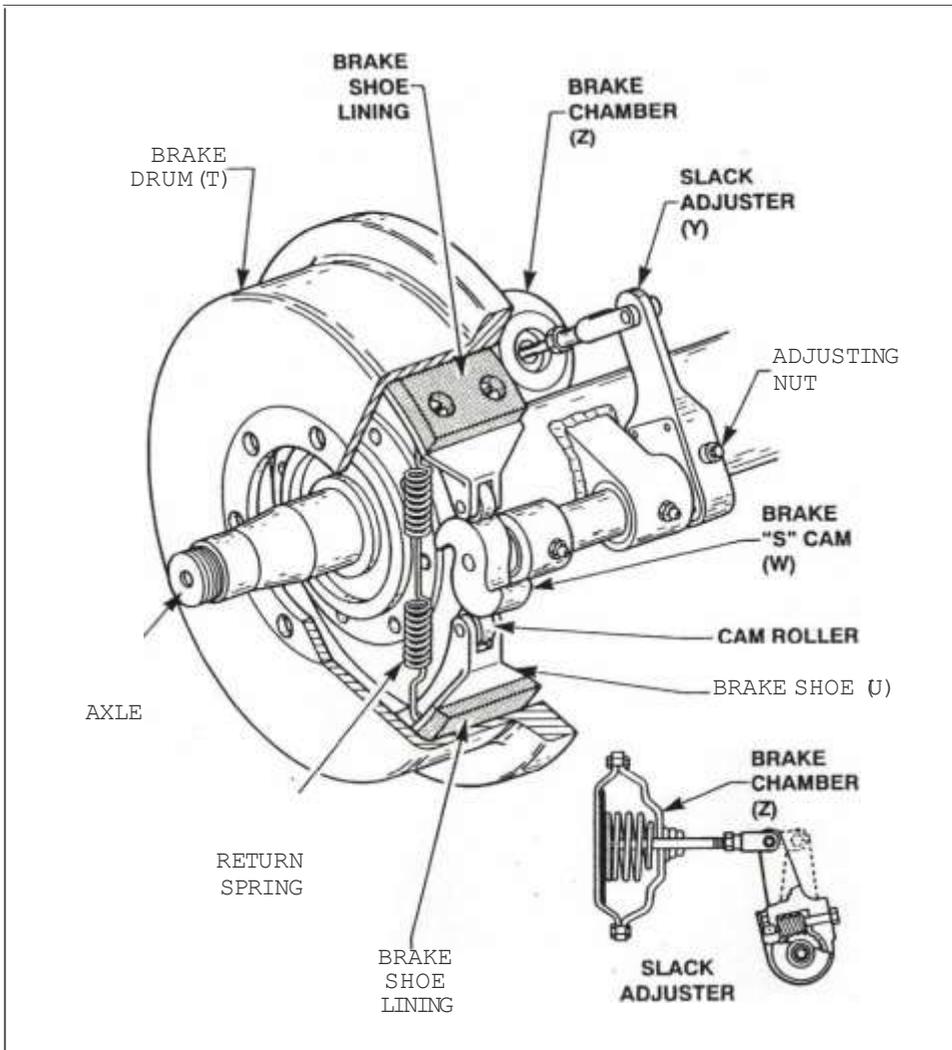
Power steering systems on trucks will be powered by air or by hydraulic oil. These steering systems will have the same parts as those listed in the paragraphs above except the air-powered system will also have a large cylinder attached to the tie rod. There will be air lines going to this cylinder from an air storage tank.

The hydraulic steering system will generally have some high pressure lines attached to the steering gear box. These lines are also attached to an oil reservoir and a HYDRAULIC PUMP (R). Sometimes the pump and the oil reservoir are attached together and sometimes they are separate, connected only by the oil lines. The hydraulic pump is connected to the engine that powers the pump.

There always seems to be some confusion as to what the wheel is. Remember, we said that sometimes parts are called different names by different companies and also in different parts of the country? Well, this situation is somewhat like that. Sometimes a person will call a tire a wheel. The same person might call a hub a wheel or a rim a wheel. This very same person could, more correctly, call the combination of a rubber tire, rim, hub and brake drum a WHEEL ASSEMBLY. So, you see, a group of parts assembled together is sometimes referred to as a wheel. Sometimes one individual part of the wheel assembly is referred to as a wheel.

Confusing, isn't it. Before we go any further, let's try to understand another problem. If you were to talk to a truck mechanic about a bent tie rod, the truck mechanic would tell you it is called a cross tube. However, an auto mechanic might not know what a cross tube is. The auto mechanic would know the cross tube as a tie rod. In order to help you, we will use names and phrases that will be used in your state CDL test. If we see that there might be any great confusion created, we will use both sets of names, but the first name quoted will be the one used in your COL test.

The metal dish circling around the spindle is the BRAKEDRUM (T) (see figure 4-2). Inside the brake drum are two BRAKE SHOES (U). In between the brake shoes is an S-CAM (W) or a WEDGE (X), depending on the type of brakes. The S-cam has a rod stretching out toward the center of the truck, on the end of which is the SLACKADJUSTER (Y). On the end of the slack adjuster is a small rod going inside of the BRAKE CHAMBER (Z).



drum (T) brake shoe (U), Figure 4-2. The Drum Brake is composed of brake

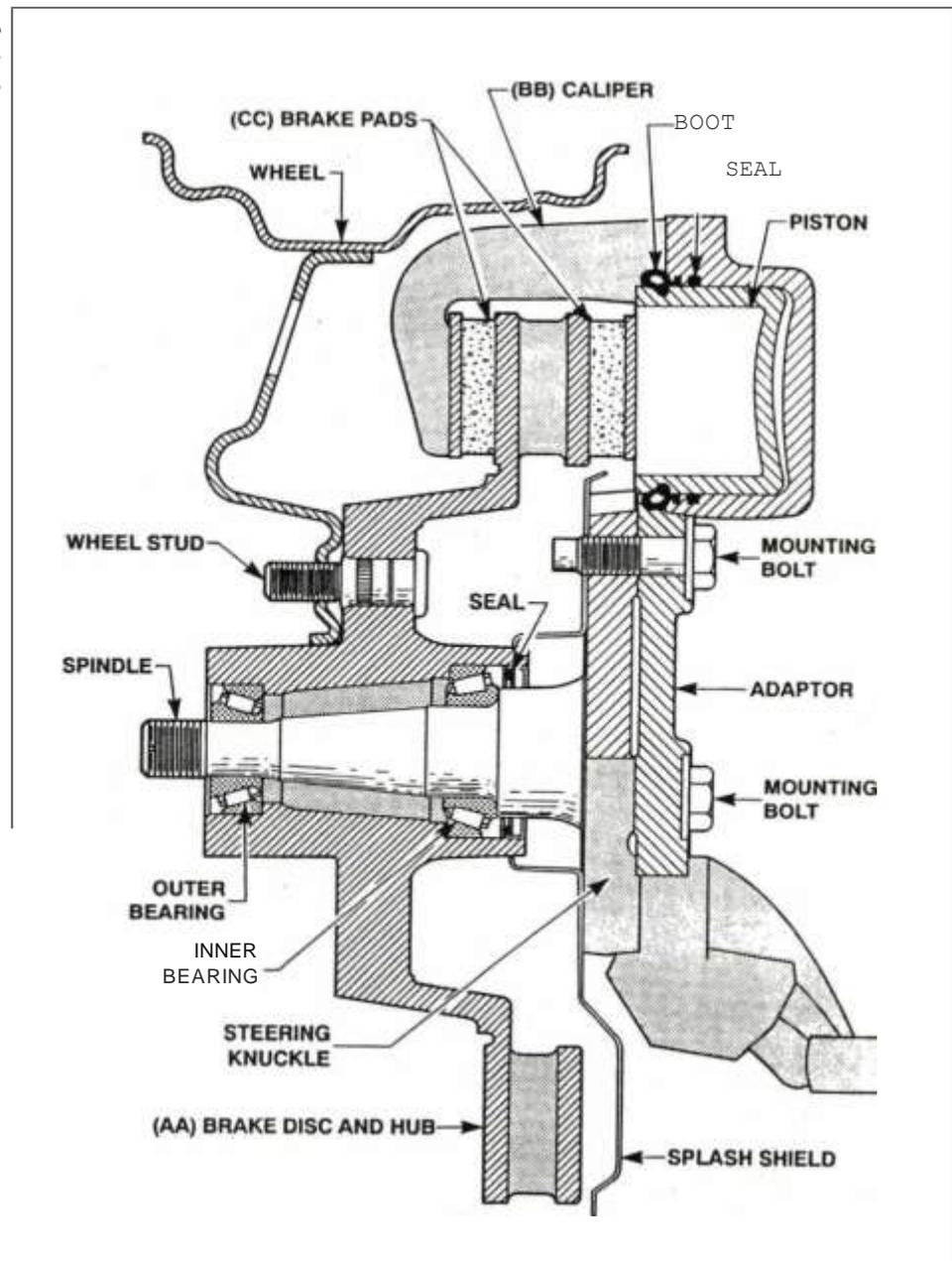
5-cam (W), slack adjuster (Y), brake chamber (Z).

If the truck is equipped with disc brakes (see figure 4-3), then it will have a DISC (AA) instead of the drum we discussed before. Instead of shoes, it will have a CALIPER (BB) with BRAKE PADS (CC) inside of it.

Now, let's go to the FRONT BUMPER (1) (see figure 4-4). Sometimes there is a foot hole on the front bumper. This is for drivers to put their toes into when climbing upon the front of the truck. There might also be FOG LIGHTS (2) set back in the front bumper, and there might be a place to attach a pulling chain or cable. This, by the way, is the only place a pulling chain should be attached.

Above the center of the bumper is the GRILL (3). Some trucks have SHUTTERS in the grill that look like Venetian blinds. The shutters open and close to help control the water temperature. TURN SIGNALS (4) are placed on each side of the cab. The turn signals are sometimes double-faced lights.

Figure 4-3. The Disc Brake is composed of brake disc (AA), caliper (BB), brake pads (CC).



On a CABOVER (COE), meaning the truck cab is overtop of the engine compartment (shown in figure 4-8), there will probably be a door or sometimes two doors. This allows for the oil and water to be checked without raising the cab. Yes, the cab can be jacked up; or sometimes the cab is spring-loaded. A spring-loaded cab can be raised by releasing the lock and lifting it by hand. Some conventionals will also have an inspection door on the hood to check the oil through.

Overtop of the grill is the GLASS WINDSHIELD. Laying against the windshield are the WIPER BLADES (5), which are connected to the WIPER ARMS (6).

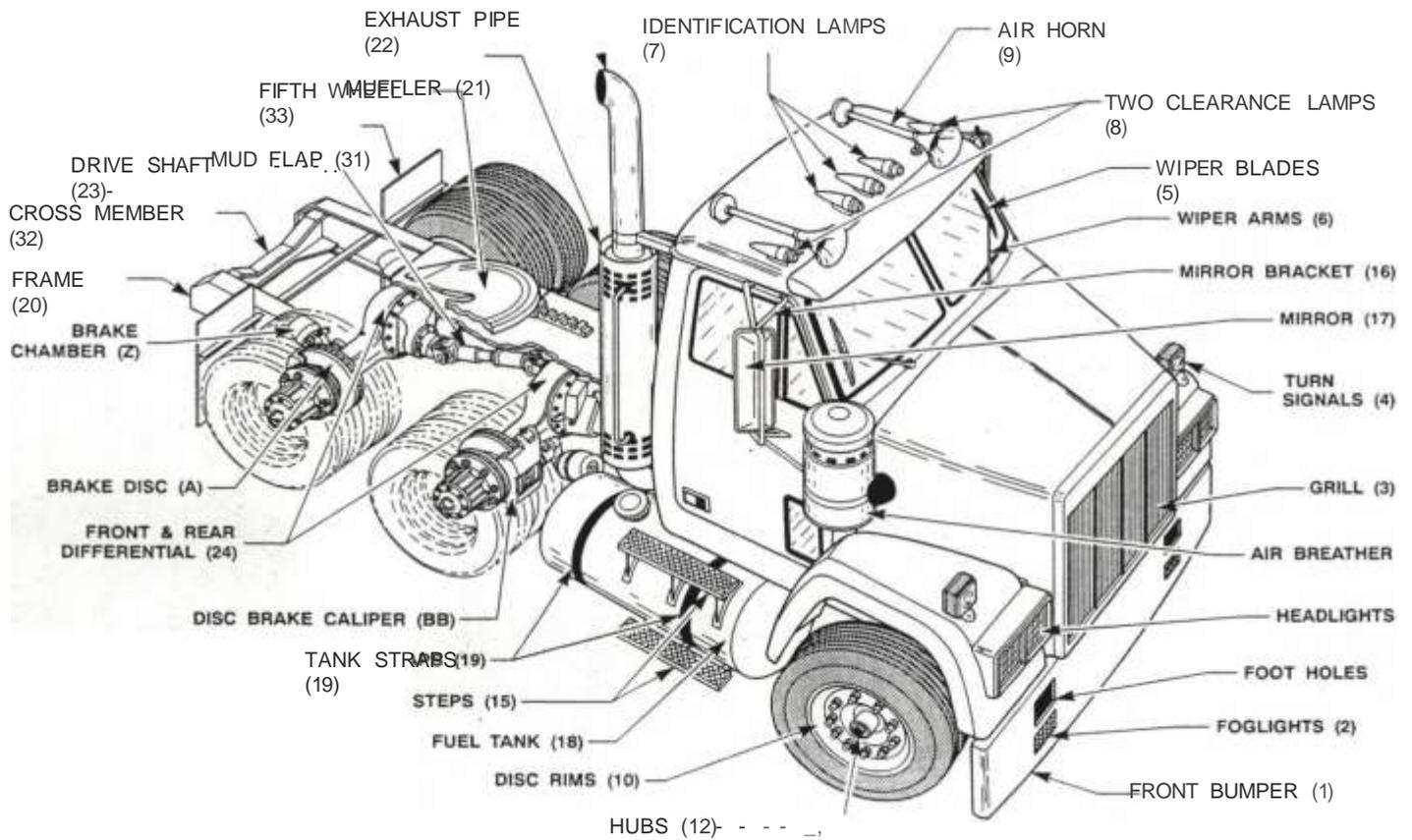


Figure 4-4. As you walk around the tractor, some of the parts you will see are: front bumper (1), fog lights (2), grill (3), turn signals (4), wiper blades (5), wiper arms (6), identification lamps (7), clearance lamps (8), air horn (9), disc rims (10), hub (12), steps (15), mirror brackets (16), mirror (17), fuel tank (18), fuel tank straps (19), frame (20), muffler surrounded by heat shield (21), exhaust pipe (22), drive shaft (23), front and rear differential (24), disc brake caliper (88), brake disc (A), brake chamber (Z), cross member (32), and fifth wheel (33).

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At the top of the cab, three IDENTIFICATION LAMPS (7) are placed in the center. Also, at the top, there is one lamp on each side of the cab. These lamps are called CLEARANCE LAMPS (8). Generally, there will be a chrome AIR HORN (9) somewhere up there. The air horn could be behind the air deflector, a shield that deflects the air up, over, and around the trailer.

As we walk on around the front of the tractor to the passenger side, we see that the rubber tire is mounted on one of two types of wheels. There is the DISC WHEEL (10) and the CAST SPOKE WHEEL (11) (see figure 4-5). Some trucks will have DISC WHEELS on the front and SPOKE WHEELS on the back. The rim is bolted to the HUB (12) with big nuts. On the spoke wheels there will be WEDGES (13) under the nuts. These wedges hold the rim securely in place. In the center of the hub is a plastic window that allows you to see the oil level in the HUB-OILER (14). In the center of the window is a rubber plug that can be pried out to put in more oil. The oiler is not supposed to be filled full of oil. There is a line on the window showing how high the oil level should be.

On a COE (cab over engine; figure 4-8), right behind and above the tire is a series of steps for climbing into the cab. The DOOR HANDLE is mounted on the bottom of the door so that the DOOR can be opened without climbing up on

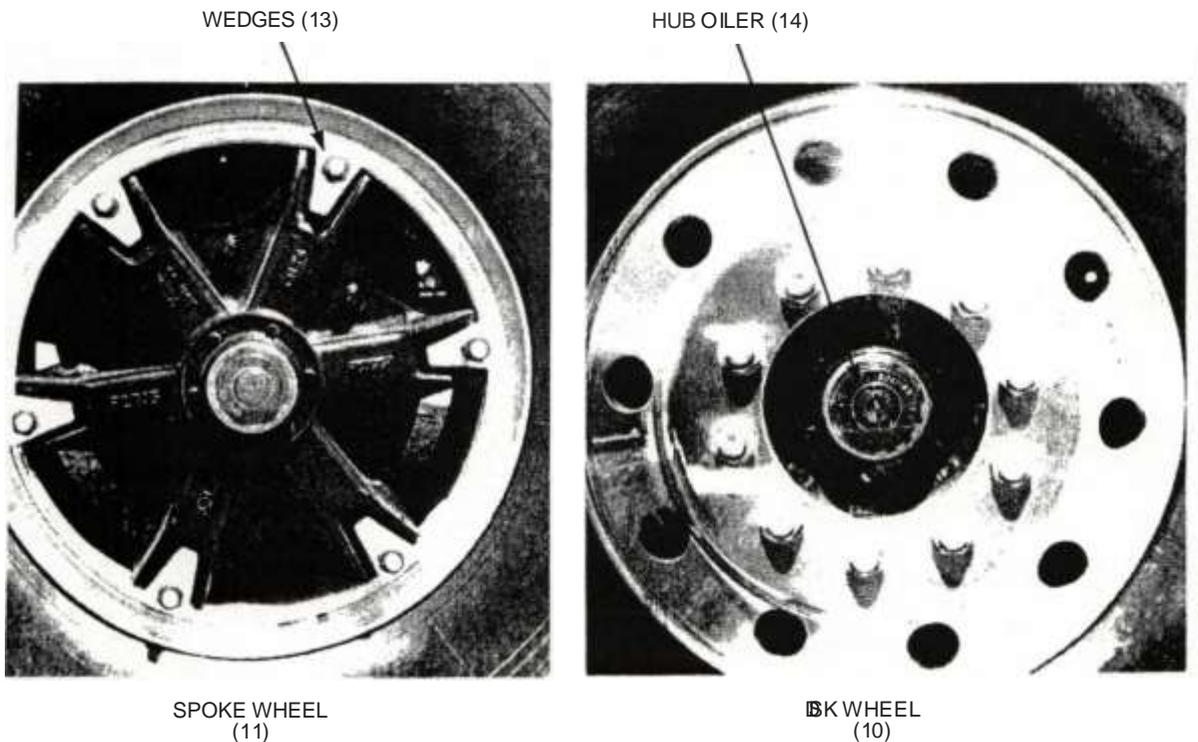


Figure 4-5. The Disc Wheels and Spoke Wheels are two different types of wheels that are used extensively. Note the spoke wheel (11) is securely fastened with nuts and wedges (13). The disc wheel (10) is fastened with and/or studs. Also, notice the hub oiler (14) in the center of the hub.

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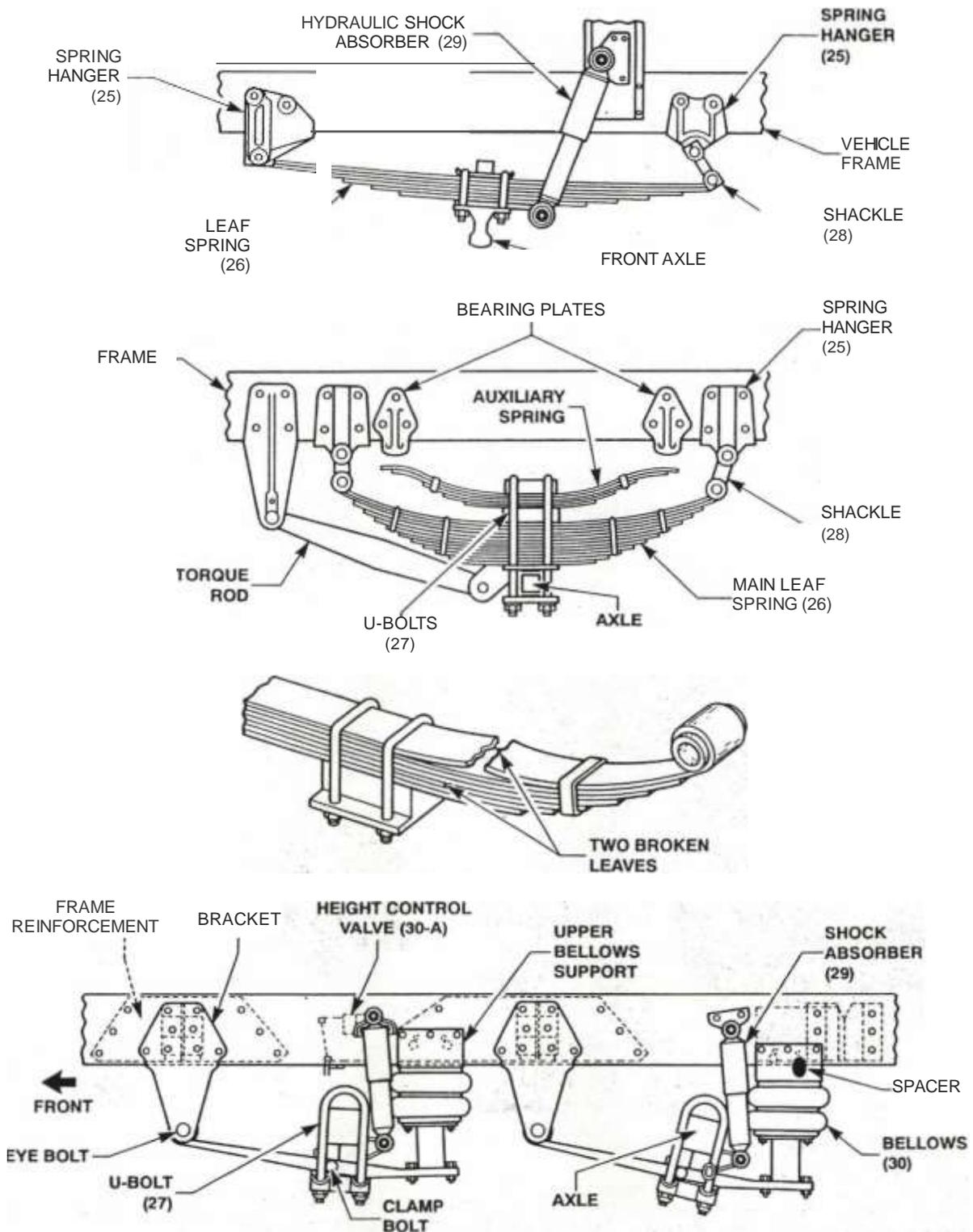


Figure 4-6. The Suspension System Is composed of spring hangers (25), main leaf spring (26), U-bolts (27), shackle (28), hydraulic shock absorber (29), and on-air suspension bellows (30) and height control valve (30-S).

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the STEPS (15). A MIRROR BRACKET (16) is attached to the top of the door above the WINDOW. The bracket curves down and is attached again under the window. On the mirror bracket is the MIRROR (17). Sometimes there is more than one mirror.

Behind the cab is a FUEL TANK (18). The fuel tank has at least two FUEL TANK STRAPS (19) circling it to hold it to the FUEL TANK BRACKETS. The brackets are fastened to the VEHICLE FRAME (20). Across from where we stand at the side of the truck, there is another fuel tank. A CROSSOVER LINE crosses under the tractor and connects the two fuel tanks. This allows fuel to flow from one tank to the other tank. Each tank should have about the same amount of fuel in them. Also attached to the frame rail, is a bracket holding the MUFFLER (21) and EXHAUST PIPE (22). The muffler and exhaust pipe extend straight up behind the cab. Stretching across the frame rails is a BATTERY BOX. Sometimes the battery box is hanging in front of one of the fuel tanks on the side of the truck. Hanging on the back of the cab and stretching back to the trailer, if the trailer is attached, are three lines. One line is an ELECTRIC CORD, with a PLUG on the end of it. The other two lines are AIR LINES with GLAD HANDS attached to the ends.

Glad hands are special connecting devices enabling drivers to connect the air lines to the trailers. They are also designed to pull loose from the trailer without breaking the air lines. This sometimes saves a repair bill if the driver forgets to unfasten them from the trailer after unhooking and driving away.

The rear axle or DRIVE AXLE is sometimes connected to another drive axle by a DRIVE SHAFT (23). This system is called a TWIN SCREW or TANDEM DRIVE AXLE because both axles have power going to them. Sometimes the back axle is called a DEAD AXLE because there is not a DIFFERENTIAL (24) on it or a drive shaft connected to it from the front drive axle.

Attached to the frame rail behind the fuel tank is a SPRING HANGER (25) (see figure 4-6). Connected to the spring hanger is the LEAF SPRING (26). The leaf spring extends to the axle which has U-BOLTS (27) connecting the two together. The leaf spring extends on past the axle to the SHACKLE (28). The shackle is right under and is attached to the back spring hanger. Sometimes there is a HYDRAULIC SHOCK ABSORBER (29) connected to the axle and frame rail.

Some trucks will have AIR SUSPENSION. The air suspension is set up much the same way as leaf springs, however, the weight is carried by air in BELLOWS (30) instead of on leaf springs. There is also an AIR CONTROL VALVE that keeps the truck the same height at all times.

As we walk behind the tractor, we should have MUD FLAPS (31) behind the wheels. Stretched between the frame rails on the back is a CROSS MEMBER (32) connecting the two frame rails together. There are several similar cross

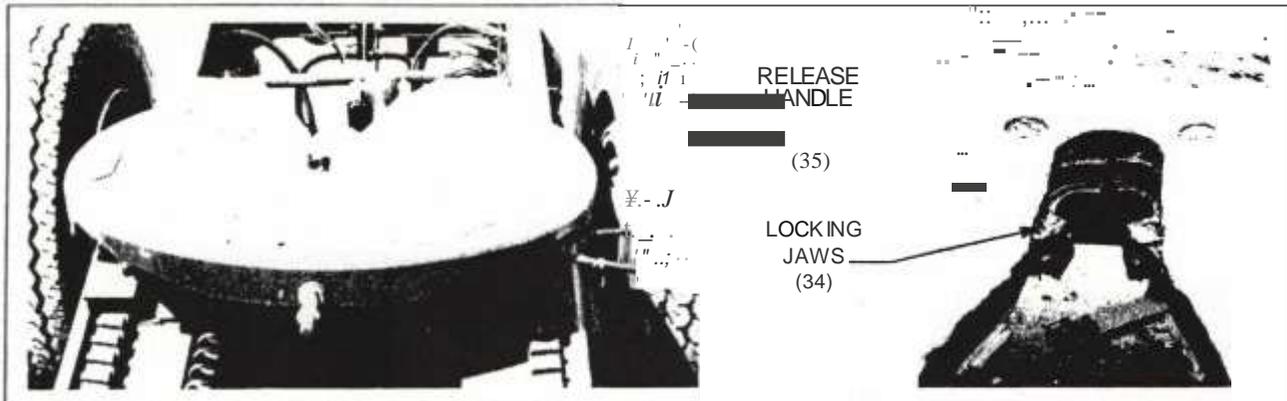


Figure 4-7. The Fifth Wheel may be either a fixed fifth wheel or a sliding fifth wheel. Notice the locking jaws (34) and the release handle (35). Remember on the sliding fifth wheel, there may be two release handles: one to slide the fifth wheel and the other to release the locking jaws.

members extending from the back of the tractor to the front of it. From this back position, we should be able to see two REFLECTORS on the back of the cab. Also on the back part of the frame, there should be a set of TAIL LAMPS and a set of STOP LAMPS.

On top of the frame over the axles is a FIFTH WHEEL (33) that holds the trailer to the tractor. Sometimes it is a SLIDING FIFTH WHEEL and sometimes it is fixed solid (see figure 4-7). In the middle of the fifth wheel there are LOCKING JAWS (34) that snap shut around the KING PIN of the trailer.

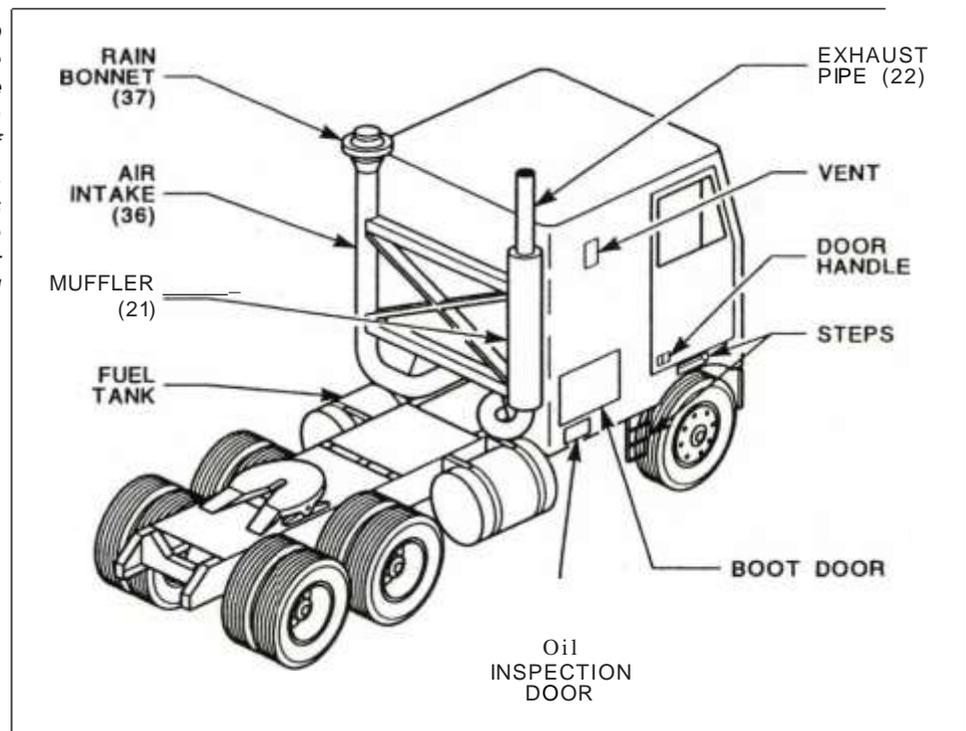
On the side of the fifth wheel there extends what is called the KING PIN RELEASE HANDLE (35). The king pin release handle allows a driver to unhook a tractor from a trailer. Sometimes right underneath this handle is another handle that releases the sliding fifth wheel, allowing it to move forward or backward. It would be wise to learn the difference between these two handles. A driver who plans to unhook a trailer and releases the sliding fifth wheel by mistake could possibly cause the fifth wheel to be jerked right off of the tractor.

In front of the fifth wheel, immediately behind the cab, you can observe a pipe extending up above the cab (see figure 4-8). At first you might think this AIR INTAKE (36) is the exhaust pipe. Unlike an exhaust pipe, the air intake is topped with a RAIN BONNET (37) to keep the weather out. On the bottom of the pipe will be a big canister holding the AIR FILTER element. This cleans the air before it is drawn into the engine.

In the Cab

Remember, safety first. If you do not have someone with you who knows how to operate THIS truck, do not push, pull or move any lever, knob, button or ANYTHING. Remember also that there are some people who think they know all about trucks. Just because they read the book doesn't mean they know how

Figure 4-8. Behind the cab there may be two or more pipes sticking up. One may be the air intake (36) or snorkle tube. On top of the air intake should be a rain bonnet (37) that helps keep water out. Some trucks will have one or two mufflers (21) and exhaust pipes (22).



to start and drive the truck. Just because they drove a friend's truck once doesn't mean they can operate this one. Make sure it is okay to be in that truck.

As we open the door to climb up into the cab, remember the safety precautions. Watch that the door doesn't get out of control, and use the three-point stance as you climb into the cab.

If you have never been in the cab of a truck before, you will probably be amazed when you climb into a "cab over". First, you will notice the large amount of open space, then how far it is to the other side of the cab. Also impressive is the size of the large steering wheel and the large number of instruments and gauges.

The first thing we always should do after climbing into the cab is check the EMERGENCY BRAKE SYSTEM (see figure 4-9). On the center of the dash to the right of the steering wheel, there will be two or sometimes three plastic knobs. Two of the knobs are GENERALLY red and yellow; the third one is generally blue. It is common to find all red knobs or all yellow knobs, depending on what was available when one or more of the knobs needed to be replaced. These knobs ALL need to be pulled out to set up the emergency brake system. Now is the time to check them.

The red eight-cornered knob, is called the TRACTOR PROTECTION VALVE (38). When it is pulled out, shuts off the air going to the trailer. When the red knob is pushed in, it allows air pressure to go to the trailer. The yellow diamond-shaped knob, is called the PARKING BRAKE (39). When it is pulled out, shuts off air going to the spring-loaded parking brake. Shutting off the air releases the spring, causing it



Figure 4-9. The Emergency Brake System controls are on the dash of the truck. The tractor protection valve (38) should be eight-cornered and colored red. The parking brake valve (39) should be diamond-shaped and colored yellow. The emergency release valve (40) should be round and colored blue. The important thing to always remember is when parked, they should all be pulled out. (Some very old trucks work in reverse.)

Courtesy of Columbus Kenworth, Columbus, Ohio

to spring out and set up the parking brake. When the yellow knob is pushed in, it allows air pressure to push the spring back. When the spring is pushed back, the parking brake is released.

We will explain the function of the blue knob EMERGENCY RELEASE VALVE (40) when we study the BRAKE SYSTEM. For now, just remember to remain parked. PULL ALL THE KNOBS OUT. To release the emergency brake system, push the knobs back in.

After making sure the emergency brake system is set, we must make sure the truck is out of gear. Push in on the CLUTCH PEDAL. It is on the floor on the left side. Now, put your right hand on the GEAR SHIFT LEVER. The gear shift is the stick just to the right of your seat. Move it from side to side to see if it has a lot of free travel, which would indicate it is out of gear. If there is not a lot of free travel, try pushing the lever forward or backward into the neutral position. We should now be safe to relax and study the different gauges, knobs and levers.

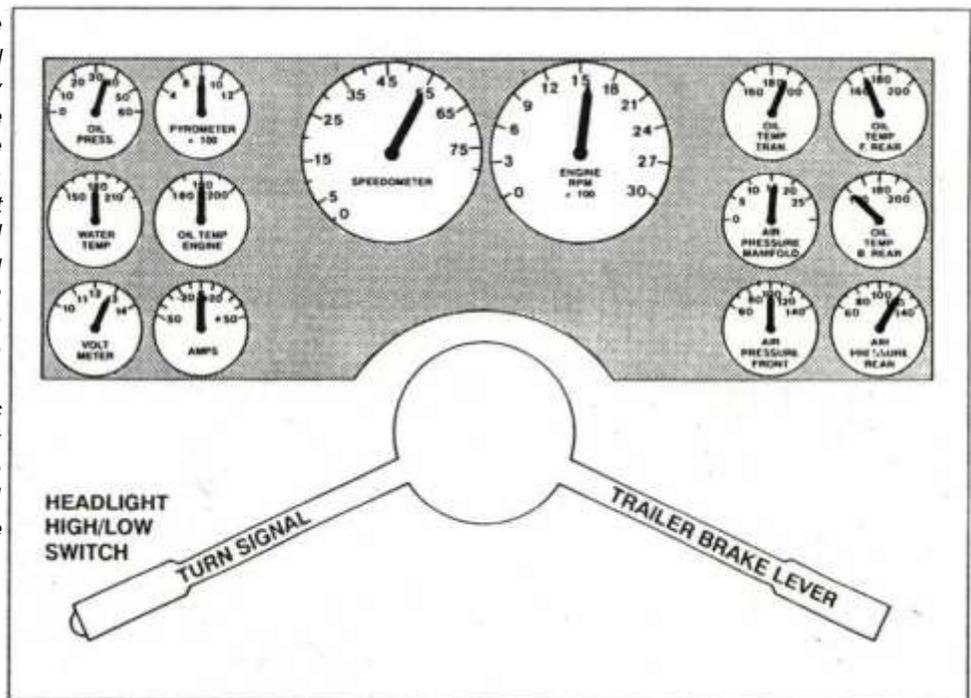
Some trucks will have a full INSTRUMENT PANEL (see figure 4-10), or set of gauges. Others might have only the bare necessities. Among the basic gauges is a SPEEDOMETER, which shows at what ground speed the truck is moving; a TACHOMETER, which shows the engine revolutions per minute (RPM); and an AIR PRESSURE GAUGE, which shows the air pressure stored in the air tanks. Most trucks will have at least two air gauges showing the air in each tank. Also among the gauges is the WATER TEMPERATURE, which shows the temperature of the water in the engine; the VOLT METER, which shows how many volts are stored in the battery; the AMPERE METER,

which shows how many amps are going into or being taken out of the battery; and the OIL PRESSURE, which shows how much oil pressure the engine lubrication pump is producing. Be forewarned, however, it does not show how much oil is in the engine.

Some trucks will also have some of the following gauges: the APPLIED AIR PRESSURE, which will show how much pressure is being delivered to the brakes as the brake is applied; the OIL TEMPERATURE, which shows the temperature of the oil in the motor, the transmissions, or the rear drive axles; the PYROMETER, which shows the exhaust temperature; another AIR PRESSURE GAUGE, which shows the amount of air pressure the turbo unit is delivering to the intake manifold; the VACUUM GAUGE, which shows the vacuum created in the intake pipe between the turbo and the air breather; and the FUEL PRESSURE GAUGE, which shows the pressure the fuel pump is producing. Once in a while, you will run across instrument panels that include even more specialty gauges than have been described here.

In addition to learning about the various gauges, we also need to understand the meaning of certain warning lights and buzzers. The first and one of the most important is the LOW AIR WARNING LIGHT and/or BUZZER. It comes on before the air pressure drops to 60 pounds per square inch (psf). There might also be a LOW WATER WARNING LIGHT, a LOW OIL PRESSURE LIGHT and a HIGH WATER TEMPERATURE LIGHT. On tandem drives, there will be a light showing when the tandems are locked together.

Figure 4-10. This is the way an Instrument panel may look as you are driving down the road. The steering wheel is removed to see better. It is important to know what each gauge is for and what the normal reading is for that gauge. The reading on the gauges can vary depending on the truck, weather, grade, load and many other factors: Some instrument panels will have more gauges than this one and some will have only the bare necessities.



Now, we need to find out about the knobs and switches that activate the various systems. The air horn is usually activated by a chain or small cable located over the driver's head to the left. The ELECTRIC HORN BUTTON is usually located on the dash. The WINDSHIELD WIPER CONTROLS and the WINDSHIELD WASHER are sometimes located on a lever to the right of the steering column or on the dash. Sometimes the windshield washer is activated by pushing on a rubber bulb mounted on the floor.

Back on the right side of the steering column is the TRAILER BRAKE LEVER. Pulled down toward your lap, this lever sets up the trailer brakes only. The HEADLIGHT SWITCH and CLEARANCE LIGHT SWITCH generally can be found on the dash. Sometimes these lights are activated by two separate toggle or rocker type switches, and sometimes one pull out, toggle, or rocker type switch operates both sets of lights. The HIGH-LOW SWITCH (41) for the headlights is sometimes located on the TURN SIGNAL LEVER (42). Sometimes the headlights are switched with a button on the end of the turn signal, and sometimes the beams are changed from high to low by lifting up on the turn signal lever.

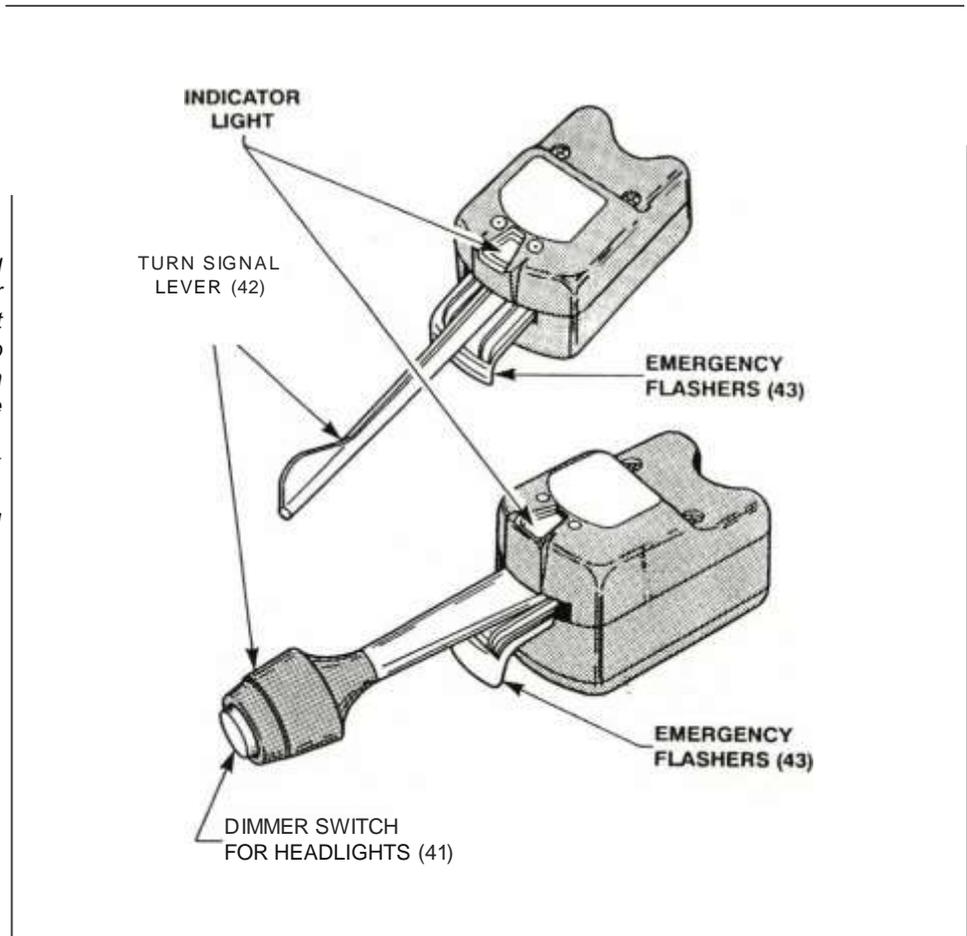
The turn signals on the left of the steering column are operated by moving the lever up for right and down for left turn (see figure 4-11). The EMERGENCY FLASHERS (43) are just under this lever. You turn on the emergency flashers by hooking your fingers under the lip of this device and moving it out toward the end of the turn signal lever until it clicks. Sometimes it takes considerable force to get it all the way out into the locked position.

The HEATER and DEFROSTER CONTROLS are usually on the dash. Sometimes there is a fan mounted on the dash or overhead to help keep the windows clear. On the TWIN SCREW or TANDEM DRIVE truck, there will be a switch to lock the tandems together. The STARTER SWITCH is sometimes combined with the KEY. Some trucks have separate push-button starters. A few have two push-button starters that have to be pushed at the same time, or the starter will not work. Some trucks will have other specialty switches and levers besides what we've mentioned.

The driver should also know what is on the floor and where it is located. You have already used the clutch pedal in checking to see if the truck was in gear. To the right of the clutch pedal is the BRAKE PEDAL. It might look like the FOOT THROTTLE that is just to the right of it. Some trucks will have the dimmer switch on the floor to the left of the clutch pedal. There might be a rubber ball beside and in front of the dimmer switch that, when mashed down, causes water to squirt on the windshield.

If this seems like a lot to learn, remember that you are familiar with many of the areas mentioned from driving a car. It is important to know where the gauges, pedals and switches are, so you can read them without taking your eyes off the road. Do remember; however, that the gauges should be glanced at from time to time as you drive to make sure everything is working properly.

Figure 4-11. The top unit is the standard turn signal that has been used for many years on trucks. The bottom unit operates the same except for the headlight dimmer switch (41) located on the end of the lever. Pull the turn signal lever (42) toward your lap to turn on the left blinkers and raise up toward the dash to turn on the right blinkers. The emergency flasher device (43) is activated by hooking your fingers under the downturned lip and pulling it out toward the end of the turn signal lever.



The Trailer

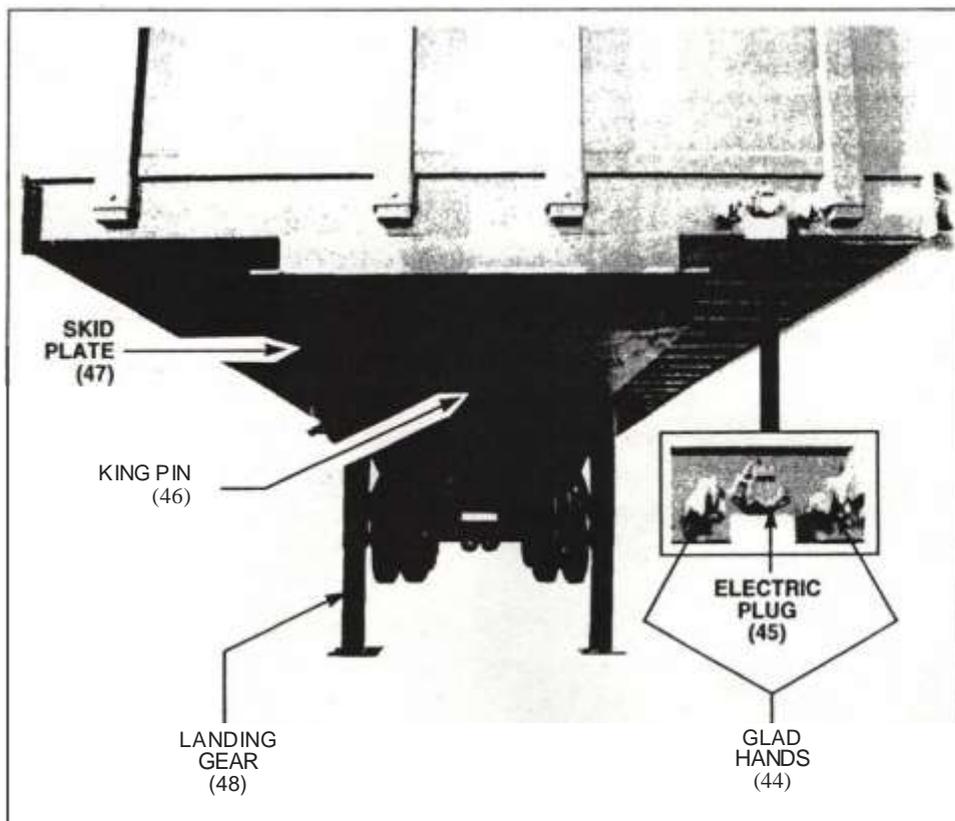
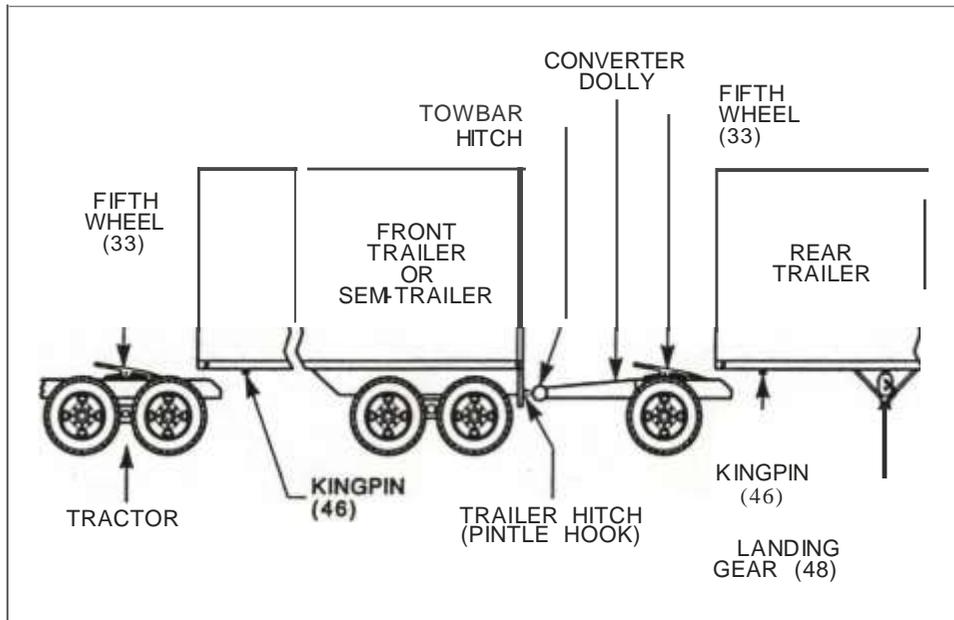
Let's understand the difference between a TRAILER (see figure 4-12) and a SEMI TRAILER. The trailer becomes a semitrailer when part of the weight is carried upon the power source. If the trailer is pulled behind the tractor and connected only by a drawbar, it is called a trailer. If the unit is sitting out in the field, it is a trailer. Not until it is hooked to the tractor's fifth wheel is it called a semitrailer.

Let's look at the trailer sitting unhitched (see figure 4-13). On the front of the trailer we can see two GLADHANDS (44) sticking out. The air lines from the tractor connect to them. In between the glad hands is the ELECTRIC SOCKET (45) for the electric line's plug.

Under the center front of the trailer, about three feet back, is the KING PIN (46). The king pin is what the LOCKING JAWS in the fifth wheel lock around. A heavy metal plate going around the king pin and extending to the front of the trailer is called the SKID PLATE (47). The skid plate slides upon the fifth wheel when the tractor is backed under the trailer.

Vehicle Definitions and Safety

The LANDING GEAR (48) is what holds the front of the trailer up so it can be uncoupled from the tractor. There is a fold-up HAND CRANK to crank the landing gear up or down. There are two speeds to this crank. By pushing in on the crank's shaft or pulling it back out, the speed is changed from high to low.



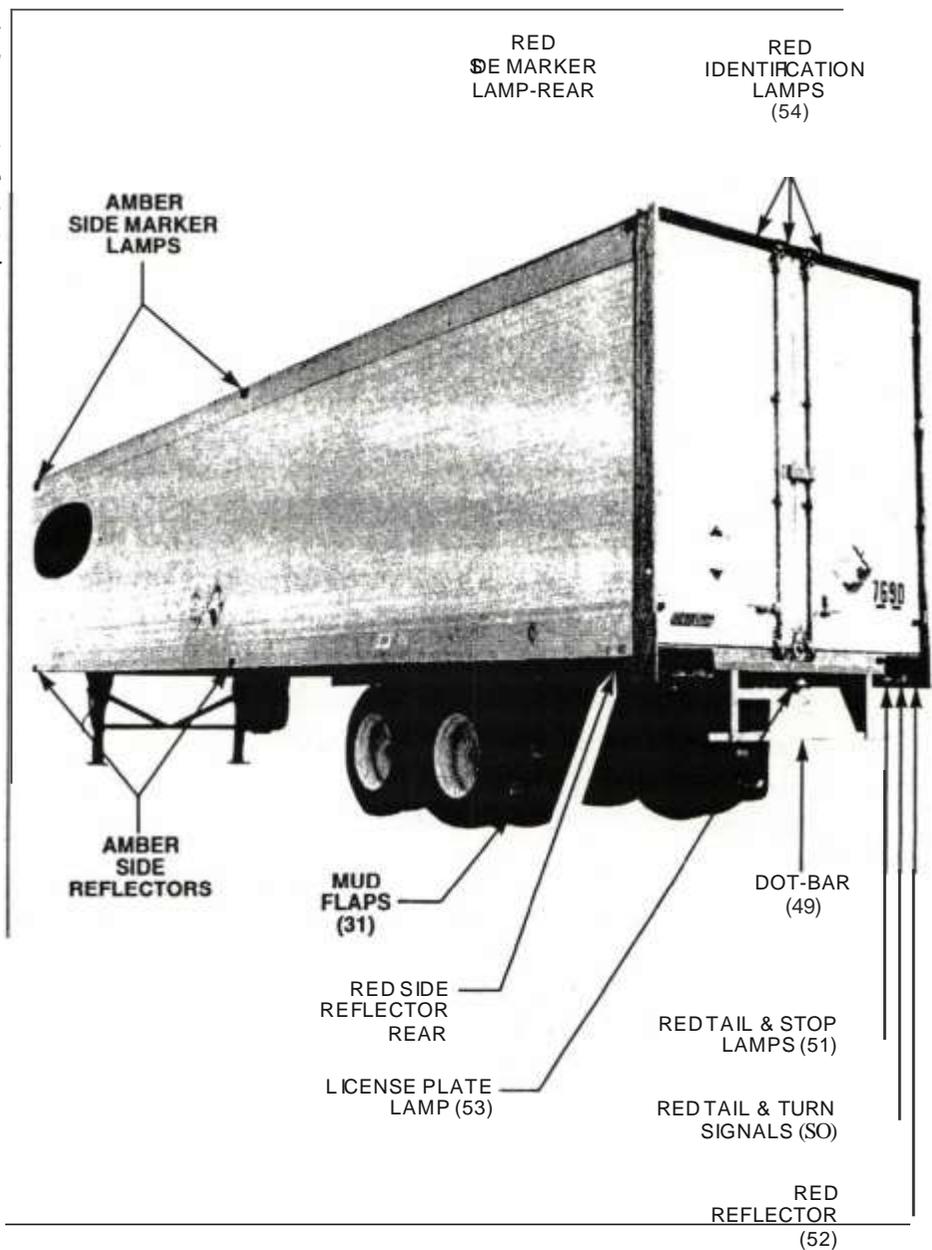
Toward the back are the REAR AXLES. The suspension and brakes on the rear axles are very much as we described them on the tractor. These axles might be sliding axles that can be moved forward or backward to make the axle weight legal. Always check that the locking pins are locked in on the SLIDERS, or you could lose both axles while driving down the road.

On the back of the trailer there should be mud flaps behind the tires (see figure 4-14). There should also be a DOT BUMPER (49) across the bottom to keep small vehicles from sliding up under the trailer in a rear-end collision.

Figure 4-14. Severs/Items on the trailer that you should be familiar with are the mud flaps (31), dot-bar (49), turn signals (50), stop lamps (51), reflectors (52), license plate lamp (53), Identification lamps (54), and marker lamps (55).

Courtesy of Great Dane Trailers, Columbus, Ohio

(Red side marker lamp-rear must be located near the bottom of trailers manufactured after March 1, 1979.)



From the back, you should see two TURN SIGNALS (50), two STOP LAMPS (51), two TAIL LAMPS, two REFLECTORS (52) and one LICENSE PLATE LAMP (53). Also, there should be three IDENTIFICATION LAMPS (54) in the center of the back, either at the bottom or at the top.

On the side of the trailer there should be warning lights and reflectors also. These will vary depending on the type of trailer and the length of the trailer.

On the front of the trailer there should be two CLEARANCE LAMPS, one on each corner facing the front.

Remember to check your FMCSR and local authorities for full compliance

Starting the Engine

Before starting any engine, there should always be precautions taken. Remember, block the tires so that the truck cannot roll. Walk all the way around the unit, checking on other vehicles, any personnel or students, and looking for any markers relating to the unit. Be especially careful to see that there is no mechanic working under the truck.

Check to see if the truck has sufficient oil, water and fuel. Do not assume it is okay, check it yourself. If it needs oil, be sure what kind of oil you are to put in it. If you put the wrong oil in, your mistake could cause several thousand dollars in damages.

Some radiators have windows so you can see that there is sufficient water in the system. However, sometimes you have to remove the radiator cap to check the water level. **DO NOT REMOVE A HOT RADIATOR CAP.** If the cap is hot, there is enough pressure in the system to spray hot fluid on anyone who loosens the cap. After you have checked to see that the radiator cap is cool, remove the cap carefully. The opening is about the right height to spray fluid out in your face! After removing the cap, you should be able to reach in and touch the water with your finger. As with the oil, be sure you are putting the right kind of fluid in the radiator. Most companies have a special mixture for the radiators in their trucks.

Do not look at the fuel gauge to see how much fuel is in the tank. Take the fuel cap off and look into the fuel tank on both sides of the truck. Both tanks should have about the same amount of fuel in them. If one tank is full and the other is only half full, it should be checked out by a mechanic. After checking the truck out completely, then we can get in the cab.

Remember, after getting in the cab, first check to see that the brake is set up. Then, make sure the transmission is out of gear. Next, look over the controls and gauges. Some engines have a manual pull knob that shuts off the fuel. Push this knob in or the truck will not start.

Now, you are ready to think about starting the engine. Put your finger on the oil pressure gauge; this will draw your attention to the fact that we must have oil pressure within seven seconds after the engine starts. Now, push the clutch in and hold it in while you are starting the engine. Yes, the tractor is supposed to be out of gear; but sometimes, when you least expect it, the transmission will still be in gear. Count on it, and build a safe habit to keep someone from possible injury.

Turn on the key and engage the starter. If the ELECTRIC STARTER does not start the engine within 30 seconds, stop the starter. Let it cool off for 3 minutes before trying again. Under normal conditions, an engine should start in less than 30 seconds.

If the truck is equipped with an air starter, the strategy is different. Once you engage the starter motor, keep it engaged until the engine starts, or the starter runs out of sufficient air pressure to turn it over. As soon as the engine starts, quickly let off the starter switch and watch the oil pressure. If the oil pressure does not come up in 7 seconds, shut the engine off and find out why. With the engine running and the oil pressure up, let the clutch out **SLOWLY**. Remember that the truck might be in gear. Now, watch your gauges, and pay close attention to anything that seems unusual.

Your Part

As a Professional Driver, it is your duty to act and talk like you know what you are doing. It is your duty to keep up on the various laws and changes that will take place throughout your career. In this chapter, we have covered a lot of parts by name. It is important for you to know about these parts for several reasons.

For one thing, you will want to know what others are talking about when they are discussing improvements on the equipment or problems with the equipment. Much can be learned by listening to others talk, but only if you understand their language. For another, you don't want to find yourself describing an intricate part of your engine to the mechanic and groping for words like "thingamajig" or "doodad".

Read and become familiar with the Federal Motor Carriers Safety Regulations (hereafter referred to as the FMCSR), Section 393, *Parts and Accessories Necessary for Safe Operation*. There is much you need to know in Section 393 that has not been covered in this chapter. In later chapters, we will go into more detail as we explain the different systems.

Some drivers feel it is nonsense to have so many rules relating to truck accessories, but remember, the rules were put there for safety. Vehicles need to be uniform in appearance so that we can recognize what we see on the highways. Consider the following story for example.

Now, you are ready to think about starting the engine. Put your finger on the oil pressure gauge; this will draw your attention to the fact that we must have oil pressure within seven seconds after the engine starts. Now, push the clutch in and hold it in while you are starting the engine. Yes, the tractor is supposed to be out of gear; but sometimes, when you least expect it, the transmission will still be in gear. Count on it, and build a safe habit to keep someone from possible injury.

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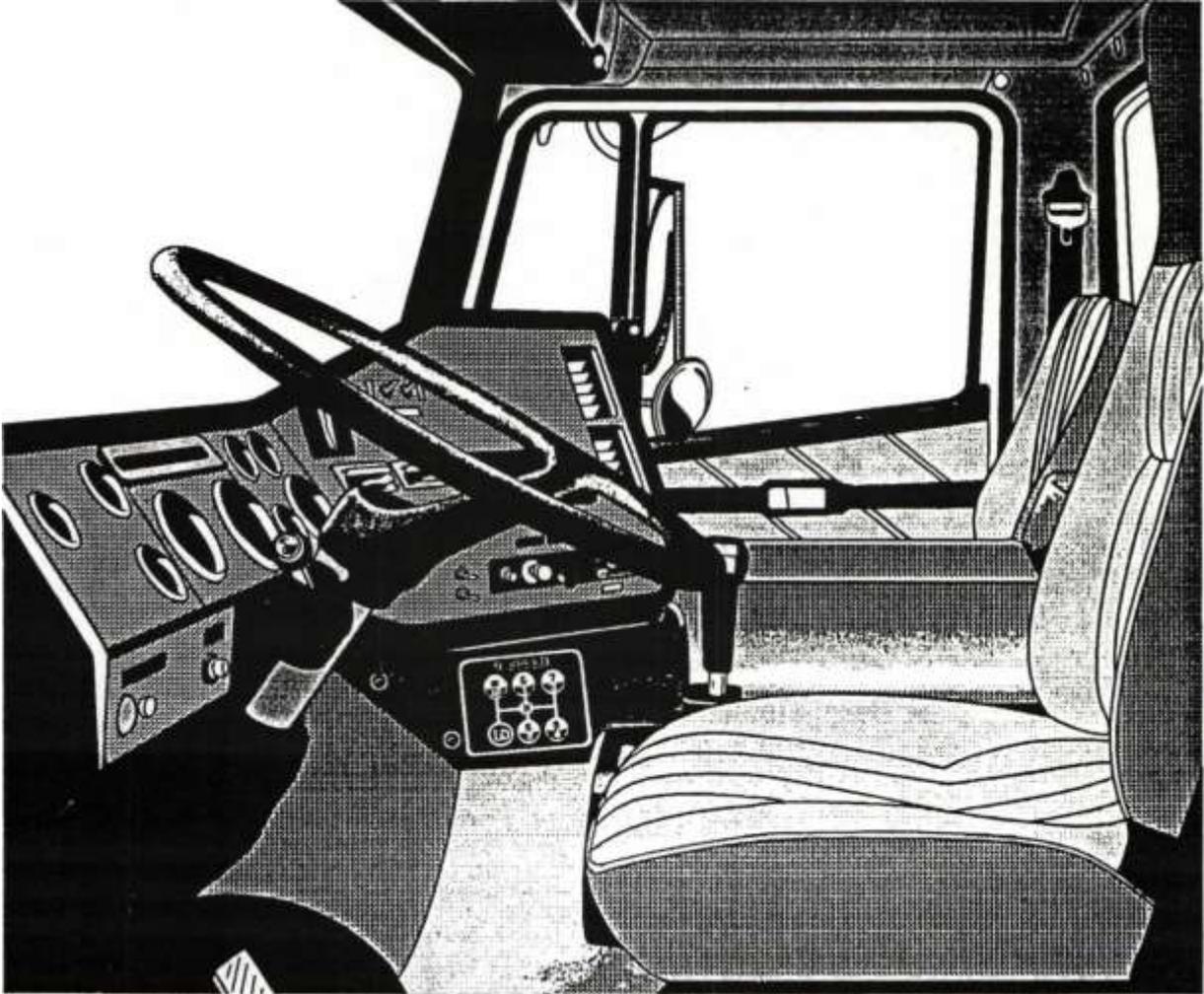
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- _____ 13. The low air warning device should come on before the air pressure drops to 60 PSI.
- _____ 14. Drivers do not need to know where all the controls are because they can find them as they drive down the road.
- _____ 15. In order for a trailer to be called a semitrailer, part of the weight must be carried on the tractor.
- _____ 16. The electric starter should be engaged for not more than three minutes at a time.
- _____ 17. The clutch pedal should always be pushed in before starting the truck.
- _____ 18. If a driver comes upon a confusing situation, it can cause an accident.
- _____ 19. While starting a truck, the driver should watch the oil pressure gauge to make sure the pressure comes up.
- _____ 20. Before starting any engine, there should always be precautions taken, such as checking the oil, water and fuel.

PUTTING THE TRUCK IN MOTION



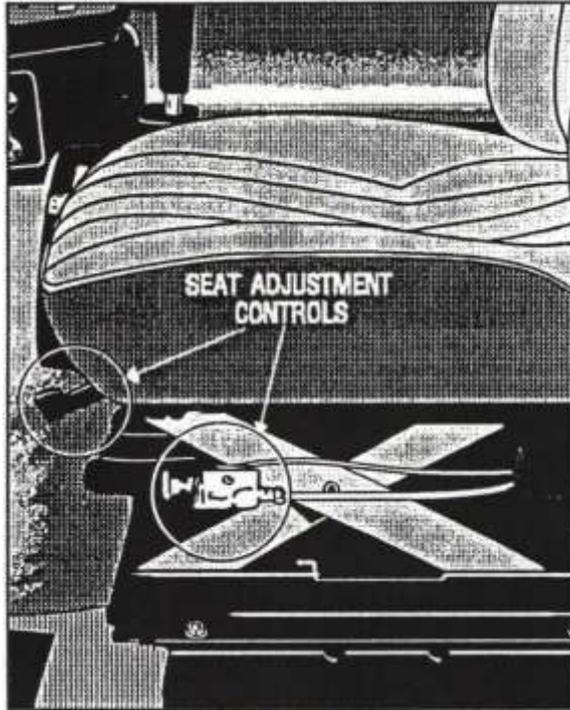
GET TO KNOW YOUR EQUIPMENT

The first time you start a tractor engine, you might be nervous . You know there are many types of tractors and dashboards. So take the time to put yourself at ease and get to know a new tractor before you start it.

Look the tractor over before you climb in. A professional driver never starts the engine without first performing the inspections⁶

Before you climb in, look at the handhold and the steps to make sure they are free of dirt and grease. Then use the three-point stance to enter the cab. This means you 'll be using the steps and the handhold and either both hands and one foot or both feet and one hand to enter the cab.

fig. 17-1
Adjust your seat for comfort, but also make sure you have clear vision and your hands and feet can reach all the controls.



Pull yourself in behind the wheel. Many driver's seats have weight and height controls and suspension systems that allow for a smooth ride even on bumpy roads. If you are too high or too low, look for the seat adjuster.

Find the ignition switch and put the tractor key in the switch, but don't turn it on. Look at the pedals at your feet. The pedal on the left side is the clutch pedal, the other is the air brake pedal. The fuel pedal is to the far right.

Find the parking brake and be sure it's set. Look at the transmission shift lever to see what type it is. Look for the shifting pattern. It will be posted in the cab. We'll show you different shift patterns later in this chapter.

Grab the gear shift lever, depress the clutch and place the lever in the neutral position. Let the clutch pedal out, sit back and locate the cab controls and gauges described in Chapter 3.

OBSERVATION SKILLS TEST

Did you familiarize yourself with the truck that started this chapter? Was it a cabover or conventional? How many speeds did it have? To check your answers, turn to the Observation Skills Test Grid at the back of the book.

STARTING

Now you're ready to start the engine. You know that a diesel engine burns diesel fuel instead of gasoline. Diesel engines differ from gasoline engines in other ways, too.

To start the gasoline engine, you depress the gas pedal at least once to the floor. When the engine starts, you increase the rpm and keep the engine running by depressing the gas pedal again. You are pumping gas into the engine.

Do not depress the fuel pedal when you start a diesel engine. Do not depress the pedal when the engine starts either. These procedures are unnecessary because the fuel injectors meter diesel fuel into the cylinders in exact amounts.

To start the tractor's diesel engine, depress the clutch pedal to the floor and hold it there. Turn the key if your vehicle has one, or press the starter button. This causes electricity from the batteries to flow to the starter motor. The starter motor turns the flywheel and cranks the engine. The air and fuel ignite in each cylinder in turn, driving down the pistons and turning the crankshaft. As soon as the engine fires, release the key.

The engine is now running. Before you let the clutch out smoothly and slowly, make sure the gear shift lever is in neutral position. If the tractor's transmission is in gear when you let the clutch out, the tractor could lurch forward or backwards. Many accidents are caused by drivers who think the transmission is in neutral when it isn't.

Another reason you depress the clutch when you start a diesel engine is to let the starter turn as fast as it can. The transmission is filled with heavy gear oil that thickens in cold weather. If you don't depress the clutch pedal, the shaft will turn inside the transmission. This creates resistance, or drag, and slows the starter motor. If the starter motor turns the engine too slowly, the engine may not start.

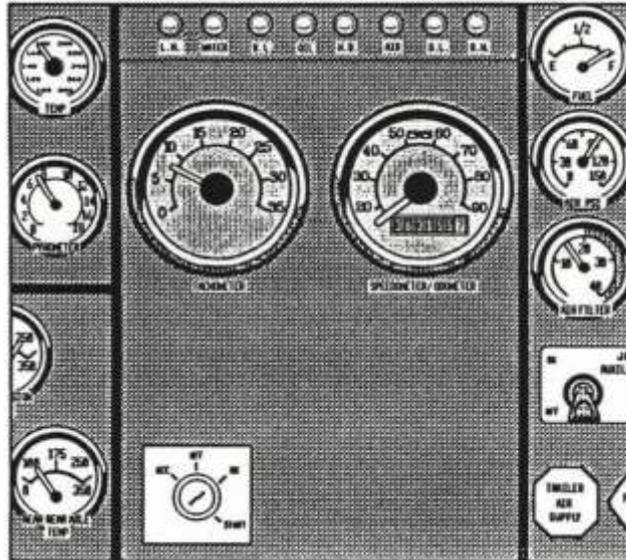
The best rule is to start the engine with the clutch pedal down to the floor. Doing it every time will ensure safety and better starting.

WARM UP

Engines need to warm up because they work best at high temperatures. A diesel engine should warm up to at least 120 degrees Fahrenheit before you engage the clutch and start rolling. The best operating temperature for a diesel engine is about 180 degrees Fahrenheit.

fig. 17-2

This engine is idling at 650 rpm. The air pressure and the operating temperature show this engine is about ready to go.



At high temperatures; the diesel fuel and air mixture ignite best. The lubricating oil in the engine flows best. You can move the truck as soon as the air and oil pressures are up, but do not try to use full engine power until the engine has reached its operating temperature.

SHIFTING

When the engine is running and has reached its operating temperature, it's time to engage the clutch and use the gear shift.

USING IBE CLUTCH

You know that when the clutch pedal is up, the clutch is engaged. When the clutch is engaged, it transmits power from the engine to the transmission. When the clutch pedal is depressed to the floor, it is disengaged. The engine can be running, but no power goes to the transmission. One of the purposes of the clutch is to interrupt the power flow from the engine to the drive wheels so the transmission can be shifted. The truck driver disengages the clutch to shift gears.

Maybe you've seen truck drivers putting their tractors into motion. Some will begin rolling in a steady way, smoother than glass. Others will attract your attention as they jerk forward with engine roaring and extra smoke pouring from the stack. Next you hear a grinding noise that tells you the driver didn't shift properly. That grinding noise is gear teeth being ground together while they are trying to mesh but can't. A tractor won't stand up under this abuse for long.

Putting the Truck in Motion

Proper use of the clutch is all important to shifting . Whether you drive an older tractor with an older model transmission or a brand new tractor with the most advanced transmission made, the clutch must be used with skill.

Chapter 8 covered the purpose of the clutch and in Chapter 4, you see why you should shift at the proper rpm. You can get operator's manuals from the manufacturer for the transmission you are about to use which will tell you what "the proper rpm" is. Or, ask your instructor. Engine rpm is not the same thing as your road speed. Engine rpm is how fast your engine crankshaft is revolving. The tachometer tells you the engine rpm . As you know, the tachometer is labelled in hundrecis of rpm. So if your tach reads 12, that means 1200 rpm. Road speed is measured in mph. Nevertheless, when you shift at the proper rpm , that's often referred to as "matching" your engine rpm to your road speed.

As a driver, you must pay close attention to the tachometer. An engine's rpm is matched to its gears. Now, let's take a close look at how you should use your ciutch.

Double-Clutching

When you 're in gear, the engine flywheel elrd the input shaft revolve at the same speed. When you depress the clutch to change gears, you disengage the engine from the tr a smission .

If you simply press down th e clutch and try to change gears , you will hear loud grinding noises. The input shaft gear and the countershaft gear will be trying to engage while turnin g at very different speeds . The grinding noise you hear tells you you 're ruining the transmission .

Double-clutching lets you speed u p or slow dow n the input shaft while it's in neutral and not engaged to any gear. When you move the shift lever into neutral and let the clutch out, the engine flywheel can tum the input shaft without engaging any gear. When the input shaft reaches the correct rpm, quickly depress the clutch, move into the next gear and release the clutch. That's double-clutching. The gear will engage without damage. You will have shifted smoothly .

Carriers encourage their drivers not to use the downshift procedure as a way to slow their rigs. As you can see, it calls for the driver to accelerate during each downshift procedure. It's more fuel efficient to use the auxiliary brake or the air brakes to slow the rig.

The Clutch Brake

There are also times when the countershaft is stopped while the input shaft is still spinning. Then you need to stop the input shaft to match the countershaft. To do this, you will use the clutch brake. The clutch brake

**TO DOUBLE-CLUTCH WHEN
YOU UPSHIFT:**

- Depress the clutch pedal.
- Move the gear shift lever into neutral.
- Release the clutch pedal.
- Let the engine speed slow down until engine rpm and road speed "match."
- Depress the clutch pedal and quickly move the gear shift lever to the next gear position.
- Release the clutch pedal and press the accelerator at the same time.

**TO DOUBLE-CLUTCH WHEN
YOU DOWNSHIFT:**

- Depress the clutch pedal.
- Move the gear shift lever into neutral.
- Release the clutch pedal.
- Accelerate engine speed until engine rpm and road speed "match."
- Depress the clutch pedal and quickly move the gear shift lever to the next gear position.
- Release the clutch pedal and press the accelerator at the same time.

stops the input shaft from turning. It works only when you push the clutch pedal all the way to the floor.

You 'll need to use the clutch brake in two circumstances. One is when you start the engine and then let it idle to warm up. When your engine idles, the clutch pedal is out, the clutch is engaged in neutral and the input shaft turns. So, to shift into LO gear you have to stop the input shaft.

The other time you'll use the clutch brake is at stop lights. When you have to wait for a long red light, you'll keep your foot on the brake, shift into neutral and let your foot off the clutch. This will increase the life of two things: the clutch and your left leg. If you hold the clutch in for any length of time while the engine is running, you'll wear out the clutch release mechanism. And if you don't know this already, holding down the clutch of a heavy duty tractor for any length of time is no easy task.

SELECTING GEARS AND RANGES

The clutch is not the only device you'll use to change gears. You need to know how to use the shift lever, too. The shift lever is the device that actually moves the gears or the sliding clutch in the transmission while the clutch pedal is depressed.

On top of the shift lever you'll notice there are one or two controls, the range control and possibly a splitter. They may look different or be in

Putting the Truck in Motion

slightly different places on different transmissions but they all perform the same way .

The range control in a transmission provides both a high and a low range of the basic gears. A range control turns a five speed transmission into nine speeds, five low range gears and four high range gears. Most truck transmissions will have a range control. This control lets the main transmission gears do double duty. You use them once in low range and use them over again in high range.

This provides an economical way to provide more gear ratio selections . The more selections you have, the more closely you will be able to match the speed of the engine to the speed needed by the wheels to accelerate, climb grades and cruise down the road . These selections help you to accelerate faster, hold your speed on hills better and keep a higher average rate of speed.

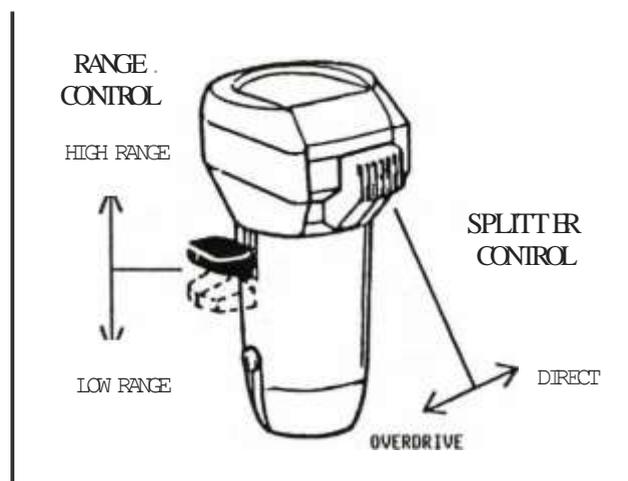
As the range control transmission splits the basic gears into low and high gears, the splitter control transmission splits those high gears into DIRECT and overdrive. That means a range control transmission with a splitter has a low gear range, a high gear range and an overdrive for each gear in high range. Figure 17-3 shows you the top of a modern shift lever for a transmission that uses both a range and splitter control.

BASIC SHIFTING INSTRUCTIONS

What follows is basic shifting instructions for two different transmissions, the 13-speed and the nine-speed . The nine-speed has range control, and the 13-speed has both range and splitter controls. Once you're familiar with both these types of transmissions , you can use the same basic shifting

fig. 173

With this shift lever, you simply move a button to select low range or high range and to split high range gears (over drive).



theory to figure your way around any transmission you might encounter. As you look at the shifting patterns in the illustrations , you will see that LO is considered one of the speeds in any transmission.

UPSHIFITNG

In either the nine- or 13-speed, start with the range control down, in low range. In the 13-speed, the splitter should be rearward, in the direct position. Now start the truck moving in LO gear. When you reach the shift rpm in LO gear, it is time to shift into first. Double-clutch as described and shift. Double-clutch and shift through each gear in sequence until you reach fourth (fourth position, low range).

Now, just before you want to shift into fifth (first position, high range), move the range control up, to high range. This is called "preselecting." Then double-clutch and move to fifth gear (which is the same shift position as first).

Now you are in high range. If this is a nine-speed you continue to shift from fifth to eighth just as you shifted from first to fourth in low range. If you are driving a 13-speed the steps are exactly the same up to sixth gear. After that you'll want to use the splitter control between each time you move the shift lever. There are two different procedures to use, depending on whether you are shifting from direct (DIR) to overdrive (OD) in the same gear or shifting from overdrive in one gear to direct in the next. Here's how that works:

Direct to Overdrive in the Same Gear Using the Splitter

This is the easiest shift to make because you only single-clutch and you don't have to move the shift lever. Just move the splitter to overdrive, let up on the accelerator, depress and release the clutch and you are in overdrive.

Overdrive in One Gear to Direct in the Next Using the Splitter

When you are in overdrive the next higher gear will be the direct position in the next higher gear. This is just like shifting from one gear to the next in a nine-speed with one exception. You add the step of moving the splitter to direct after you've moved the shift lever and just before you release the clutch the final time.

When you get to fifth gear (first position, high range) you have to remember to select the low range with the range control before moving the lever to fourth gear (fourth position, low range).

If you have a 13-speed, downshifting from overdrive to direct in the same gear uses almost the same steps as upshifting from direct to overdrive. Remember that you must raise the engine speed when you double-clutch.

Putting the Truck in Motion

Downshifting from direct in one gear to overdrive in the next lower gear is similar to upshifting from OD to DIR in the next gear. The difference is that you move the splitter to DIR before you do anything else. After that you proceed as if it were a normal downshift in a nine-speed.

We have been discussing two common transmissions, the nine- and the 13-speed. Of course there are several other varieties on the road today. For instance there is a 10-speed. This is basically a nine-speed but it uses the LO gear (fict position) in high range as well as low range. There is an 18-speed which is like the 13-speed but which lets you use the splitter in the low range as well as in the high range. There is a 15-speed which, like the 10-speed, uses the LO gear in both low and high ranges and the splitter also works in that position.

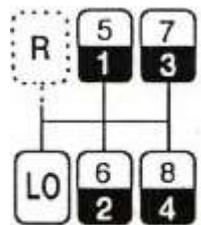
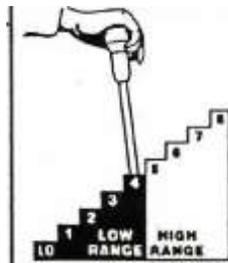
There is also a 15-speed deep reduction transmission. This is like the 10-speed but it has another control which gives a LO-LO or deep reduction range for moving very slowly on rough terrain, up steep grades or working with construction equipment.

There are still several other different types. But as we said, if you understand the principles of the nine- and the 13-speed, you will be able to look at the shifting pattern that is posted in the truck and figure out what to do.

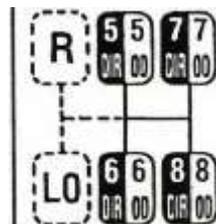
Just what type of transmission you will find in your truck depends on several things. When purchasing a new truck, the buyer will select the transmission based on the job the truck will probably do. If the truck will

be working primarily in flat country or in city delivery perhaps a nine-speed or even a seven-speed will be selected. But if the truck will be working in more demanding circumstances, like mountain driving, then a 13- or 15-speed might be chosen. The extra gears mean you can more closely match the engine power to the terrain. For construction or logging trucks, a 15-speed deep reduction would be a good choice, allowing the driver to take advantage of the very slow gears in LO-LO range.

9 SPEED



13 SPEED



OVERDRIVE

DIRECT

fig. 17-5
This table shows how to select each gear in a nine- and a 13-speed transmission.

GEAR		LEVER		
9-SPD	13-SPD	POSITION	RANGE	SPLITTER
1	1	LO	low	DIR
2	2	1	low	DIR
3	3	2	low	DIR
4	4	3	low	DIR
5	5	4	low	DIR
6	6	1	high	DIR
	7	1	high	OD
	9	2	high	OD
	11	3	high	OD
	13	4	high	OD

The choice of transmission also depends on the personal preference of the buyer. Some people won't drive anything but a 13-speed, others are sold on nine-speeds.

The perfect situation would be to match the truck exactly to the job. But in real-life trucking, things are rarely that perfect, and trucks have to be more flexible. So the buyer must consider that the truck may end up working in a different situation than was originally intended. A construction truck with a 15-speed deep reduction might be pressed into service to haul com in Nebraska. You might find yourself pulling ore out of an open pit mine with a nine-speed.

Of course, you will do all this shifting at the proper rpm. What's the proper rpm? As we said, that depends on the engine and transmission in your truck. Do not attempt to shift your transmission until you know the correct shifting rpm for your vehicle.

PROGRESSIVE SHIFTING

Often when you are driving, you may not have to shift through every gear. Progressive shifting is simply shifting to the highest gear possible as soon as possible. For example, when the load is light or the truck is on a slight downhill grade, you can skip a gear as you accelerate. The same is true when you are decelerating. When you must slow the truck down, it is better to let the truck slow down as much as it can on its own rather than to downshift.

9-SPEED

UPSHIFT

One gear to the next

- Double-clutch.
- Select the next higher gear.

Changing ranges

- Select high range.
- Move the lever to first position.

DOWNSHIFT

One gear to the next

- Double-clutch.
- Select the next lower gear.

Changing ranges

- Select low range.
- Move the lever to fourth position.

13-SPEED

UPSHIFT

One gear to the next

- Double-clutch.
- Select the next higher gear.

Changing ranges

- Select high range.
- Double-clutch.
- Move the lever the first position.

DOWNSHIFT

One gear to the next

- Double-clutch.
- Select the next lower gear.

Changing ranges

- Select low range.
- Double-clutch.
- Move the lever the fourth position.

USING THE SPLITTER

UPSHIFT

DIR to OD in the same gear

- Move the splitter control to overdrive and immediately let up on the accelerator.

- Depress the clutch pedal.
- Release the clutch pedal.
- Press down on the accelerator.

OD in one gear to DIR in the next

- Depress the clutch pedal.
- Move the gear shift lever into neutral.
- Release the clutch pedal.
- Let the engine speed slow down until rpm and road speed "match."
- Depress the clutch pedal and quickly move the gear shift lever to the next gear position.
- Move the splitter to direct.

- Release the clutch pedal.

DOWNSHIFT

OD to DIR in the same gear

- Move the splitter control to direct and immediately depress the clutch pedal.

- Raise engine speed until rpm and road speed "match."

- Release the clutch pedal.
- Press down on the accelerator.

DIR in one gear to OD in the next

- Move the splitter to OD.
- Depress the clutch pedal.
- Move the gear shift lever into neutral.
- Release the clutch pedal.

- Raise the engine speed until rpm and road speed "match."

- Depress the clutch pedal and quickly move the gear shift lever to the next gear position.
- Release the clutch pedal.

DRIVING TIPS

The following are some very basic cautions to keep in mind for smooth, proper shifting every time.

- Always double-clutch when moving the shift lever.
- Never force the lever into the next position.
- Never coast (drive with the lever in neutral or with the clutch depressed so that the power is disengaged from the driving wheels). Regulations prohibit this.
- With a nine- or 13-speed, never move the lever to LO when in high range.
- Never move the range control or the splitter control when the transmission is in neutral while the truck is moving.
- Never make a range shift when moving in reverse.
- Always immediately complete the shift after moving the splitter control.
- In most cases, depending on the engine and axle ratios, you can save valuable fuel by operating the vehicle at less than governed rpm while cruising in the highest gear.

QUIZ

1. Before you start a truck for the first time, you should get to know the location of the gauges and controls.
A. True
B. False
2. To start the _____, depress the clutch pedal to the floor and hold it there. Turn the key or press the starter button.
A. gasoline engine
B. diesel engine
3. The best _____ for a diesel engine is about 180 degrees Fahrenheit.
A. rear rear axle temperature
B. transmission temperature
C. idling temperature
D. operating temperature
4. You know that when the clutch pedal is up, the clutch is _____
A. engaged
B. disengaged

Putting the Truck in Motion

5. _____ lets you speed up or slow down the input shaft while it's in neutral and not engaged to any gear.
A. Progressive shifting
B. Skip shifting
C. Double-clutching
D. the splitter control

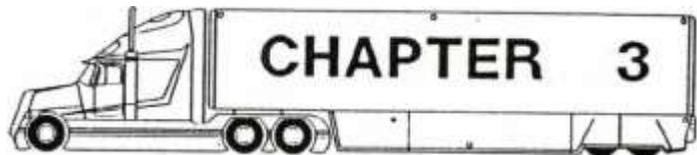
6. "Depress the clutch pedal .
Move the gear shift lever into neutral .
Release the clutch pedal .
Let the engine speed slow down until engine rpm and road speed match .
Depress the clutch pedal and quickly move the gear shift lever to the next gear position .
Release the clutch pedal."
This is a description of double-clutching when you _____
A. upshift
B. downshift

7. Carriers encourage their drivers to use the downshift procedure as a way to slow their rigs.
A. True
B. False

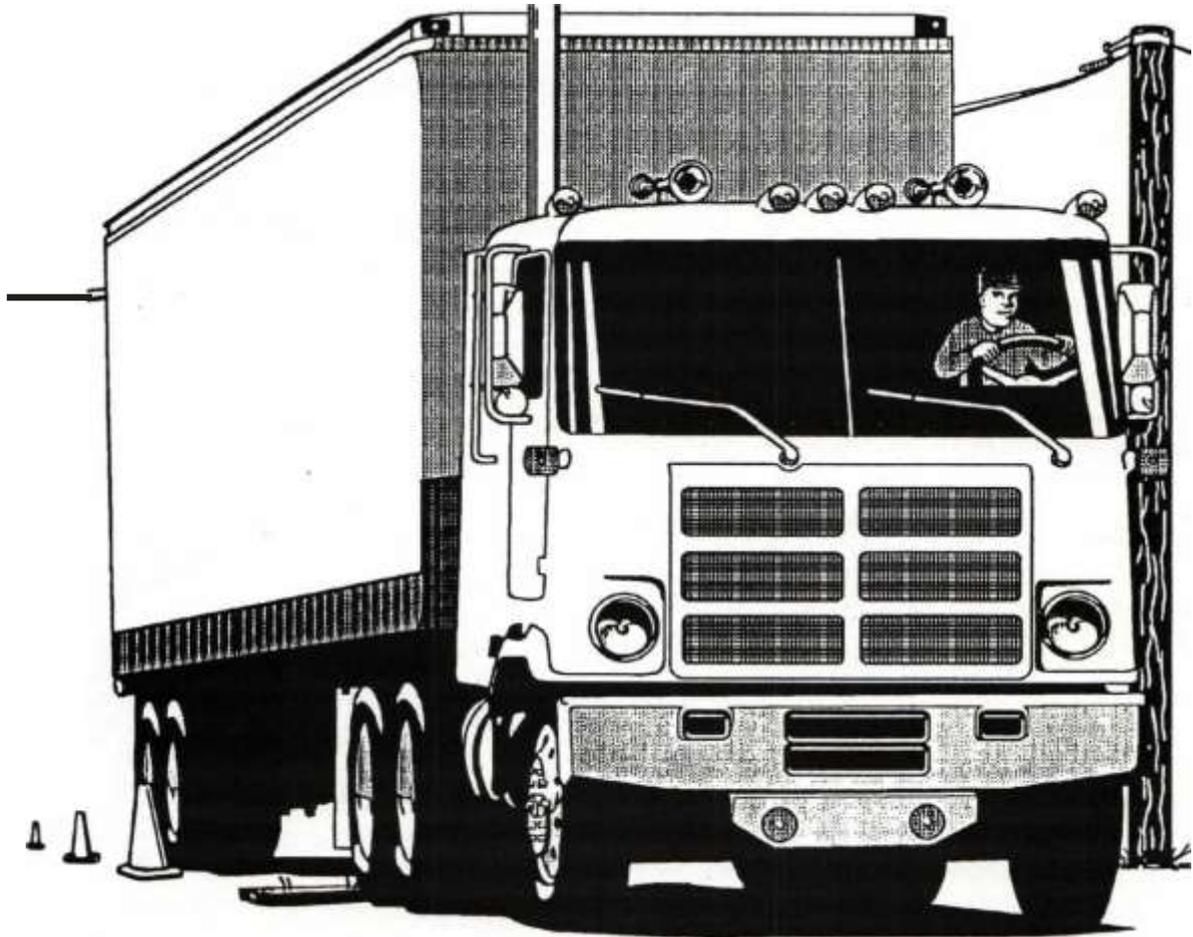
8. A transmission will have a range control or a splitter control, but never both.
A. True
B. False

9. The shift from _____ is the easiest shift to make because you only single-clutch and you don't have to move the shift lever.
A. LO to idle
B. fourth high to fifth low
C. direct to overdrive in the same gear
D. manual to automatic

10. If your transmission has a splitter, you don't need to double clutch when you move the shift lever .
A. True
B. False



BACKING



BACKING IS EASY, ISN'T IT?

No, it isn't. Backing a tractor-trailer may sound like a simple task, but it isn't, not even for the experienced driver. In fact, most accidents involving tractor-trailers happen during backing. It takes patience and practice to develop the ability to back a tractor-trailer skillfully and safely. In this chapter, you'll learn the backing procedures used by experienced drivers. You'll learn pre-positioning, steering and docking procedures for backing. We'll also cover another not-so-easy procedure: parallel parking. But first, let's look at where and why backing accidents occur and how you can prevent them.

BACKING ACCIDENTS

A good driving record is important to you . You don't even want one minor accident on your record . So, prepare yourself well to avoid backing accidents by knowing where and why they happen and how to prevent them .

OBSERVATION SKILLS TEST

Avoid backing accidents by being aware of your surroundings. How aware were you of the illustration that began this chapter? What did you notice? Now, test your awareness by checking the Observation Skills Test Grid at the end of the book .

WHERE THEY HAPPEN

The three most frequent types of backing accidents are those that occur

- on the right side
- at the rear
- at the top

of your vehicle.

Yes, backing into something at the top of the vehicle is a common backing accident! Low hanging wires and eaves can damage the overhead area of your vehicle. This type of accident is easily avoided . In fact, it should never happen . Simply make sure the area above is clear of anything that might tear off an exhaust stack or otherwise damage the top of the cab.

Many backing accidents occur on the right side of the rig . These are the most difficult to avoid . The reason for this is many times when backing the tractor will be at an angle with the trailer and you will not be able to see the right side at all.

WHY THEY HAPPEN

Most accidents happen when the driver is in too much of a hurry. A lack of attention on the part of the driver causes many backing accidents. Backing takes a lot of concentration . Turn off the radio and the CB. The

less noise there is to distract you, the less likely you will lose concentration and get into an accident.

However, carelessness causes most backing accidents. They most often happen when drivers don't take the time to:

- get out of the truck and check the area they are backing into
- use mirrors properly
- be prepared to stop immediately
- back slowly

So, right away you can see four procedures that will greatly reduce the likelihood of your having a backing accident.

How To Prevent Backing Accidents

First, always check the area you're backing into before you begin backing. Get out of the truck, walk behind it and visually check the area. Even if you're just backing up in a straight line, get out and take a good look at the area. Never make the mistake that you can catch everything with your mirrors. Look up and down and all around. And, don't forget to look under your rig to make sure a stray animal hasn't turned up out of nowhere. Always check just before you begin backing. If any time at all has passed since the last time you checked, check again just before you begin backing. In other words, you should check the area, get into your truck and begin backing without further delay.

Whenever you can't clearly see what's next to you or behind you, you should stop, get out and check the area you're backing into during the procedure. This will be the case when you back from a blind side pre-position. You'll learn about blind side backing later in this chapter. For now, you need to know that sometimes you'll need to stop, get out and check the area after each few feet of backing.

Second, use your mirrors properly. Once you're sure nothing is in the way on either side of your rig, behind your rig, over your rig or under your rig, you can begin to back using your mirrors. You may need to adjust your mirrors. Take time to do this. In some cases, it may be necessary to roll down your window and look back out of it while you back your rig. Be careful, though. If you hit something, you could slam your head into the door jamb. In any case, don't use just this or just one mirror. Watch both sides of the rig. And don't open your door and lean out of it. That makes it impossible to use the right side mirror, and increases the risk of being injured.

Third, keep your right foot off the throttle. You'll rarely need to use it to start your rig backing up anyway (if you do, use the lowest reverse gear

brake pedal. This prepares you to stop immediately to avoid hitting anything. Also, you'll eliminate the response time it would otherwise take

possible). Move very slowly, and keep your right foot poised over the to move your foot from the throttle to the brake. This response time is just as crucial to stopping in time when you're going backward as it is when going forward.

So, you can go a long way toward preventing backing accidents if you take the time to:

- always check the area you're backing into just before you begin to back
- stop, get out and check the area you're backing into during the procedure
- use both your mirrors the entire time you're backing
- keep your right foot poised over the brake

accidents result from drivers backing tractor-trailers across city and suburban streets. Big as your rig is, cross-traffic may fail to recognize it as an

According to the Ohio Highway Patrol, far too many traffic problems and obstacle. Sometimes delivery areas are hard to get to other than by backing up to them. When you must back across a city street, get your co-driver to help by stopping traffic while you back. If you're alone, inquire at the consignee's business. Perhaps they can spare someone to help control traffic while you make delivery.

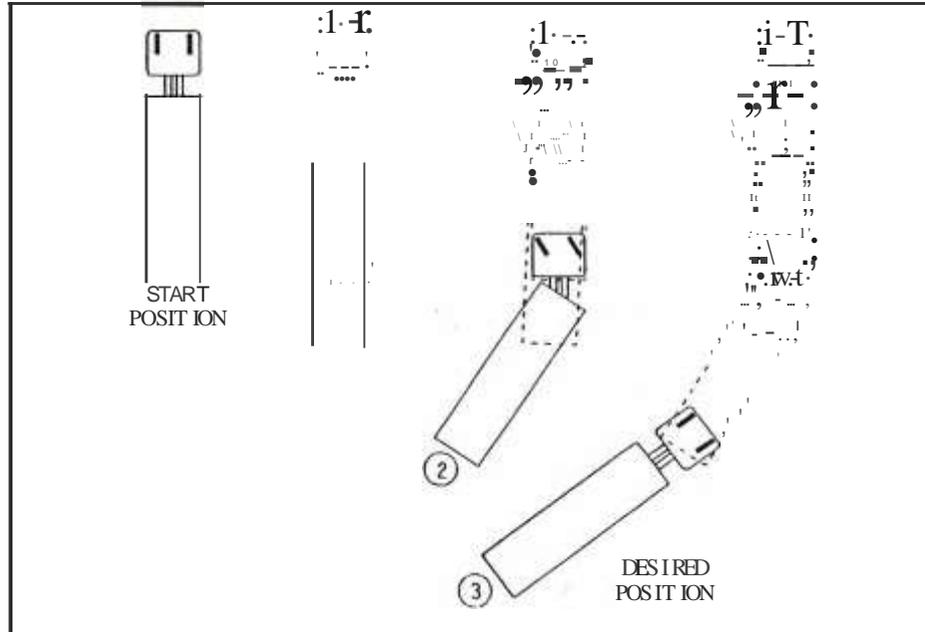
Of course, you can't always prevent a backing accident. You can't control the actions of others. However, you can often make up for the actions of others, if you see them coming. And, you can always make sure you are not the cause of a backing accident.

HOW TO STEER IN REVERSE

There are three steps to any backing maneuver: jacking, following and straightening. Jacking is turning the tractor so it is out of line with the trailer. As you move backwards this starts the trailer going back in a curve. To do this you start by turning the top of the steering wheel opposite the direction you want the rear of the trailer to go. Or, try this: Place your hand on the bottom of the steering wheel. Then move your hand (and therefore the wheel) in the same direction you want the trailer to go first.

After you jack the tractor, you will need to follow the trailer around the curve. To do this, reverse the steering angle. As the trailer moves

fig. 19-1
Steering in reverse.



Steering In Reverse
(refer to Figure 19-1)

Jacking (1): Turn the steering wheel to the right. The front of the tractor will point to the left. The rear of the tractor will point to the right, putting the tractor at an angle with the trailer;

Following (chasing) (2): Turn the steering wheel to the left. This maintains the angle between the tractor and the trailer. Follow the trailer around.

straighten (3): Turn even more to the right to straighten the tractor with the trailer wheel;

backwards, the tractor will follow it. Some people refer to this procedure as chasing the trailer.

Once the trailer has curved far enough you straighten the tractor by bringing it back into line with the trailer. To do this you increase the steering angle and continue backing until the tractor is straight with the trailer, then straighten the steering axle.

Steering backwards should always be slow and deliberate. Use your idle speed only. If the trailer should happen to get off course, stop and move forward so you can start over once again. As you back, always pay special attention to the front of the tractor, the front of the trailer, the angle of the tractor and trailer and the rear of the trailer.

Your ability to jack and chase the trailer is put to the greatest test by a maneuver called the backward serpentine. In this maneuver, you go through all the steps described in Chapter 18, only in reverse. You may have to do a backward serpentine as part of your COL skills test, and you'll have to do it with few if any stops for repositioning your vehicle.

PRE-POSITIONING

Now that you know where and why backing accidents occur and how to prevent them, you're ready to begin learning backing procedures. The first and perhaps the most critical is pre-positioning. This is the position into which you place your rig before you begin backing. These are the three common pre-positions:

- straight back
- clear side
- blind side

As we discuss the three pre-positions, let's assume you're driving a cabover tractor pulling a 45-foot trailer. This is a popular rig on the road today and will serve as a good example of what is involved in the skill of backing. In our examples, you are backing your rig into a dock.

The distances which we will be dealing with apply to this type of rig. As you become a more experienced driver, you will learn that different sized rigs call for different distances and turning angles.

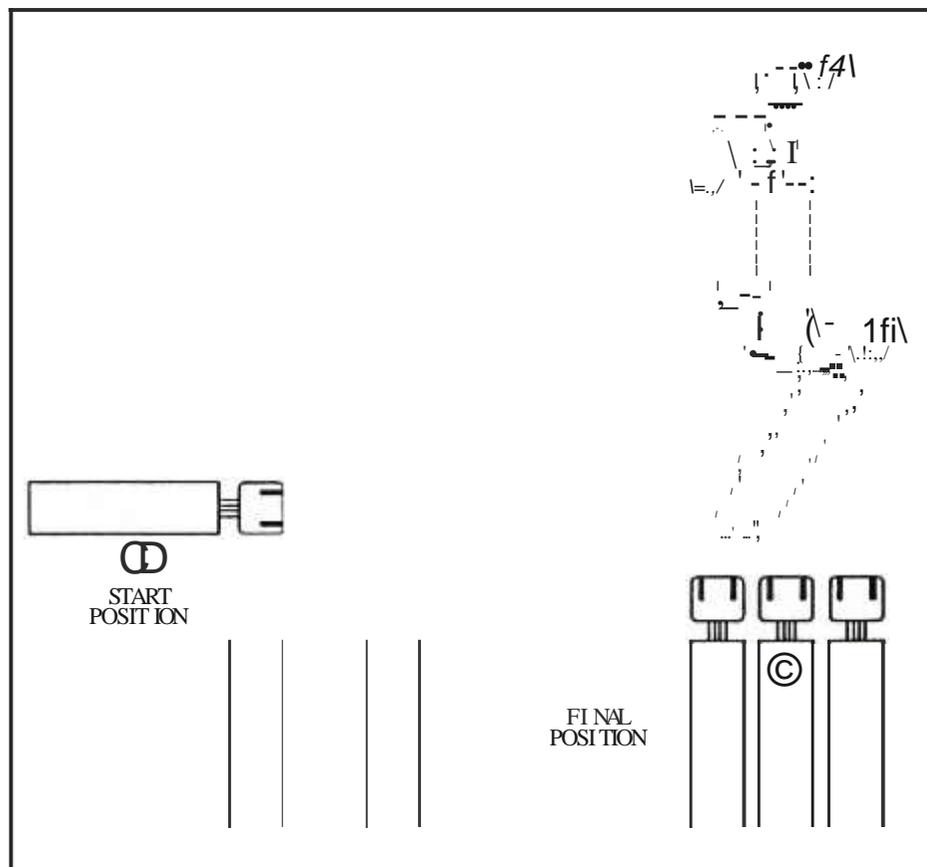
Pre-positioning for Straight Back (refer to Figure 19-2 on the next page)

1. Stop, if necessary, in the area
2. Pull up until the tractor passes through the hole; steer hard away from the hole;
3. Steer back into line with the hole.
4. Pull ahead until tractor and trailer are straight and line up with the hole; if you do this right as soon as the tractor and trailer straighten out you'll be directly in front of the hole; adjusting as necessary to keep centered in the hole.

Backing

fig. 19-2

Pre-positioning your rig for a straight back involves these steps.

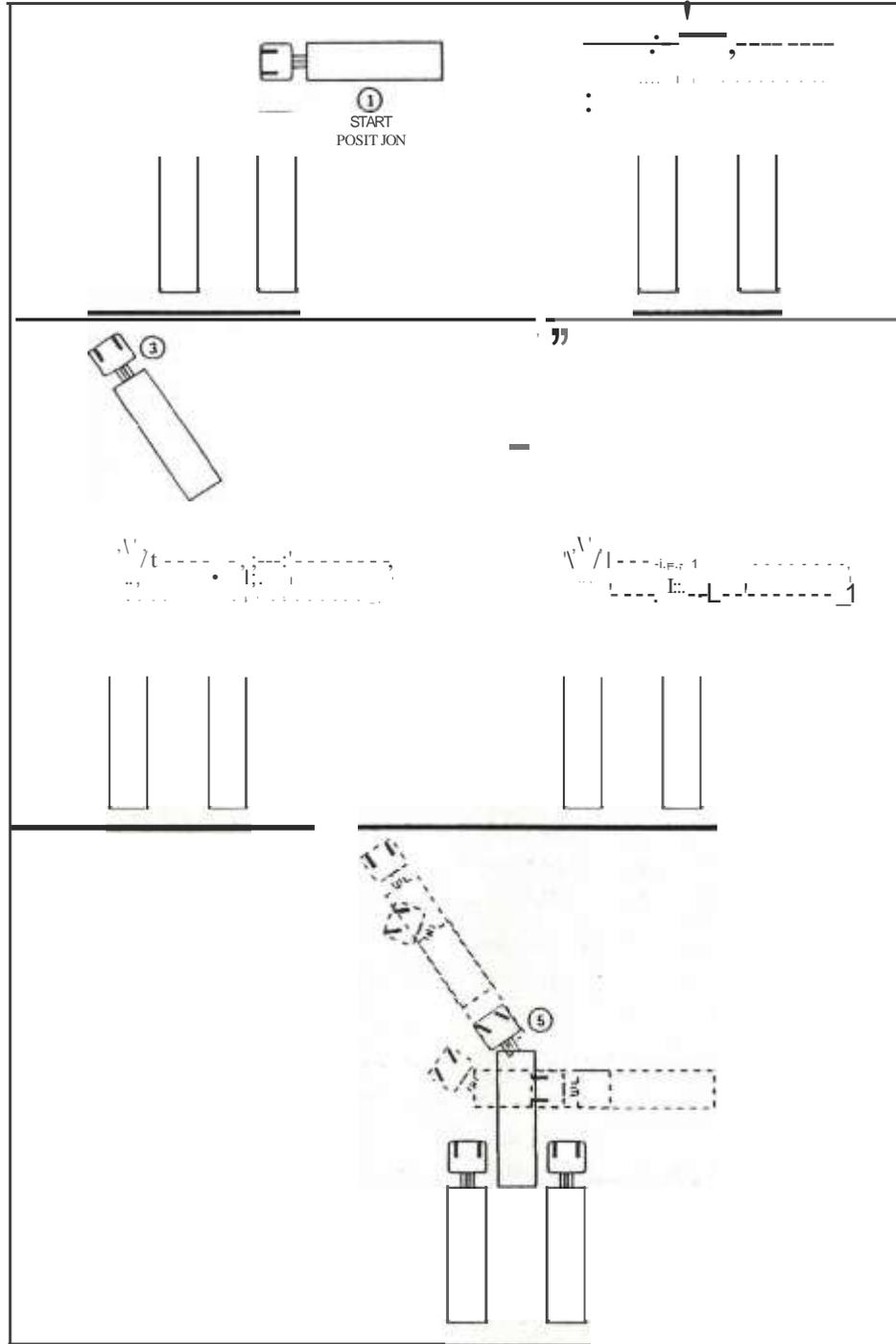


If you're pulling a trailer with swinging doors, here's an important first step to remember for all docking maneuvers. Open the trailer's swinging doors while you are still clear of the dock and other vehicles. You will not be happy to work hard getting to the dock just to find you have to pull away again to get your trailer's swinging doors open.

3. When the tractor is at a 45-degree angle to the space, straighten the wheels and pull ahead until the tractor and trailer are in line and the trailer is pointing at the space. You will be able to see the space in your left mirror.
4. Start backing. Turn the steering wheel to the right to jack the tractor. Once the trailer is curving towards the space, turn the steering wheel to the left and let the tractor follow the trailer into the space.
5. When the trailer is in line with the space, turn the steering wheel even more to the left to straighten the tractor with the trailer. Continue backing.

fig. 19-3

Pre-positioning on the clear side to back your rig involves these steps.



IBE STRAIGHT BACK PRE-POSITION

Straight back backing is the easiest and safest to perform. So, whenever you can back straight in, you should. From this pre-position, you have a clear view in both mirrors of the space you are backing into. (You'll sometimes hear this space referred to as "the hole," as we will in the following discussion.) Straight backing is the basis for all other kinds of

Backing

backing. Get straight backing down good before you try the more complicated maneuvers .

THE CLEAR SIDE PRE-POSITION

"Clear side" is a term used to describe backing from a position which lets you have a clear view in your left rear view mirror of the space you back into. This is the type of backing you 'll do most often. Remember that if you can back straight in, you should. If you can't back straight in, the second best choice is to back from the clear side pre-position .

THE BLIND SIDE PRE-POSITION

With a blind side position, it is more difficult to see the area you're backing your rig into. Your rear view mirrors are less useful. Your left mirror will help you when turning and pulling forward. Once you s back, you can see with the right mirror and the spot mirror, although you may have to move around in the seat to do so.

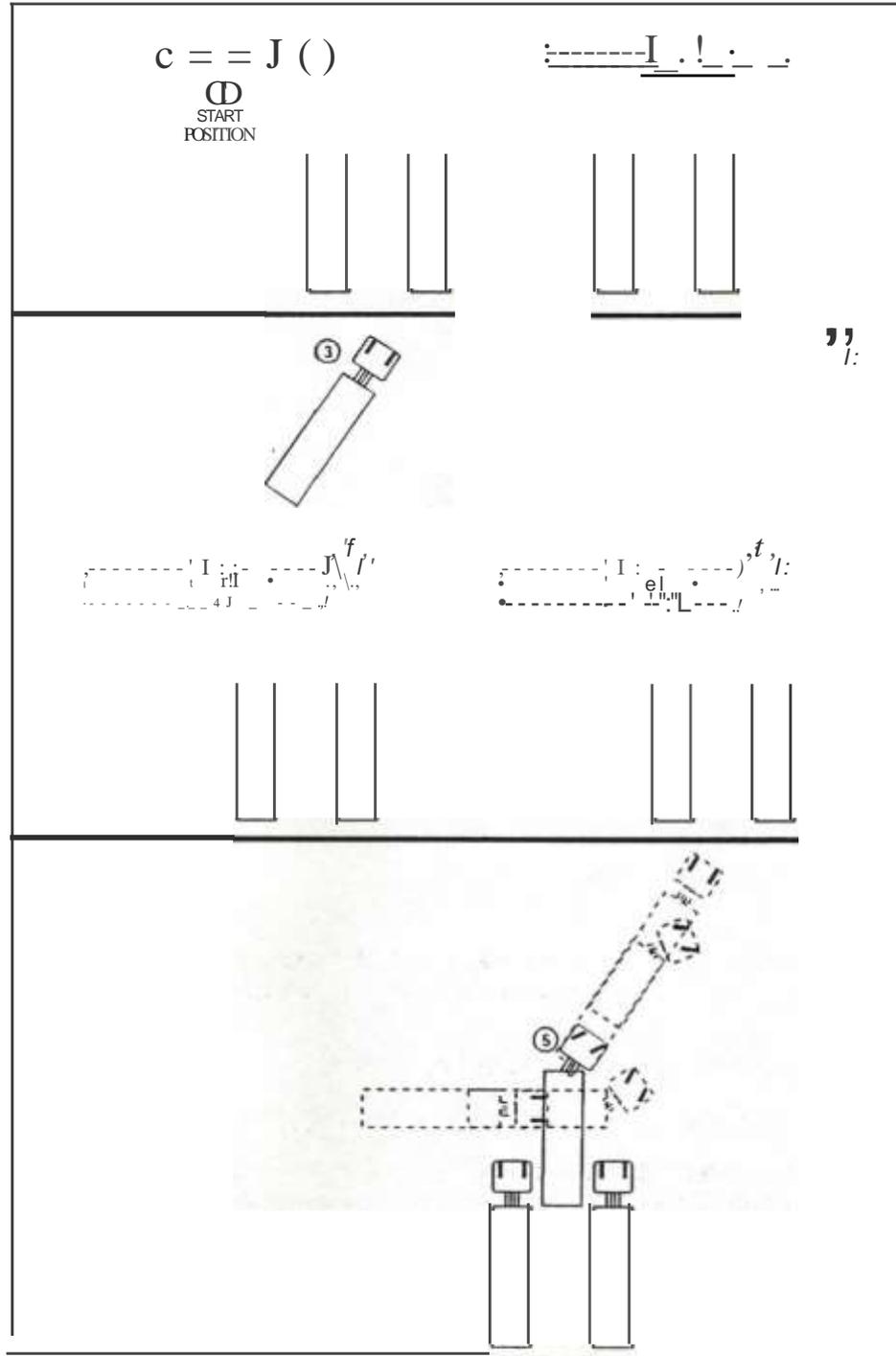
This is the most difficult and the most dangerous pre-position . Avoid it, if you can. Of course, you won't always be able to avoid it, so you must know how to back from this position .

Backing in from the blind side uses the same steps as clear side backing. The only difference is it's harder to see what you are doing. Your right side mirror will help you. At those times when you can't see, you should stop often and get out of your rig to check your position. It is a lot easier to stop, get out and check where you are a few extra times than it is to explain to another driver why you backed into his brand new truck .

Pre-positioning For A Blind Side Back (refer to Figure 19-4 on page 268)

- 1. Stop, get out and inspect the area.**
- 2. Pull ahead and steer away from the space.**
- 3. When the tractor is at a 45 degree angle to the space, straighten the wheels and pull ahead until the tractor and trailer are in line and the trailer is pointing at the space. You will be able to see the space in your right mirror.**
- 4. Start backing. Turn the steering wheel to the left to jack the tractor. Once the trailer is curving towards the space turn the steering wheel to the right and let the tractor follow the trailer into the space.**
- 5. When the trailer is in line with the space turn the steering wheel more to the right to straighten the tractor with the trailer and continue backing.**

fig. 19-4
Pre-positioning on the blind side to back your rig involves these steps.



Backing

Remember, what you can see depends on your pre-position :

PRE-POSITION

Straight Back

WHAT YOU CAN SEE

You have a clear view in both mirrors of the space you are backing into.

Clear Side

You have a clear view in your left rear view mirror of the space you are backing into.

Blind Side

You are unable to see the area you are backing your rig into.

DOCKING

One backing procedure that will probably be a routine part of your job is docking to load and unload. To be able to dock, you must understand how to pre-position and how to steer backwards. You have, however, just learned all about that. So, now you're ready for docking!

If you must dock from a blind side pre-position, have someone help you from the ground. If you don't have a partner in the cab, ask someone in the dock yard. All drivers know what a chore it is to back up blind. You won't find it hard to get someone to help.

Many warehouses require you to chock your trailer tires after you have backed up to the dock. Chocks are wood or rubber blocks placed in front of the trailer tires to keep the trailer from rolling away from the dock. This can happen because of the motion caused by loading or unloading .

Docking

1. Inspect the area.
2. Pre-position the rig.
3. Open the trailer doors.
4. Operate at idle speed only.
5. Back up close to the dock.
6. Inspect the area behind the trailer and estimate the remaining distance.
7. Back easily until the trailer touches the dock.

"Center, straight and easy" are the words you should keep in mind as you dock. You want to be sure that the trailer is going to be centered as it meets with the dock. You also want to make sure that the trailer and the dock contact in a straight line. And, you're supposed to ease up to the dock, not ram it.

PARALLEL PARKING

Like backing, parallel parking is a difficult driving maneuver. In terms of difficulty, it comes close to blind side backing. The exact procedure differs with each tractor-trailer. Each rig will back and turn differently. One reason for this is that different rigs have different wheelbases.

You should avoid parallel parking whenever you can, and you usually can. However, you may find yourself somewhere, sometime with no choice but to parallel park. Figure 19-5 illustrates how.

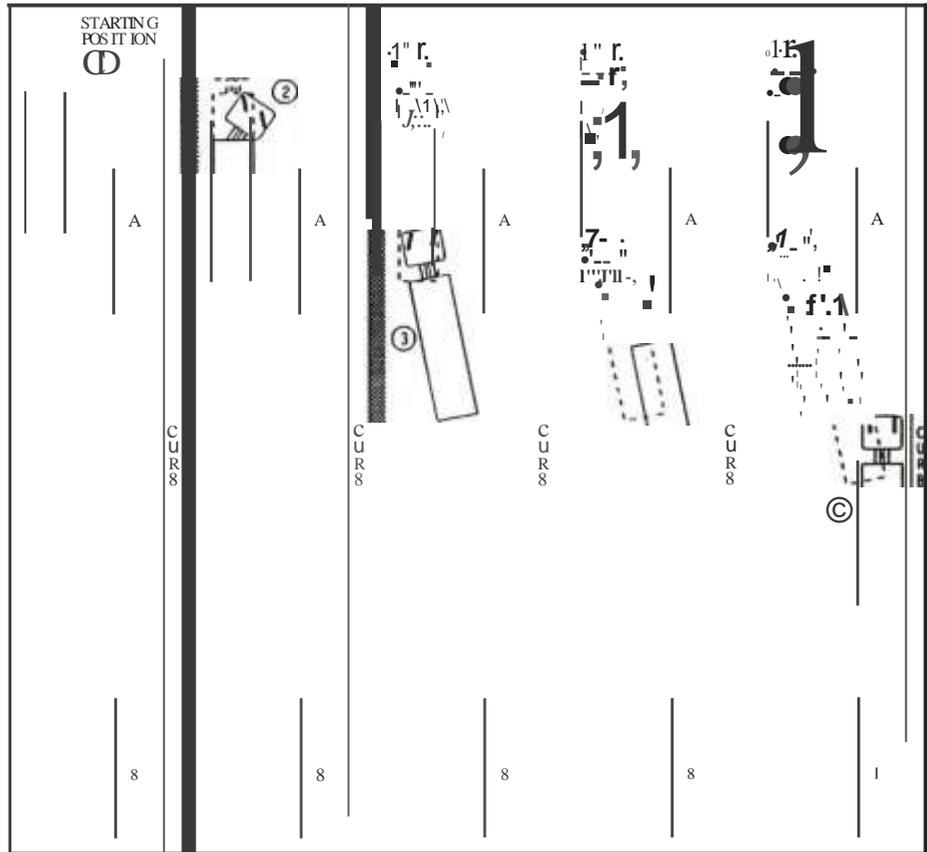
This procedure should bring you within inches of the curb. The sides of inches from the curb may not keep the left side of your rig out of the traffic your front and rear tires must be within 12 inches of the curb for you to be legally parked. Remember, however, that rigs are wide vehicles. So, 12

lane. Remember you have a long rig so you will need a long space to be able to parallel park successfully. Never try to parallel park unless you're sure you have enough room.



pull forward and adjust your position a time or two before you can back neatly into the space.

I- 19-5
these are the steps
 1 parallel park.



QUIZ

- The three most frequent types of backing accidents are those that occur on the right side, at the rear and _____ of your vehicle.
 - at the fifth wheel
 - on the left side
 - on the top
 - at the front
- The most difficult backing accidents to avoid are _____ accidents.
 - overhead
 - right side
 - left side
 - rear of the trailer

3. Backing accidents most often happen when drivers fail to get out of the truck and check the area they are backing into or
 - A. use mirrors properly
 - B. tum on their radios or CBs
 - C. chase the trailer properly
 - D. chock the wheels at the dock _____

4. When backing, your right foot should be _____
 - A. poised over the clutch pedal
 - B. positioned between the brake and the throttle
 - C. resting lightly on the throttle
 - D. poised over the brake pedal

5. Straight back, clear side and blind side are all examples of
 - A. pre-positions
 - B.chasing the trailer
 - C.steering procedures
 - D.jacki ng proced ures

6. When you can see your parking space in both rear view mirrors, you're in a _____ pre-position.
 - A. straight back
 - B. proper
 - C. clear side
 - D. blind side

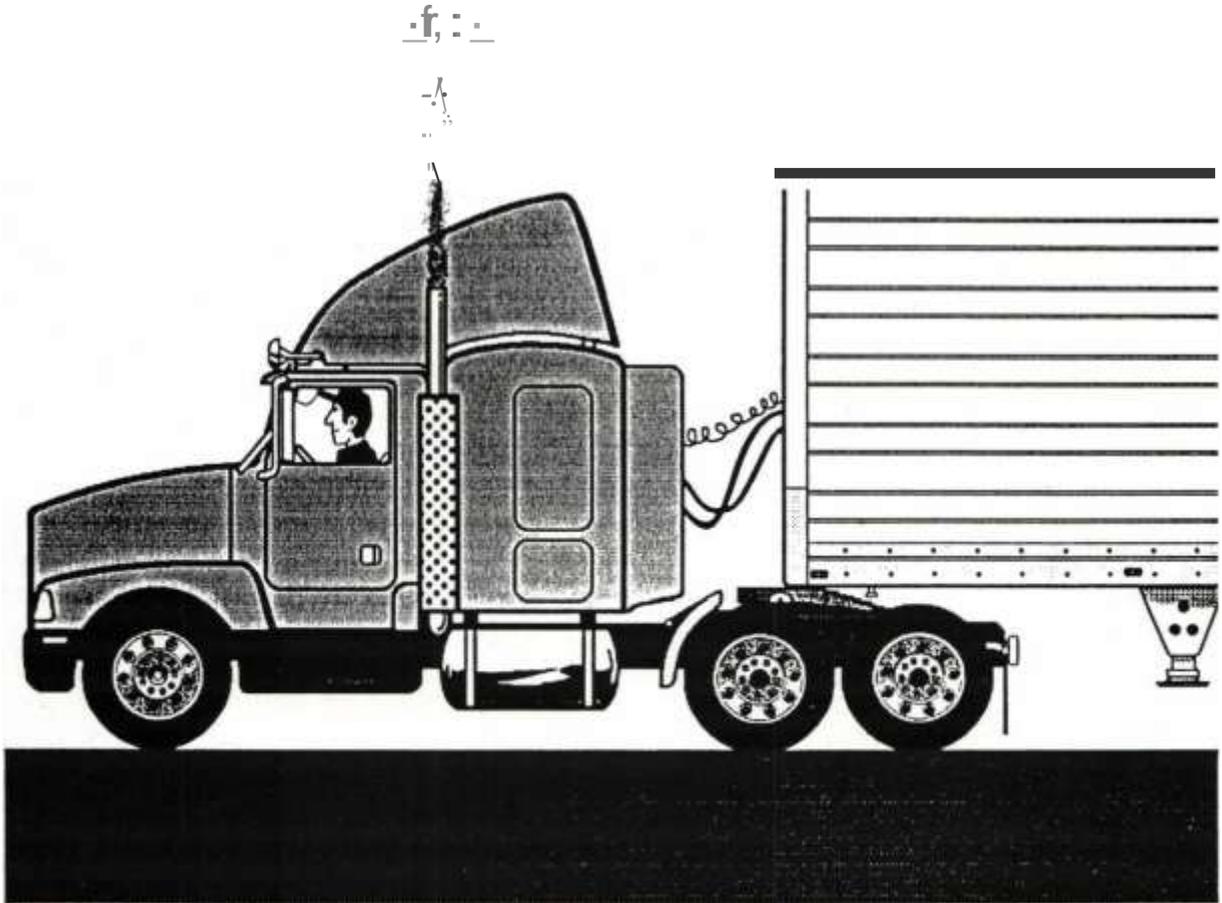
7. When you can see your parking space in your left rear view mir-
ror, you're in a _____ pre-posit ion .
 - A. straight back
 - B.proper
 - C. clear side
 - D. blind side

8. The procedu re that creates an angle between the tractor and the trailer is known as_ _ _ _
 - A.jacking
 - B. following
 - C.chasing
 - D. pre-positioning

9. When you back to a dock, it's expected you'll probably ram into it.
- A. True
 - B. False
10. Parallel parking is a backing maneuver that you _____.
- A. will never have to perform
 - B. should choose over straight backing
 - C. may need several tries to accomplish
 - D. should be able to perform easily



COUPLING AND UNCOUPLING



CONNECTING THE TRACTOR AND THE TRAILER

It is obvious that before you can pull a trailer, the trailer must be joined to the tractor. This is the process known as coupling. How is this done? What parts of the tractor and trailer are involved in this process? How do you separate them again?

Coupling and uncoupling aren't hard procedures, but for safety's sake they must be done right. You'll have to show you have both knowledge of and skill in coupling and uncoupling to get a CDL for combination vehicles. In this chapter we'll outline a procedure that will ensure a safe couple every time.

PRE-COUPLING PROCEDURES

Connecting the tractor to the trailer begins with two simple "get ready" steps. First, make sure you have picked up the right tractor and trailer. This may sound a little silly now, but wait until the first time you confront a large terminal yard packed with equipment. You'll see rows and rows of vehicles that look much the same except for their vehicle numbers. Double-check the numbers Dispatch gave you to make sure you have the equipment you are meant to have. Don't wait until you get to the right warehouse with the wrong trailer (and the wrong cargo) to find out!

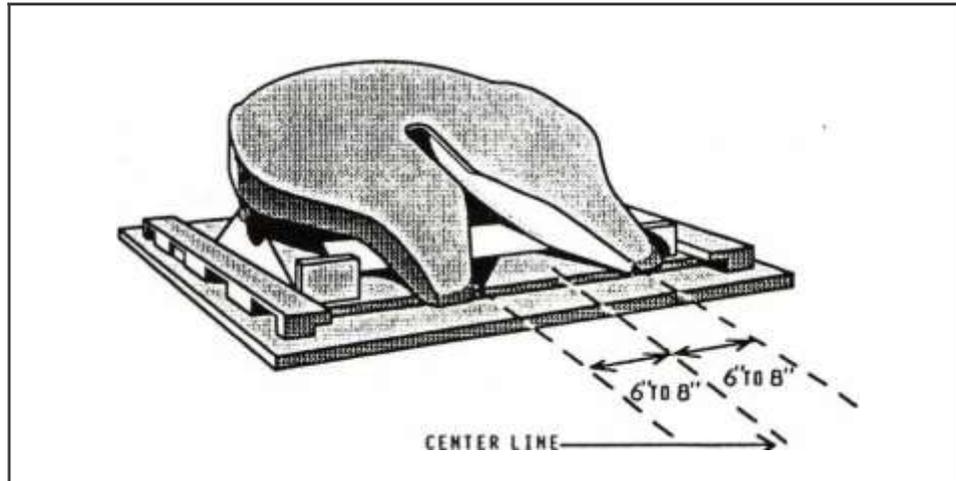
Next, inspect that equipment. Chapter 26 describes pre-trip inspection procedures in detail so we won't cover those here. Before coupling, though, take a few extra minutes to check the fifth wheel and kingpin. Look for damaged or missing parts on the fifth wheel. See that the mounting to the tractor is secure. Make sure the trailer kingpin isn't bent or broken. Double-check that cargo is secure and won't shift.

Before you begin any coupling procedure, get out of the tractor and walk the area around the trailer and tractor. Look for anything in your path that could damage the tractor or trailer. Boards lying on the ground can fly dangerously about when popped from the ground by a tire. Nails, glass or other objects can do severe damage to a tire. Make sure the way is clear before you begin the first stages of alignment.

Work on the most level ground you can find if you have a choice about it. Uneven ground will make your task just that much harder. Then put chocks at the rear of your trailer tires. When you chock the trailer tires at the rear you're making sure the trailer won't roll backward from the pressure applied by the tractor as it moves under the trailer. If your trailer has spring brakes you may not need chocks. Refer to your company policy when in doubt.

ALIGNING THE TRACTOR

What's involved in coupling? To put it very simply, you're going to back the tractor up to the trailer so the coupling assemblies connect without moving the trailer backwards. When joining the trailer to the tractor you will be concerned mainly with just two vehicle parts: the fifth wheel on the tractor and the kingpin on the trailer. This makes it sound just a little easier than it is. A proper coupling requires you to center the kingpin in the fifth wheel within a small margin of error. So in your backing, you have to be pretty precise about how you align the tractor and trailer.



The V-shaped slot in the fifth wheel allows for about six to eight inches error margin to either side of center on most models. This means that your fifth wheel must come into contact with the trailer kingpin at a point six to eight inches to either the left or right of center to complete the coupling without having to realign the tractor. It is up to you to place the tractor so the trailer kingpin is as near to center of the fifth wheel V-slot as possible.

Slow and steady really wins the race here. If you follow the procedures step by step every time, you should have few problems. This procedure involves the proper use of the rear view mirrors. As you back, watch both mirrors. If your view of the trailer is the same in both rear view mirrors, you're centered. Know the width of the tractor as compared to the width of the trailer. Remember that the center of the fifth wheel is always in the center of the tractor frame and the kingpin is always in the center of the front of the trailer.

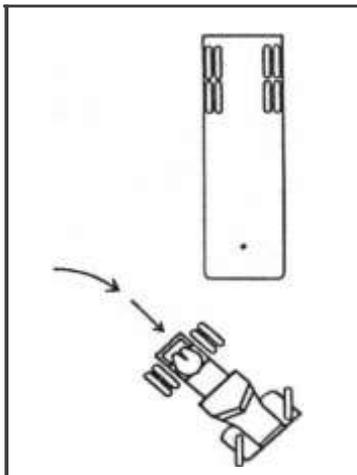
OBSERVATION SKILLS TEST

Did you notice that the driver of the rig in the very first illustration skipped some steps in his coupling procedure? Name two things that will happen if he pulls out now. Check your answers against the Observation Skills Test Grid at the end of the book.

Before you attempt to align the tractor and trailer, learn about the physical characteristics of both. How wide is the tractor? If you drive the same tractor day after day you should know its width, fifth wheel height, wheelbase and other important measurements. If the tractor is new to you, ask! It is not a sign of ignorance or inexperience to ask questions about the equipment that you will be driving. It is a sign of a conscientious, careful driver.

fig. 16-2

Approach the trailer, preferably from the right, and start to turn away from the trailer when the front of the tractor comes near the right corner of the trailer.



What about the trailer? Is it 96 inches wide or 102 inches wide? How does this compare to the width of your tractor? How does it compare to the span of the mirrors on your tractor? This is all very important for determining the approach to the trailer.

To align the units properly you must be able to locate the center of the trailer by using its sides as a gauge in your rear view mirrors. We'll discuss how in detail later.

HORIZONTAL ALIGNMENT

The first step in aligning the tractor with the trailer is approaching the trailer. To illustrate this we will imagine that there is enough room in front of the trailer to maneuver the tractor easily. Approach the front of the trailer from either side (right or left). Experienced drivers prefer to approach the trailer from the right side (the trailer will be at your left). This gives the driver full view of the trailer from the window at all times during the first stage of alignment. This, of course, will become a choice you will have to make as you experience the different methods of approach.

As you approach the trailer, steer away from the front into the area in front of the trailer (see Figure 16-2). Taking it slow and easy, watch your mirrors as you start to straighten out in front of the trailer. Some novices assume that they should begin the turn away from the trailer after they are directly in front of it. Because each tractor has its own wheelbase and turning radius, this is a wrong assumption. Often, this would place the tractor far to the side of the trailer after the tractor is straightened out. It is wise to start the turn as the front of the tractor approaches the near corner of the trailer. This will place the fifth wheel in a closer alignment with the kingpin and less adjustment of position will be necessary.

As you pull away from the trailer, keep an eye on your mirrors. As you straighten the tractor in front of the trailer, the corners of the trailer will appear evenly in the mirrors. If there is an unequal amount of the trailer in one mirror, you are too far to the other side. For instance, if the right mirror shows a large portion of the trailer, and the left side very little, you will have to adjust the tractor further to the left. Do this by pulling forward while steering to the left. When you think you might be positioned more evenly, straighten the tractor.

It may be in your best interest to pull the tractor far in front of the trailer when beginning alignment. That will give you more room in which to adjust your position as you back toward the trailer. If you back slowly

Coupling and Uncoupling

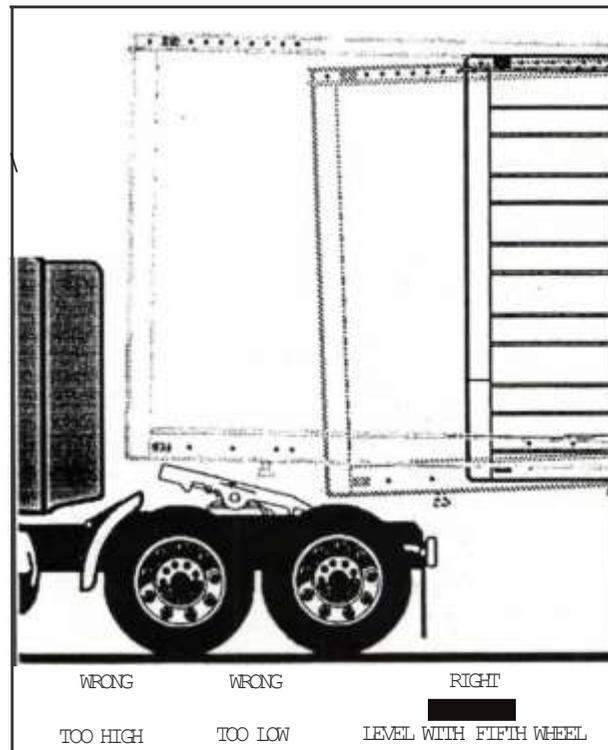
you can steer the tractor in the desired direction to align the fifth wheel with the kingpin. It is not unusual for the novice driver, or even the experienced driver for that matter, to adjust the tractor more than once before proper alignment is achieved. Never back under the trailer at an angle. You might push the trailer sideways and break the landing gear.

When an equal amount of the front of the trailer shows in each mirror, you are aligned with the trailer kingpin. You can stop working on position and start to back slowly.

Do not back completely under the trailer at this point. Stop when the rear of the tractor is about five feet from the front of the trailer. To gauge the stopping distance look at your tractor drive tires in the mirror and judge their distance from the nose of the trailer. This is not to say that five feet from the trailer is the exact distance that should be left between the tractor and trailer. It should be the minimum left, though. Allow yourself enough room to walk safely and comfortably between the tractor and trailer as you inspect both. Set the tractor brakes, put the transmission in neutral and get out of the tractor. Inspect the area around the trailer and tractor, making sure it is safe to back the rest of the way.

fig. 16-3

The levels of the kingpin and the fifth wheel must be evenly matched so they connect properly.



From a vantage point under the trailer, check the alignment of the fifth wheel with the kingpin. It is much easier to notice any extreme offset from the ground than it is from the tractor. If they are aligned properly, proceed with the inspection and coupling. If they are not, return to the tractor and make any necessary adjustments in your position.

VERTICAL ALIGNMENT

As you walk around the area compare the level of the fifth wheel with the height of the kingpin. The coupling surface of the trailer should be just

below the middle of the fifth wheel. If the trailer is too far below the fifth wheel level, the kingpin will hit the tractor frame. If the trailer is too high the kingpin could slide right over the top of the fifth wheel when you try to back under it. You could damage the rear of the tractor that way.

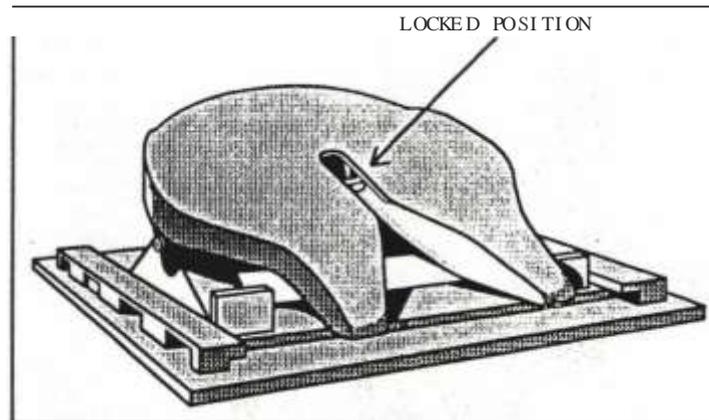
If you are either too high or too low, you will have to use the landing gear to raise or lower the trailer to the fifth wheel level. We'll be the first to admit that it is not at all easy to crank a loaded trailer up. It is hard on the landing gear and physically demanding of the person at the crank.

On most trailers, you turn the landing gear crank at the left side of the trailer clockwise to raise the trailer and counterclockwise to lower it. The main gear housing is under the trailer. As the crank is turned the gears spin to lower or raise the trailer landing legs. Most trailer gear boxes have two speeds. Use low gear while the landing legs are supporting most of the trailer's weight. Then shift to high gear.

Although they are built of hardened steel the gears can become damaged if you aren't careful.

The landing gear crank is hinged and swings under the trailer to a latch which secures it to the frame while the trailer is in motion. If the crank handle were allowed to swing freely while the trailer is moving it could hit a nearby vehicle or passing pedestrian. Always secure the crank handle when you're done using it.

fig. 164
Note the position of the fifth wheel locking mechanism before you complete the coupling.



Now inspect the fifth wheel. Make sure that the locking mechanism is closed. If it is opened, the kingpin can not slide in the jaws and

complete the coupling. If it is even partly closed it could slam shut when the tractor comes into contact with the trailer. This would also prevent the kingpin from becoming locked in the fifth wheel. Be sure the fifth wheel is tilted down in the back, so the trailer can slide up when you couple.

Also check to see that the surface of the fifth wheel has been properly greased. A fifth wheel that is poorly lubricated will not let the trailer rotate freely and smoothly when turning or backing. If it's *dry* apply a liberal

Coupling and Uncoupling

amount of grease to the fifth wheel. You should always carry a supply of grease with you since you'll probably need it the most when it's not readily available.

If you have a sliding fifth wheel, make sure it's locked.

MAKING THE CONNECTION

The first step of actually coupling the tractor and trailer is to connect the air supply lines. There are two air supply lines, the service brake line and the emergency brake line. These are almost always colored red for emergency and blue for service. The connections at the front of the trailer will usually be painted the color of the air hose that should be connected to them. Check the seals and secure each air supply line to the corresponding colored trailer connection. If you cross the air lines, supply air will be sent to the service line instead of the trailer air tanks. Then you won't be able to release the parking brakes.

Air lines should be supported so there's no chance they'll be crushed or caught while the tractor is backing under the trailer.

After you return to the tractor, charge the trailer air supply by pushing the red trailer air supply knob. After the trailer is charged, the compressor will have cut out. Apply the trailer parking brakes by pulling the red trailer air supply knob back out. This activates the trailer spring brakes to keep the trailer from moving. Release the tractor brakes by pushing in the tractor parking brake knob. Put the transmission in reverse in low range and back...slowly.

Keep backing until the tractor comes into contact with the trailer. You will feel a definite bump. Continue backing slowly until progress is stopped by the kingpin locking into the jaws of the fifth wheel.

If the trailer is fairly light, you'll be able to get the tractor under it without much effort. If the trailer is heavily loaded, you will feel some resistance. If the trailer is a little too low and you can't get the tractor under it without a lot of effort, don't force it. Get out and jack that trailer up a little more. This isn't all that easy with a loaded trailer, but it's still the best solution. If your drive wheels start spinning when you meet that resistance, use the inter-axle differential lock to get more traction.

To check the connection, raise the landing gear slightly and try pulling forward very slowly. If the tractor will not move, the connection is complete. If it does move, stop immediately and back again.

Do not attempt to back under the trailer at high speed. This could damage the fifth wheel, the kingpin or the rear axle differential.

Put the transmission in neutral, set the parking brakes, shut off the engine and pocket the key. Get out of the tractor and check to see that the fifth wheel locking jaw is closed around the trailer kingpin. To do this you must be under the front of the trailer and behind the fifth wheel. If the jaw is closed you will see it locked securely around the back of the kingpin and the kingpin will not be visible. There should be no space between the upper and lower fifth wheel. If the kingpin is clearly visible in the fifth wheel opening and the locking jaw is positioned to the side of the fifth wheel opening you do not have a good connection. The locking lever should be in the Jocked position. The safety catch must be in position over the locking lever (you may have to put it in place by hand). If the locking jaw is not secured around the kingpin, disconnect both air lines, pull the tractor forward and start the backing procedure again.

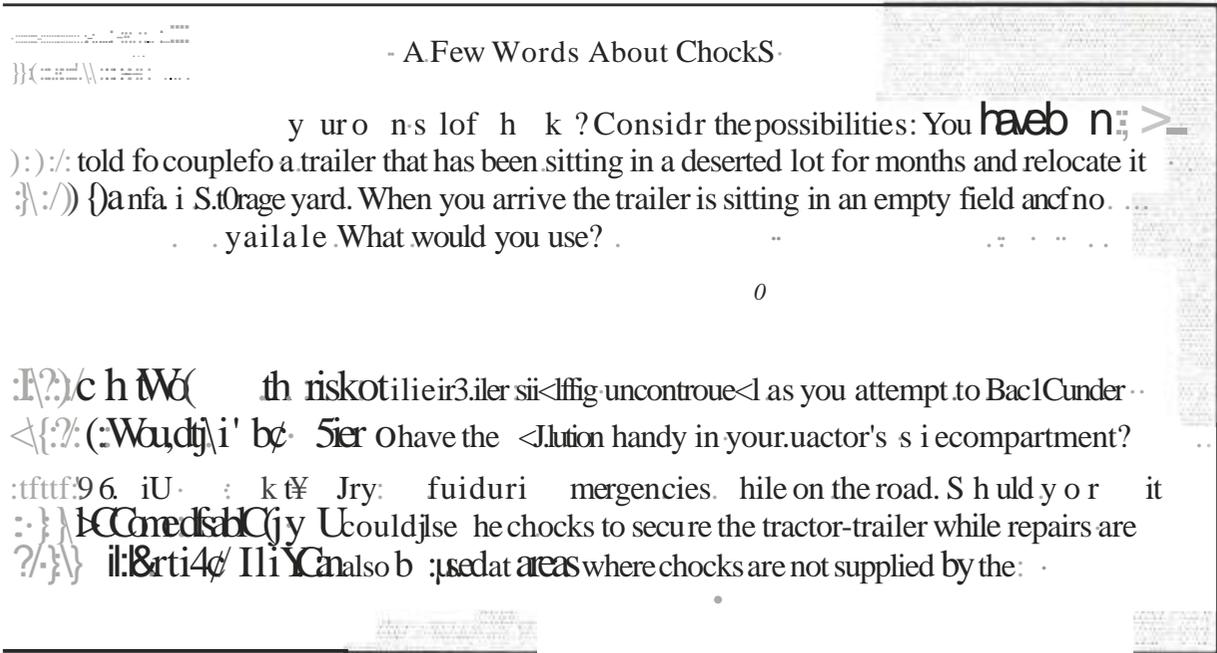
Once you have determined that the kingpin is secured, connect the single electrical supply cable (pigtail) to the trailer and fasten the safety catch. Return to the tractor and turn on the emergency flashers and trailer lights. Walk around the trailer to make sure the lights are working. Check the clearance lights and side marker lights. Walk to the back of the trailer and check the turn signals (turning on the emergency flashers at the tractor will activate the turn signals).

If none are working, there is possibly a bad connection at the trailer supply plug. Disconnect, then reconnect the pigtail securely into the trailer connection. If the lights still don't work have them checked by a mechanic. Certainly if you are well versed in the electrical components of the tractor and trailer you may search for the problem yourself.

If only one light is not working its bulb may be out and need to be replaced. Always carry a supply of spare bulbs with you. This is true for the tractor and the trailer. You may have to couple to a trailer at a deserted freight yard or at an unusual hour when there is no one available to supply you with a bulb. Have at least two of every type with you at all times. When you use one, don't forget to resupply yourself.

While you're checking out the trailer tires, take the time to gauge tire inflation if you didn't do this in your routine inspection. Also check for worn hoses or loose connections on the trailer's brake system. The hiss of escaping air may be heard coming from these areas. Rusty connections should be closely inspected for cracks. Should any leaks exist, have them repaired immediately. A ruptured air hose or broken connection is sure trouble while the vehicle is moving.

Check for enough clearance between the tractor frame and the trailer, and between the top of the tractor tires and the nose of the trailer.



The trailer can finally be considered connected and ready to roll. But you must first remove any wheel chocks. Never simply leave the chocks lying on the ground as you pull away, unless that is what is requested. Be courteous and place them where they belong.

Now you should crank up the landing gear as high as it will go. Optimum ground clearance is available with the gear in its uppermost position. Never drive with the landing gear part way up. This should be the last thing you do before moving the tractor-trailer.

Once the landing gear is up return to the tractor and prepare to pull away. Do not simply disengage the trailer and tractor brakes and drive off. Perform one more test to assure yourself that the trailer is secured to the tractor. Release the tractor brakes, leaving the trailer brakes engaged. If you have an older trailer without spring brakes, test the trailer brakes with the hand valve or by pulling the air supply control.

Try pulling forward slowly. If the coupling is not secure and the tractor begins to pull out from under the trailer, stop immediately and back under the trailer. Engage all brakes, get out and crank the trailer landing gear down, and begin the coupling procedure again.

If the coupling is secure, the tractor will not move. You can then release the trailer brakes and begin a safe trip. A word to the wise: When you're pulling the tractor forward to check the firmness of your connection, do it slowly! Let's say your coupling isn't secure. If you were to drive the tractor out from under the trailer while the landing gear is up the trailer nose would lose its support and land on the tractor frame or, worse, on the

ground. To correct this, heavy duty wreckers would have to lift the front of the trailer so the landing gear could be lowered. The landing gear alone isn't strong enough to raise a trailer, especially a loaded one, from this position.

Coupling doubles and triples? You will find the process of coupling and uncoupling multiple trailers described in detail in Chapter 22.

COMMON PROBLEMS AND SOLUTIONS

PROBLEM #1: While attempting to align the tractor with the trailer you can't seem to get a good picture of the trailer in your rear view mirror.

SOLUTION: Your mirrors may be out of alignment for your position in the seat. Readjust the mirrors so you can see them properly while sitting naturally in your seat.

PROBLEM #2: You're just about all coupled up. Upon making a final check of the trailer tire inflation you notice that one is completely flat.

SOLUTION: If there is no air hose immediately available, complete the coupling and drive slowly to the nearest facility with an air hose. Do not risk overheating the flat tire by driving too fast.

PROBLEM #3: All too often, especially during cold weather, the trailer brakes may be frozen and will not turn as the trailer is pulled.

SOLUTION: Try to loosen the brakes by tapping the relay valve and low points in the line to dislodge any ice. Also tap the brake drum with a hammer. If this doesn't help you may have to use hot water, a torch or even a hair dryer to melt ice from the brakes.

UNCOUPLING PROCEDURES

Once you have checked for hazards and obstacles and have parked the trailer in the desired location, shut off the trailer air supply to lock the trailer brakes. Back up gently so you can more easily release the fifth wheel locking lever. Set the parking brake while the tractor is pushing against the kingpin. This will hold your rig with pressure off the locking jaws, so the lock is easier to release. With the parking brakes engaged, leave the tractor and put chocks on the front of the trailer tires.

You may then lower the landing gear. Unhook the crank from its travel position, shift to high gear and turn it counterclockwise. This will lower the landing gear. Turning the crank will be fairly easy until the dolly plates come into contact with the ground. Then shift to low gear and crank until most of the trailer weight is on the dollies and not on the tractor. Don't lift the trailer off the fifth wheel.

Be aware of the dolly plates as you lower the landing gear. Some landing gear assemblies have plates which sit flat on the ground in their lowered position. These plates are connected to the dolly leg by heavy duty swivels. These swivels allow the dolly to sit evenly on uneven or rough surfaces. If the plate has swung into a position which would keep it from sitting flat on the ground it could be damaged and become useless. If it is in such a position, reposition it so it will sit flat when lowered.

It is also wise to check the surface that the dollies will be sitting on when lowered. A heavily loaded trailer can sink in to hot asphalt or loose dirt. On such surfaces you should always place something, a wide plank or dolly pad, under the landing gear plate. Cement is virtually the only surface which is likely to support a loaded trailer without allowing it to sink.

As you crank the gear watch the joint between the fifth wheel and the trailer. When you see them start to separate you can stop cranking. After the landing gear is fully lowered replace the crank handle in its travel position. More than one person walking past a trailer has been injured by a free-swinging or projecting handle.

Now you can disengage the fifth wheel locking mechanism. This is done by using the release lever. The release lever may be permanently attached to the locking mechanism and can be accessed from the side of the fifth wheel. Reach under the trailer, grab the release lever and pull. This will disengage the locking mechanism. Keep your legs and feet clear of the rear tractor wheel to avoid being injured.

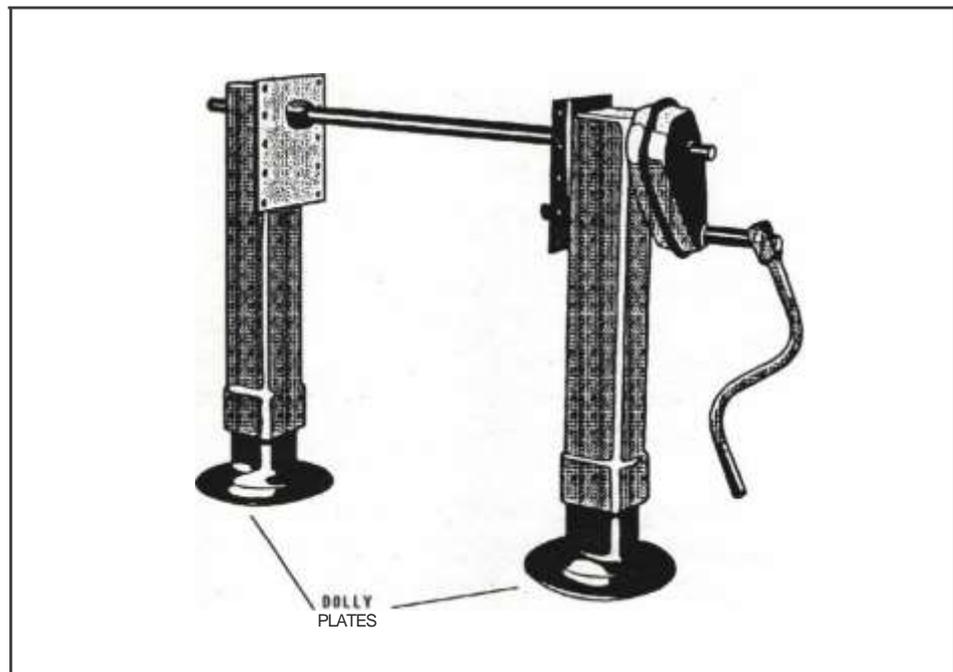
Other types of release levers are removable. When not in use this type should be kept in its proper place in the tractor side compartment. The removable release handle has a hook which fits into a slot on the fifth wheel jaw release. Simply place the hook in the slot and pull. If you are assigned to drive a tractor with a removable release lever handle, make doubly sure the handle is in its place before driving the vehicle. You will not be happy to find the handle missing when attempting to release the fifth wheel far from home.

Next you should disconnect the air supply lines and electrical cable from the trailer. Stow each in its proper position at the rear of the tractor. Lines should be supported so they won't be damaged while driving the

tractor. Hang the electrical cable with the plug down to keep water from getting in. Once the tractor is completely uncoupled from the trailer you can safely pull away. Pull away from the trailer slowly. Stop with the tractor frame under the trailer. That way, if the landing gear collapses, the tractor will keep the trailer from falling to the ground. Apply the parking brake and leave the cab. Check one last time that the ground and the landing gear support the trailer. Then get back in the tractor, release the parking brakes and drive the tractor clear.

fig. 16-5

Some landing gear assemblies have pads for dolly plates, as shown here. Others have wheels and still others have plates that swivel.



COMMON PROBLEMS AND SOLUTIONS

PROBLEM #1: No matter how hard you pull the fifth wheel release handle the locking jaw will not open. The kingpin may be stuck in the locking mechanism.

Coupling and Uncoupling

PROBLEM #2: The trailer will not allow the tractor to pull from under it. Friction is causing the tractor to drag the trailer and no chocks are available.

SOLUTION: Crank the trailer higher with the landing gear. If you can't raise the trailer any further, then reconnect the air supply lines and engage the trailer brakes. Pull slowly forward until the tractor is free of the trailer. Do not forget to disconnect the air lines before driving completely away from the trailer.

PROBLEM #3: Ice or snow on the ground is causing the tractor to slide or slip while uncoupling (or while coupling, for that matter).

SOLUTION. If your vehicle has an inter-axle differential lock, use it to get more traction. If not, salt or sand the path the tractor will follow to get out from under the trailer. In all cases, proceed with extreme caution.

SAFETY PRECAUTIONS

In the interest of safety, we'll remind you that any time you plan to back your tractor to a trailer for coupling you should fully inspect the area for safety hazards like boards, nails, curbs or people. Correct any dangerous conditions before going any further.

Follow the procedures outlined, step for step. Don't take shortcuts, rush the job or force anything into place. Do it the hard way, that's usually the best and safest way to proceed.

The final piece of advice is: GO SLOW.

QUIZ

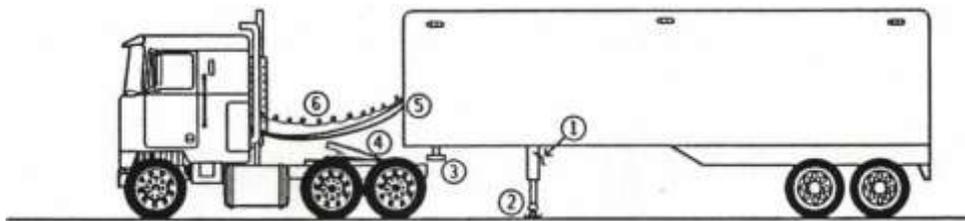
1. Under slippery conditions, unlock the inter-axle differential to get more traction.
A. True
B. False
2. A poorly lubricated fifth wheel should be _____
A. salted down
B. greased
C. dried off
D. sanded down

3. If a single light on the trailer is not working, the

_____ should be checked.

- A. entire electrical system
- B. electrical connection to the trailer
- C. electrical connection to the tractor
- D. light bulb

Refer to this sketch of a tractor and trailer to answer Questions 4 through 9. Complete the sentence by inserting the number of the component that makes the statement true.



4. The _____ should be the first connection you make from the tractor to the trailer.

5. The jaws of the tractor fifth wheel lock onto the _____ of the trailer.

6. The _ _ _ _ must be connected to check the trailer lights.

7. Always secure the _____ when you are done using it.

8. When coupling, the _____ should be the last trailer component moved from its original position.

9. The driver should check the alignment of the _ _ _ _ before backing the tractor under the trailer.

10. Only when there's ice or snow does a driver have to inspect the area around the trailer before backing.

- A. True
- B. False

SLIDING FIFTH WHEELS AND TANDEM AXLES

INTRODUCTION

Many tractor-trailers have a sliding fifth wheel on the tractor and sliding tandem axles on the trailer. Tractor-trailers can have either one or both of them.

The sliding fifth wheel can:

- Adjust the overall length of the tractor-trailer.
- Adjust the turning radius of the vehicle.
- Adjust and balance the weight on each of the axles.

The sliding tandem axles on the trailer can:

- Adjust the tracking angle of the trailer.
- Adjust the turning radius of the vehicle.
- Adjust and balance the weight on each of the axles on the trailer.

As you can see, wheels and axles have similar effects on both the tractor and trailer. Their positions are very important to the driver if he or she wishes to safely and legally haul a load. Remember, the driver is responsible for:

- The legal gross vehicle weight of the vehicle.
- The amount of weight per axle.
- The overall length of the vehicle.
- The rig's maneuverability and ability to turn safely, should state or local restrictions apply.

The purpose of this chapter is to help you learn how to slide the fifth wheel and the trailer tandem axles. You will also learn some of the basic reasons for making these adjustments to a rig.

SHIFTING WEIGHT

When a trailer is coupled to a tractor, some of the weight of the trailer is transferred to the tractor through the connection with the fifth wheel. If the freight is evenly distributed in the trailer, standard trailer axle and fifth wheel settings will properly distribute the weight on each axle.

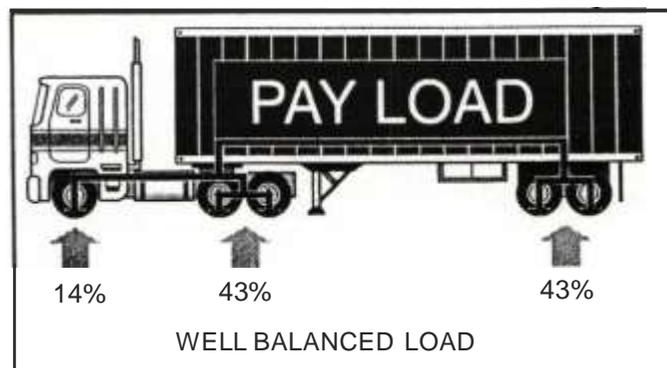


Figure 8-1

Some trailers have sliding tandem axles to transfer weight to the tractor if the load in the trailer is not evenly distributed. The amount of weight transferred to the tractor can be adjusted by sliding the tandem axles on the trailer toward the rear. This will increase the amount of weight on the drive and steering axles of the tractor.

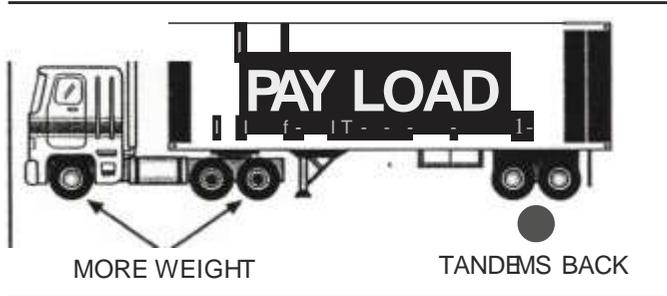


Figure 8-2

tandems *forward*, you can shift weight off the tractor.

behind the trailer's tandem axles to actually tip the

Shifting the weight decreases the amount of weight on the drive and steering axles of the tractor.

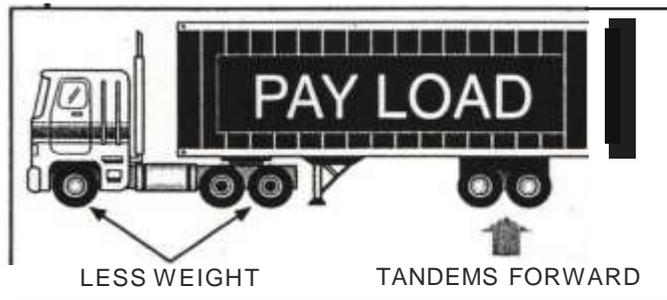


Figure 8-3

Some tractors have a sliding fifth wheel. It can adjust the length of the tractor-trailer and balance, or shift, some of the weight from the trailer to between the steer axle and drive axles of the tractor.

By sliding the fifth wheel on the tractor *forward*, you can transfer

weight to the steer axle and also shorten the overall length of the vehicle. If too much weight is shifted to the steer axle, the tractor will be hard to steer. It will also be harder to maneuver. If you shift too much weight, the rig may also be overweight according to regulations on the steer axle. At night, your headlights will not be aimed properly, and you will not see as well.

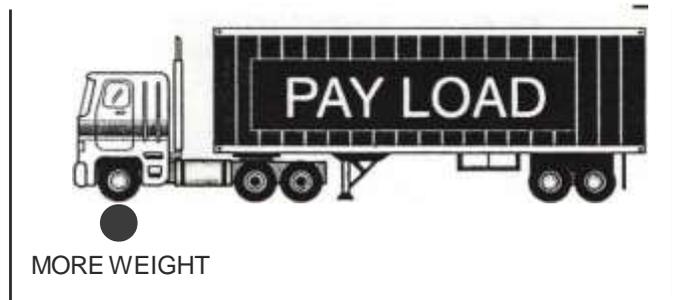


Figure 8-4

If you slide the fifth wheel on the tractor toward the rear, you can reduce the amount of weight on the steer axle, but you will increase the total length of the tractor. If too much weight is shifted off of the steer axle, the

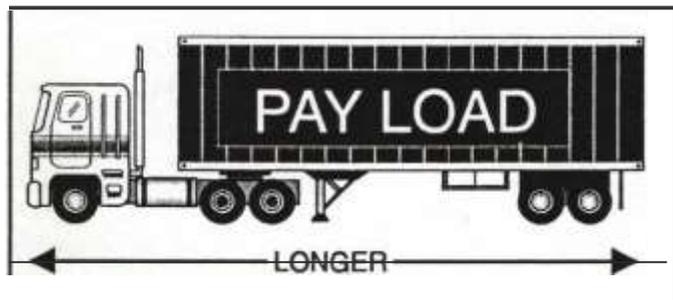


Figure 8-S

LIDING FIFTH WHEELS AND TANDEM AXLES

steering will feel light, and you will not have as much control of the steering. Shifting too much weight off the steer axle can also make the rig overweight on the drive axles. At night, your headlights will be aimed at the sky instead of on the road ahead.

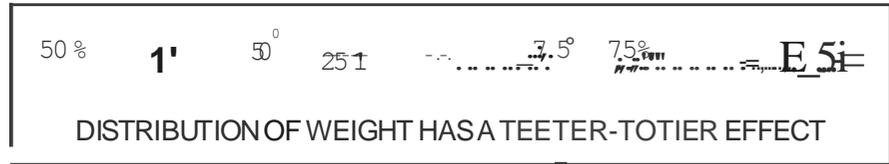


Figure 8-6

As you can see, the positions of the fifth wheel and the trailer tandem axles have a lot to do with the weight per axle and handling of the rig.

MANEUVERABILITY AND OFF-TRACKING

The maneuverability and off-tracking of the tractor-trailer are affected by the position of the trailer tandems and the position of the fifth wheel. When you slide the fifth wheel to the rear of the tractor, the overall length of the vehicle increases. The distance between the steer axle and the kingpin also increases along with the distance to the trailer tandem axles.



Figure 8-7

When you turn, the greater the distance between the steer axle and the pivot point (kingpin) of the trailer, the further the trailer will off-track. The swept path of the trailer will increase. You will need more space to make a turn.

The position of the tandem axles of the trailer also affects off-tracking and the space needed to turn. When you slide the tandem axles all the way to the rear, the distance between the kingpin and the rear axle wheels

increases. The overall length of the vehicle does not change, but the amount of space needed to turn increases.

When the tandem axles are all the way back, trailer off-tracking increases and so does the swept path of the vehicle. The sharper the turn, the more the rear wheels will off-track.

When you slide the tandem axles forward and the distance between the kingpin and the rear axles decreases, the rig is easier to maneuver. There is also less trailer off-tracking. This is very helpful when you are making deliveries. You must also be very careful when the tandem axles are all the way forward because there is a trailer overhang.

As you can see, the benefits of sliding the tandem axles forward when you drive in downtown traffic can be offset by the possible dangers of trailer overhang.

THE FIFTH WHEEL

There are two types of fifth wheels.

1. Fixed (stationary)
2. Sliding

A fixed, or stationary, fifth wheel is usually mounted directly on the frame rails of the tractor by a bracket assembly. The bracket assembly allows the fifth wheel to *rock* up and down. The stationary fifth wheel is placed to get the best weight distribution between the tractor's steer axle and the drive axle(s) of a properly loaded trailer. Weight adjustments are made by sliding the tandem axles of the trailer.

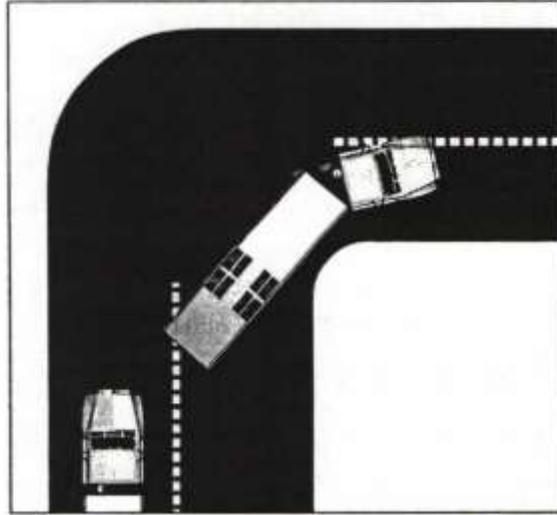


Figure 8-8

Sliding fifth wheels are attached to sliding bracket assemblies. The sliding bracket assemblies can be attached to a base that has a sliding rail assembly built into it. The base is then attached to the frame rails of the tractor. Sometimes the sliding rails are attached directly to the frame rails of the tractor. Then the fifth wheel and sliding bracket assembly are attached directly to them.

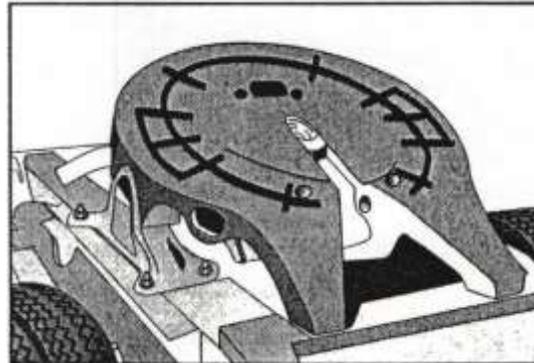


Figure 8-9

The fifth wheel has a locking device that holds the sliding assembly in place. There are two types of locking assemblies.

1. Manual release
2. Air operated release

The manual release allows you to release, or unlock, the sliding mechanism by pushing or pulling a release handle. This release handle may be on the driver's side of the fifth wheel or directly in front of the fifth wheel. When the handle is pulled to the unlock position, the locking pins are released from the locking holes, or notches, on the mounting base or sliding rail assembly.

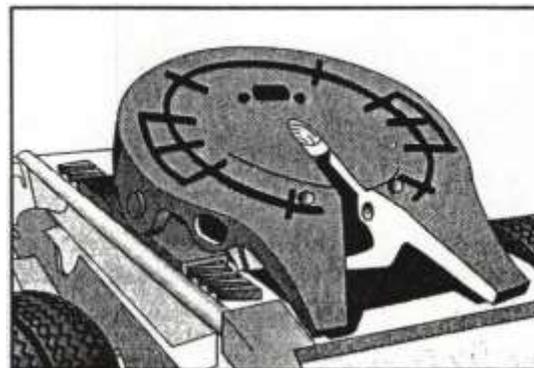


Figure 8-10

SLIDING FIFTH WHEELS AND TANDEM AXLES

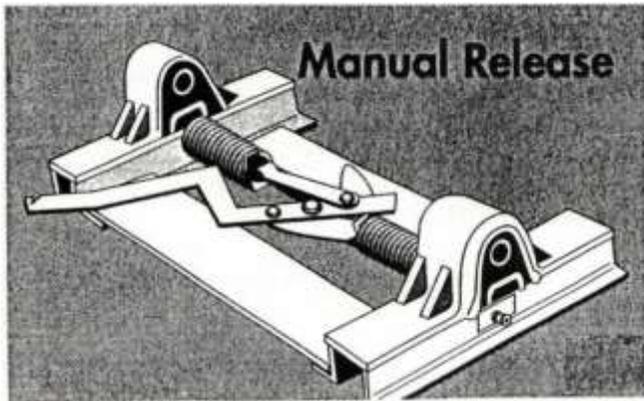


Figure 8-11

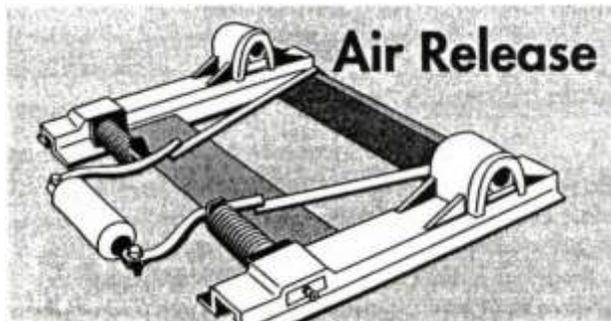


Figure 8-12

fifth wheel, and the kingpin locked into place. The air and electrical lines should be connected to the trailer. If the trailer has a sliding tandem axle, it should be locked into place. Be sure to put on the tractor parking brake before getting out of the cab for any reason. This will keep the tractor from rolling away.

Test the connection to the trailer by gently pulling forward with the trailer brake on. If you have just made the connection to the trailer, look at the connection to make sure the fifth wheel jaws are locked around the kingpin of the trailer. Then crank up the landing gear of the trailer.

The next step is to place the fifth wheel release lever, or handle, in the unlocked position. Put on your trailer brakes either by pulling down your trailer brake hand valve (if you have one) or by pulling out the red trailer air supply

The air operated release lets you release the locking device on the sliding fifth wheel by moving the fifth wheel release lever in the cab to the unlocked position. When the lever is in the unlocked position, air is forced against a piston on the fifth wheel locking device. The piston forces the locking pins to release from the locking holes, or

"notches, on the mounting base or sliding rail assembly.

SLIDING THE FIFTH WHEEL

Sliding the fifth wheel is not very hard. It should be done on a level surface, off the road, and away from hazards. The trailer must be properly connected to the locked

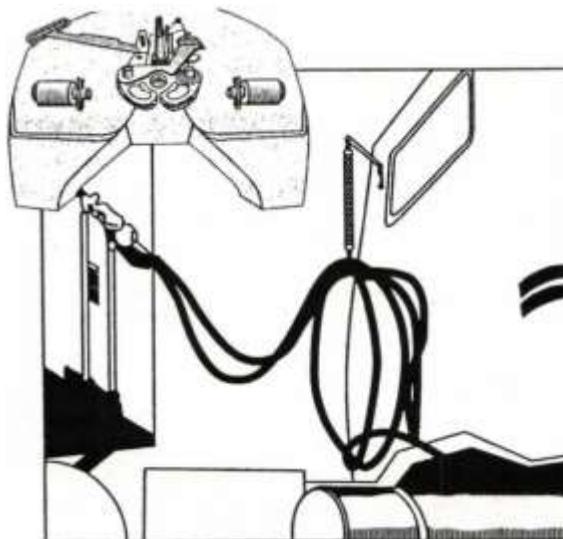


Figure 8-13

valve. Release the tractor parking brake valve. Your tractor brakes are now released and your trailer brakes engaged. You are ready to slide the fifth wheel.

If you are going to slide the fifth wheel forward, put the tractor into reverse. If you want to slide the fifth wheel backward toward the rear of the tractor, use low gear. With the tractor in gear, ease the tractor

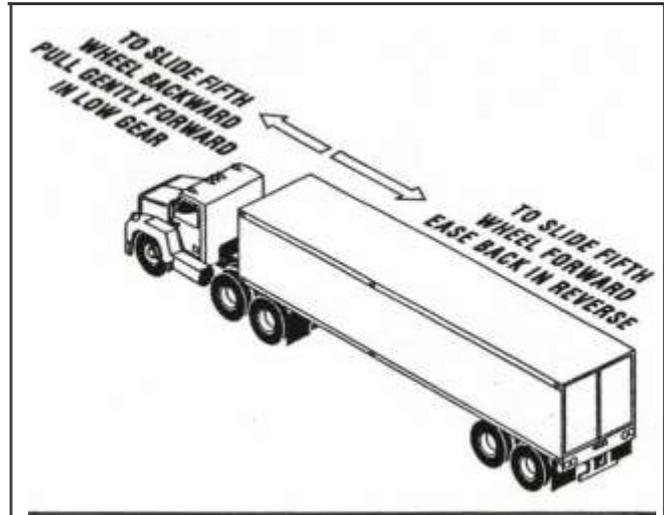


Figure 8-14

QUICK REVIEW - Sliding the Fifth Wheel

1. Make sure the tractor is properly *coupled* to the trailer.
2. Place the fifth wheel release in the *unlocked* position.
3. *Set the trailer brakes* using the hand valve or by pulling the red trailer air supply valve.
4. *Release the tractor brake* or parking brake system.
5. *Ease the tractor gently* in the direction you want to move the fifth wheel.
6. Place the fifth wheel release in the *locked* position.
7. With the trailer brakes still set, gently *tug or push* against the trailer to seat the locking pins.
9. Set the tractor brakes and *visually check* that the fifth wheel slider is properly locked into place.

Remember you have just *changed the rig's overall length*.

TRAILER TANDEM AXLES

Not all trailer axles are tandem axles. A light duty trailer may have just one axle. In this case, the axle is usually stationary, or fixed. Trailers with a high rated cargo carrying capacity usually have tandem axles. All trailer axles are attached to a suspension system and sub-frame.

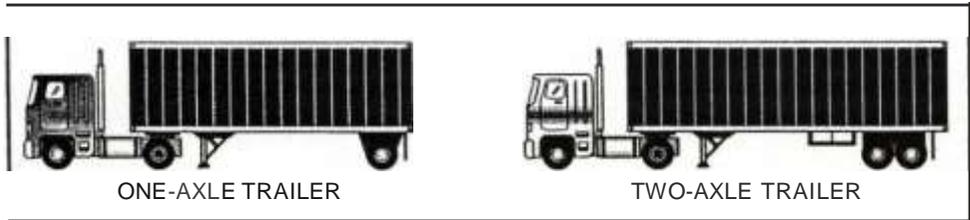


Figure 8-15

Trailer tandem axles can be grouped into two types:

1. Fixed (stationary)
2. Sliding

A fixed, or stationary, trailer tandem axle assembly includes the suspension and sub-frame. The assembly is usually mounted directly on the frame rails of the trailer. The stationary tandem axle assembly is placed to get the best weight distribution between the tractor and the trailer. Weight adjustments between the tractor and the trailer are then made by moving, or shifting, the load inside the trailer.

The sliding trailer tandem axle assembly is also mounted directly on the frame rails of the trailer. The difference is that the sub-frame assembly allows the trailer axles and suspension to slide, or move along, the frame rails of the trailer. The part of the sub-assembly that slides is called the tandem axle slide. There is one slide on each side of the trailer.

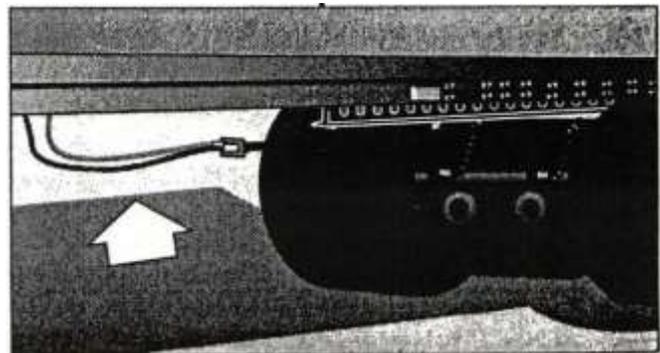
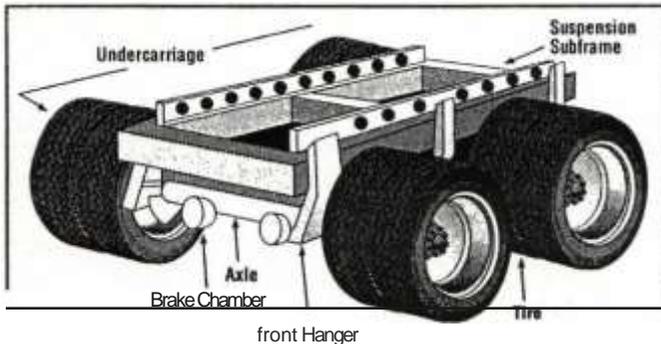


Figure 8-16

You will notice there are evenly placed holes along the length of the slide. The holes are designed to seat four locking lugs or pins. These locking pins or lugs are attached to a lever, or handle, called the lug control lever. You engage the lug control lever manually. There is no cab control switch as with an air operated assembly. At the ends of the sliding rails, there are stops that keep the assembly from coming apart when you slide the axles.

SLIDING THE TRAILER TANDEM AXLES

Sliding the trailer tandem axles is very similar to sliding the fifth wheel. It should be done off the road, on a level surface, and away from hazards.

- The trailer must be properly connected to the fifth wheel.
- The kingpin should be locked into place.
- The air and electrical lines should be connected to the trailer.
- The sliding fifth wheel and the trailer's sliding tandem axle assembly must also be locked.

If you must get out of the cab for any reason, be sure to put on the tractor parking brake. This will keep the tractor from rolling away.

Now you are ready to test the connection to the trailer by gently pulling forward with the trailer brake in the *on* position. If you have just made the connection to the trailer, look at the connection to make sure the fifth wheel jaws *are locked* around the kingpin of the trailer. Then *raise* the landing gear of the trailer.



Figure 8-17

The next step is to locate the pin or lug control lever. It is usually on the driver's side of the trailer and just in front of the trailer wheels. The lever is usually inside the lever guide that serves as a support. Some units have a safety pin or lock on the lever guide that keeps the lever from bouncing up and down while traveling.

You will note the lever controls four locking pins, two on each side of the trailer. Lift and pull this lever toward you until the grooves on the lever line up with the slot on the lever guide. Then slip the lever into the sideways slot. The slot will hold the lever in the *unlocked* position. Make sure the lever is firmly seated in the slot.

Now that you have unlocked the slides, it is important to make sure all four locking Jugs are completely out of the holes in the slides. Check the lugs on each side of the trailer. If any are not all of the way out of the holes, you will have to repeat the unlocking procedure.

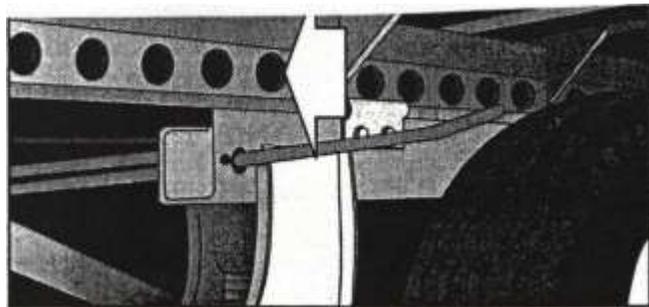


Figure 8-18

Get in the cab again. *Engage* the trailer brakes by either pulling down the trailer brake hand valve or by pulling out the red trailer air supply valve. *Release* the tractor parking brake valve. You now have your tractor brakes released and your trailer brakes engaged. You are ready to slide the tandem axles. If you have wheel chocks, use them. They will keep your locked wheels from dragging along the pavement and scuffing the tires.

SLIDING FIFTH WHEELS AND TANDEM AXLES

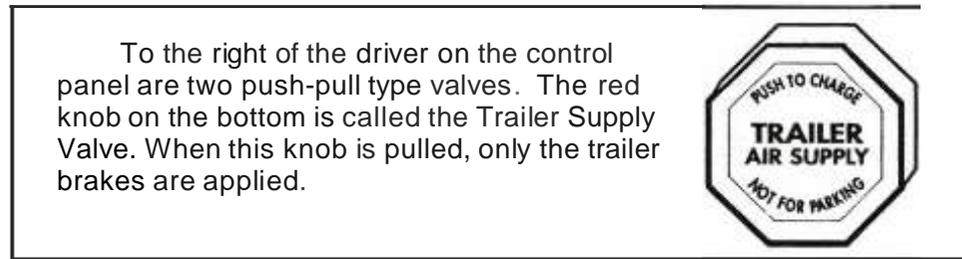


Figure 8-19

If you are going to slide the tandem axles *forward*, put the tractor into *reverse*. If you want to slide the tandem axles *backward* toward the rear of the trailer, use *low gear*. With the tractor in gear, ease the tractor forward or backward gently.

If the tandem axle assembly has not been moved for quite some time, the sliding assembly may resist (bind) when you do this. To let the assembly move freely, you will need to find out why it is binding.

Look at the locking pins first to be sure that they have *unlocked*, and the tandem axles are free to *slide*. There may be pressure on the pins holding them in place. If the pins appear to be stuck or binding, you can usually correct this problem by gently rocking the tractor against the trailer.

Corrosion, dirt, or grime may have worked their way into the slides themselves. This creates more friction and can cause them to lock up. You may have to *clean* some of the road grime off the slides so they will work properly.

Once you have moved the sliding tandem axle to the position where you want it:

- Put on the parking brakes.
- Climb out of the truck.
- Release the lug control lever, and place it into the locked position.
- Get back in the tractor.
- Release the tractor brakes.

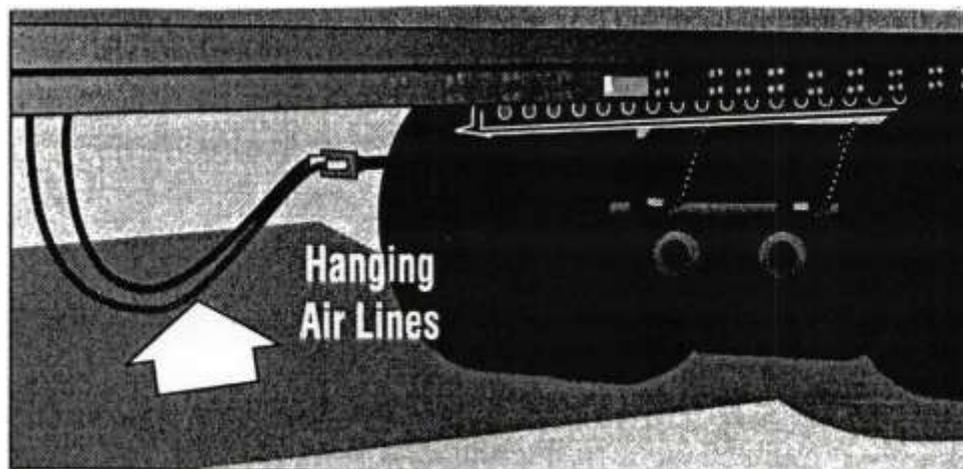


Figure 8-20

With the trailer brakes still *set*, gently tug or push against the trailer. This will let all four locking pins or lugs seat themselves. *Set* the tractor brakes, and *look* at all four lugs or pins to be sure they are firmly seated through the holes in the tandem axle slides. Make sure the lug control lever has remained locked and is secured. If you have moved the tandems forward, make sure the air supply lines under the trailer are not hanging down. If they are hanging down, something along or in the road can damage or cut the lines.

Now that you have moved the sliding tandem axle, remember you have just changed your axle dimensions. This will make a difference in your ride, weight distribution, and maneuverability.

- If you moved the tandems *forward*, you now have an *overhang* that you must pay attention to on curves and turns.
- If you slid it toward the *rear*, your *off-tracking* will increase. You will have to compensate for this when maneuvering and turning.

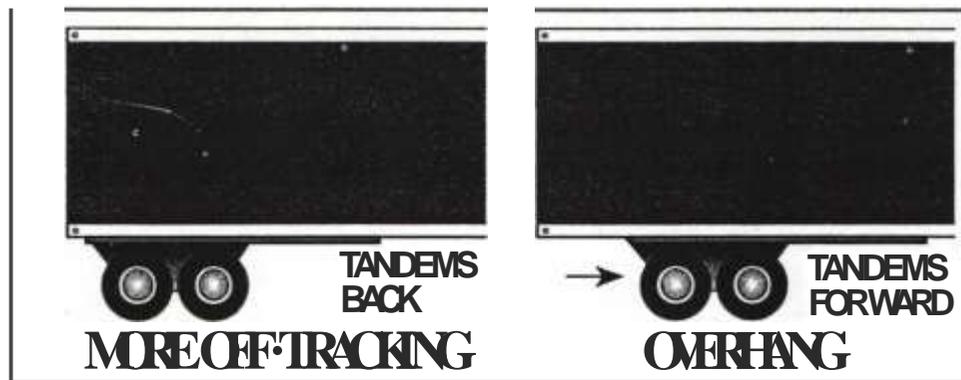


Figure 8-21

It is always best to decide how you want to set up your rig for loading before it is actually loaded. It is easier to make adjustments on any empty unit than on a loaded one. Even though it may be hard in the beginning, try to become skilled in doing this.

A good way to learn is to keep a notebook on each customer. In it, describe how you set up your rig for the load, as well as directions for getting to the stop, their phone number and the person to talk to, the days and hours they ship, whether they are seasonal, and is an appointment needed. Then you will be able to set your rig before it is loaded because you have a diary of the loads you have already hauled.

How you adjust your fifth wheel and axles depends on a combination of factors.

- Distribution of weight
- Overall length laws
- Legal axle weight limits
- Bridge weight laws
- Handling stability
- Maneuverability
- Preventing damage to the cargo

SLIDING FIFTH WHEELS AND TANDEM AXLES

QUICK REVIEW - Moving the Sliding Tandem Axle

1. Make sure the cab is properly *coupled* to the trailer.
2. *Set* the tractor brakes.
3. *Lift and pull* the lug (locking pin) control lever until the grooves slip into the sideways slot on the lever guide. This will disengage the locking pins/lugs.
4. *Check* to make sure all four lugs are retracted properly.
5. *Set the trailer brakes* by pulling out the red trailer air supply valve or pulling down the trailer brake hand valve.
6. *Release the tractor brakes* by pushing in the yellow parking brake valve.
7. *Ease* the tractor gently in the direction you want to move the sliding tandem axles.
9. *Reset* the tractor brakes by pulling out the yellow parking brake valve.
9. *Release* the lug/pin control lever. Place it into the *locked* position.
10. *Release* the tractor brakes.
11. With the trailer brakes still *set*, gently tug or push against the trailer to seat the locking lugs.
12. *Reset* your tractor brakes.
13. *Look* at all four lugs/pins to make sure they are firmly seated through the holes in the tandem axle slides. Make sure the lug control lever has remained locked and is secured.
14. *Inspect* the trailer air supply lines for clearance under trailer. Be sure they are not hanging down.

Remember that you have just made changes to your tandem axle setting. This will affect the handling of the tractor-trailer.

SUMMARY

In this chapter, you have learned the reasons for sliding either the fifth wheel or the trailer tandem axles. You have also learned that doing this will change the distribution of weight as well as the overall length of the rig, maneuverability, and off-tracking of the trailer wheels. The correct ways to slide the fifth wheel and the tandem axle assembly were explained and illustrated. Finally, you found there can be hazards if these procedures are not done correctly.

KEY WORDS

Air operated release: The device on a fifth wheel that allows you to release the locking mechanism on the sliding fifth wheel by moving the fifth wheel release lever in the cab to the unlocked position.

Frame Rails: Steel beams that run the length of the tractor and trailer. Lug

lever: The device that unlocks locking lugs on a sliding tandem axle.

Manual release: The device on a fifth wheel that allows you to release, or unlock, the sliding mechanism by pushing or pulling a release handle.

Maneuverability: The ability of the tractor-trailer to change direction while moving.

Off-tracking: When the rear wheels of a tractor-trailer follow a different path than the front wheels while making a turn.

Release: The device that unlocks locking pins on a sliding fifth wheel.

Slides: Sliding assemblies for the fifth wheel and the tandem axle.

Sliding fifth wheels: Fifth wheels that are attached to sliding bracket assemblies and can be moved.

Stationary fifth wheel: A fifth wheel that is placed to get the best weight distribution between the tractor's steer axle and the drive axle(s) of a properly loaded trailer.

LEARNING ACTIVITIES

Review Questions

1. Who is responsible for the gross vehicle weight and the weight per axle of the tractor-trailer?

2. What is the purpose of the sliding fifth wheel?

3. Explain what happens to the weight per axle of the tractor when you move the fifth wheel forward toward the cab.

4. Explain what happens to the weight per axle of the trailer when you move the fifth wheel forward toward the cab.

5. Explain what happens to the weight per axle of the tractor when you move the fifth wheel rearward toward the trailer.

6. Explain what happens to the weight per axle of the trailer when you move the fifth wheel rearward toward the trailer.

7. What is the purpose of the sliding tandem axle?

forward toward the cab.

8. Explain what happens to the weight per axle of the tractor when you move the sliding tandem axle rearward toward the trailer.

9. Explain what happens to the weight per axle of the tractor when you move the sliding tandem axle

Review Quiz

PART A: Sliding Fifth Wheel

List the following steps in the correct order for sliding the fifth wheel. Each step is used only once, so you can cross off the steps as you use them.

- A. Remember you have just changed the rig's overall length.
- B. Set the tractor brakes and visually check that the fifth wheel slider is properly locked into place.
- C. With the trailer brakes still set, gently tug or push against the trailer to seat the locking pins.
- D. Set the trailer brakes using the hand valve or pulling the red trailer air supply valve.
- E. Make sure the cab is properly coupled to the trailer.
- F. Ease the tractor gently in the direction you want to move the fifth wheel.
- G. Place the fifth wheel release in the locked position.
- H. Release the tractor brake or parking brake system.
- I. Place the fifth wheel release in the unlock position .

Sliding Fifth Wheel Procedure

1. _____ 2. _____ 3. _____ 4. _____ 5. _____
6. _____ 7. _____ 8. _____ 9. _____

Review Quiz

PART B: Sliding Tandem Axle

List the following steps in the correct order for sliding the tandem axle. Each step is used only once, so you can cross off the steps as you use them.

- A. Ease the tractor gently in the direction you want to move the sliding tandem axles.
- B. Release the tractor brakes. With the trailer brakes still set, gently tug or push against the trailer to seat the locking lugs.
- C. Inspect the trailer air supply lines for clearance under the trailer. Be sure they are not hanging down.
- D. Reset your tractor brakes and look at all four lugs/pins to make sure they are firmly seated through the holes in the tandem axle slides.
- E. Remember that you have just made changes to your tandem axle setting. This will affect the handling of the tractor-trailer.
- F. Make sure the tractor is properly coupled to the trailer.
- G. Lift and pull the lug (locking pin) control lever until the grooves slip into the sideways slot on the lever guide disengaging the locking Jugs.
- H. Release the lug/pin control lever. Place it into the locked position .
- I. Release the tractor brakes by pushing in the yellow parking brake valve.
- J. Set the tractor brakes.
- K. Reset the tractor brakes by pulling out the yellow parking brake valve.
- L. Set the trailer brakes by pulling out the red trailer air supply valve or pulling down the trailer brake hand valve.
- M. Check to make sure all four lugs are retracted properly.

Sliding Tandem Axle Procedure

1. _____ 2. _____ 3. _____ 4. _____ 5. _____
6. _____ 7. _____ 8. _____ 9. _____ 10. _____
11. _____ 12. _____ 13. _____

SLIDING FIFTH WHEELS AND TANDEM AXLES

10. Explain what happens to the weight per axle of the trailer when you move the sliding tandem axle rearward toward the trailer.

11. Will off-tracking increase or decrease when you move the fifth wheel rearward toward the trailer?

12. Will off-tracking increase or decrease when you move the sliding tandem axle forward toward the tractor?

13. Name the two types of locking devices that lock and unlock the sliding assembly.

14. What is the name of the locking device that locks and unlocks the trailer sliding axle?

15. How many locking lugs or pins are part of the sliding tandem axle? Where are they located?

16. What should you do if the sliding fifth wheel is binding?

17. What should you do if the sliding tandem axle is binding?

18. What four things will change when you move the fifth wheel?

19. What four things will change when you move the sliding tandem axle?

Curves, Turns, Intersections and Upsets

Anything other than a straight line in the highway is a curve or turn and should cause warning bells to flash in truck driver's minds. It means danger, an accident is likely to happen if not handled carefully.

If you do not think that is so, watch as you travel down the highway and read the tracks. That's right, like a hunter in the wild country reading signs on the ground and knowing what has happened in the recent past.

You can learn to read the "tracks" on the highway and know about accidents that have happened before. You can learn to look at the skid marks, torn up pavement, damaged ditches, trees, and signs in the area and know what has happened in the area.

Notice the "tracks" around curves and intersections and take note of these high accident areas. These are the areas you should be extra alert in.

When approaching a curve/turn, it is important to analyze that turn before entering it. There are five different items you should learn to look for on every curve/turn. We will call them the "five signs of a dangerous curve".

1. Tracks.
2. Turning angle.
3. Bank angle.
4. Gripping surface.
5. Obstacles.

We will talk about each one separately.

Tracks

Those "tracks" should serve as a warning about the road you are on. If there are a lot of "tracks" as you approach the turn, you know it has been the site of accidents.

Skid marks in a straight line going off the side of the highway, torn up ditches, trees, fences, or traffic warning signs could indicate the curve is sharper or more dangerous than it looks.

Skid marks curving across the highway and into the ditch should tell you to watch for traffic coming at you and possibly skidding into your path.

Two sets of skid marks that come together with chunks of the road surface gouged out, indicate a collision of two vehicles.

Remember if there are no signs, it does not mean the curve is not a dangerous one. Many curves do their sneakiest tricks only when it is wet and that of ten leaves no skid marks on the pavement to warn the next driver.

A good example is sharp interstate ramps after a long dry spell. A close look at a concrete surface will show it as being shiny and black. This is from the tires that have left a thin deposit of rubber from navigating the curved ramp.

Now think of rubber tires as being made from a dehydrated, slippery, oil-based product. When it is dry it is not so bad, but what happens when you add water to it? It is like a sheet of ice.

It does not take much liquid to turn this black, shiny surface into a real problem area. A little dew in the evening or morning, fog in the air, or spilled liquid from a passing vehicle is enough to do it.

Caution: Wet interstate ramps are very good at surprising drivers, throwing them out of control before they have a chance to realize the danger they are in.

Turning Angle

The angle of the turn can make a difference in what the speed of the vehicle should be when navigating the curve. A sharp 90° turn must be entered slower than a long sweeping 20° turn. But even a 20° turn must be entered at a somewhat reduced speed from normal straightaway speeds.

Never depend on signs to give you dependable information about curves. Traffic warning signs will *not* give you the correct information as to the safe speed of the vehicle in the turn.

There may be a sign that says there is a curve ahead, and it may show 35 MPH on that sign, but that may not be a safe speed to enter the curve. Depending on signs for warnings will get you killed. Also, keep in mind, the sign you need to see may have been torn down in an accident.

Sometimes a driver's ability to determine the angle of the curve may not accurately be determined until you are into the turn. There may be a high bank on the side of the road, brush and trees growing, or other objects blocking the driver's view. Therefore, a blind curve should be entered slower to avoid a costly surprise.

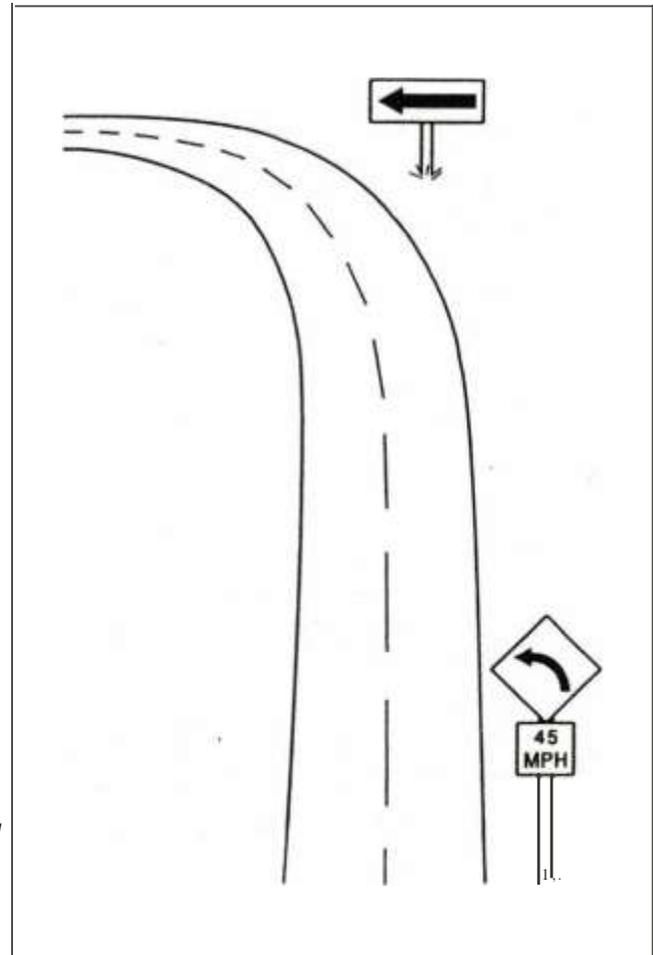


Figure 15-1. The traffic warning sign showing 45 MPH does not mean it is safe to enter the curve at 45 MPH with a truck. Note the straight arrow, dead-ahead of the curve entry. That sign is a good indication there have been several accidents at this curve and it is a tricky, dangerous curve to navigate.

Bank Angle

Have you ever seen stunt drivers riding motorcycles around a circular enclosure as though they were glued to the wall? The same principle can keep a vehicle "glued" to the road or dump it in the ditch on a curve.

If the bank angle is in proportion to the curve and the speed set for that curve, a vehicle has little trouble staying on the highway. However, if the bank of a gradual 30° turn is banked in the wrong direction, you will not be able to stay on the highway if you do not slow down slower than on a properly-banked curve.

Some highways are designed with different bank angles to help prevent water from accumulating on the surface. This is great for getting rid of surface water, but can be very dangerous when the angle is not engineered properly in the curves.

Crowned highways are high in the center and slope off to the sides allowing surface water to run off each side. Crowned highways are naturally banked in curves to the right, but these same highways are often banked in the wrong direction in curves to the left or sometimes properly banked most of the way

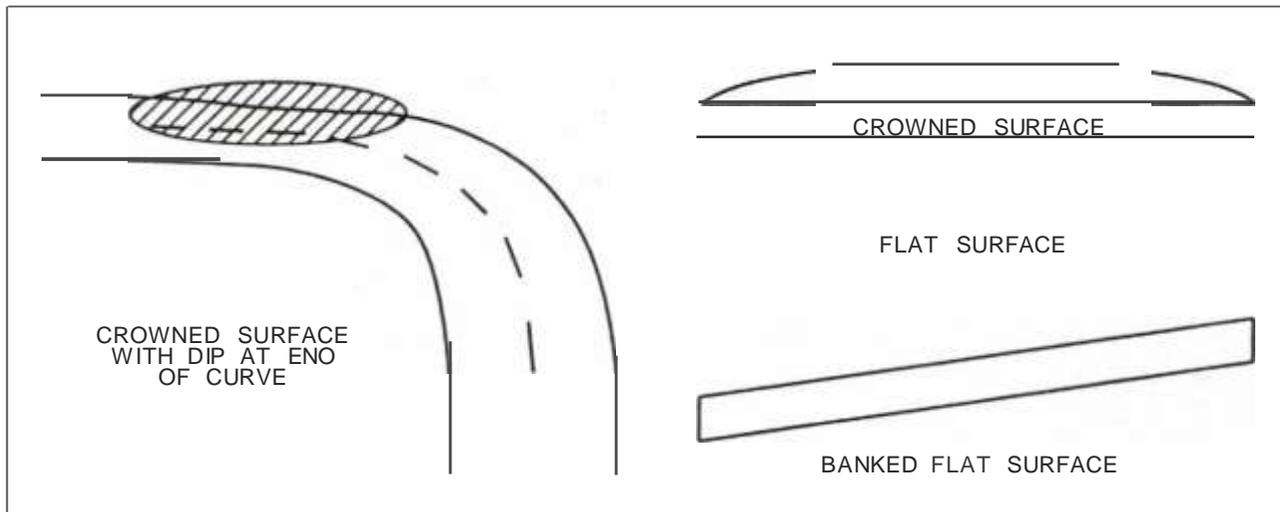


Figure 15-2. The "bank angle" can make a big difference in the safe speed needed to navigate a curve. Think of a long curve to the left with the different surfaces shown above. Some poorly engineered highways with a flat surface may bank in the wrong direction on a curve.

through the curve and then, returning back to the crowned formation part way through the curve. The curve that is banked properly only part way through the curve is a very dangerous curve and must be watched for.

Think for a moment what will happen to a driver on a narrow two-lane road with a half-full trailer loaded with liquid when encountering such a curve. The driver may enter the curve at a safe speed with everything under control, until encountering a sudden dip in the road surface that tips the truck toward the outer edge of the highway. That action by itself could cause problems, but what happens when the liquid throws its weight against the side of the vehicle in addition to the problem already encountered? It could easily cause an accident.

Gripping Surface

Learning to read the surface of the highway is somewhat like reading the tracks on the highway. By watching, you can sometimes know if the surface is slippery and be forewarned how dangerous the highway is at that spot.

A surface that looks shiny is generally slippery, and a surface that looks rough is generally a safer highway. The rough surface will grip the rubber tires better, especially when the surface is wet.

New concrete surfaces are finished with a rough surface, but after several years of wear from traffic, they will become as smooth as glass. Interstate ramps are often worn down smooth and can be like a sheet of ice in wet weather.

Asphalt surfaces can be extra dangerous at different times of their life. When first put down, they may have a slippery surface from the fresh ingredients

that are on the surface, and also, after years of wear they will become smooth and slippery.

Tar will work up through some road surfaces and in hot weather is slippery. The hot tar will not always look shiny and can be deceiving.

Brick surfaces look rough but they are generally one of the most slippery surfaces you will find, especially when wet. You find bricks on city streets where the speed limit is not fast, but it can still cause an accident.

Debris on the highway will cause loss of traction. Some of the items to watch for are wet leaves, sand, gravel, mud, fuel or other liquids, and of course deposits from weather such as water, ice, and snow.

Obstacles

Obstacles can come in many different shapes and sizes. They may be big enough to see long before entering the curve or they may be so small you will not see them until you are right on top of them. No matter what the shape or size of the objects, curves are a dangerous place to find them.

Think for a moment of navigating a long sweeping curve and suddenly finding several pieces of firewood scattered across your lane of traffic. If there is no other traffic, you may be able to use the other traffic lane, but that means you will have to turn a sharper angle than you planned. If you are traveling at a high speed this could throw you out of control.

You may have to stop and wait for traffic to clear before going around the objects, but that means using your brakes and could result in a loss of traction in an already stressful situation.

If you do not have time to stop or can not go around, you may have to run over the objects, and that could cause you to lose control of the vehicle or cause damage to it.

Notice that too much speed in any of these situations can make the difference between having or not having an accident.

Animals are one of the worst objects to be encountered because you never know what they are going to do. A horse standing beside the highway may become frightened and run head first into the front of your vehicle. A deer may jump out of the bushes and in one leap, land on the hood of an automobile.

In such situations, it is not just the animal you must be concerned about, but also the other vehicle that is dodging that animal. The vehicle may end up out of control and in your path.

Pot holes, rough roads, construction, any of these can cause an abrupt change to the smooth surface or consistent speed of your vehicle triggering a loss of control.

Hostile Conditions

Drivers often travel the same route over and over again. These can create the worst surprise. You know in your mind you have taken a certain curve at 50 MPH many times in the past. That does not mean it is safe to navigate it at that speed tomorrow.

Conditions change from day to day. Let's look at "five hostile conditions" that should be considered:

1. Road condition.
2. Vehicle condition.
3. Load condition.
4. Traffic condition.
5. Driver condition.

Road Condition

The road surface may change because of spilled liquid, sand, gravel, fuel, oil, or mud from an accident or other objects. If the surface will not grip the tires you could slip off the side of the highway or jackknife.

The dewpoint can fall upon a small patch of highway and disappear in just a few hours. The moisture from this can form water or ice on the highway. You may not know this has happened until your vehicle slides out of control.

Vehicle Condition

The vehicle condition yesterday may have been perfect, but today it may have several low tires, broken springs, different type of tires, brakes grabbing on one side, sloppy steering control, etc. Any of these can lead to an upset or loss of control.

Load Condition

The load is one item that is consistently on every Professional Drivers mind. The effect of different loads can vary so much that you may be able to safely take a curve at 55 MPH with one load and only 35 MPH with another load.

Unstable loads have upset many vehicles. Liquids in bulk containers sometimes move so much that trucks will spin on steep inclines (liquid flows to the back) or upset in low-speed yard maneuvers (liquid moves from side to side).

Unstable loads may include live stock, rubber tired vehicles, swinging loads (hanging from the roof of the trailer), or kids of material that rock around on the skid such as pop bottles. These unstable loads handle the same as bulk liquid loads and create dangerous shifting conditions in turns.

Another type of unstable load is one that is not blocked well and shifts in transit. Heavy skids may be loaded single file down the center of the trailer with no

blocking material to keep the skids from shifting to the side in turns. If the load shifts on a curve, it generally will throw the vehicle out of control and upset.

Heavy loads that are loaded high on the trailer make the vehicle top-heavy and hard to control, especially in turns. Remember that trailer is over 13 ft. high and the load is sometimes all the way to the top.

Try carrying an upright 13 ft. 2 x 4 around with 10 lbs. of potatoes tied to the top. You will soon get the idea of the tremendous force at work on a curve with a trailer loaded high with heavy freight. The top-heavy load is consistently trying to upset the vehicle.

Flexible flatbed trailers handle differently than a ridged van, and a refrigerated trailer with a load hanging from the top will handle differently from an open top with a load of steel that is only 3 ft. off the floor. You must keep in mind the load conditions when approaching a turn or you could be in serious trouble.

Traffic Condition

Any traffic at all means there is additional danger to be considered. It could be pedestrian, bicycle, auto, or truck traffic and each will demand its own type of attention.

Pedestrian traffic should be off the side of the highway and out of danger, but what if they are not? What if they have small children or pets with them?

Sighting one bicycle should make warning bells sound in your head. Keep in mind there may be a long line of bicycles stretched out for miles, or it may just be one child on a bicycle. Remember that a bicycle is not as stable as four wheels, and may dart out in your path.

Laws differ from area to area, but bicycles are often considered as another vehicle. This could mean that all of the traffic lane that the bicycle is traveling in belongs to that bicycle. Using part of the occupied lane to pass the bicycle could cause an accident and be considered as your fault. In the eyes of a jury, and the press, a big truck picking on a small bicycle - think about it.

On some narrow two-lane roads, a long truck must use more than one lane to navigate a sharp curve. This can present problems with automobile traffic at times. In some extreme situations you may have to bring your vehicle to a stop, allowing the traffic to clear before proceeding around a curve (this is very common at intersections when making sharp turns).

Encountering truck traffic can create some serious problems because of their size, but generally the driver of the other truck knows the problems about to be encountered and will work with you. It is important in such cases to keep in mind who should have the right-of-way but do not insist on it.

Traffic in front of you may encounter any of the problems mentioned above and because of those problems stop in front of you, or approaching traffic may enter your lane directly in front of you.

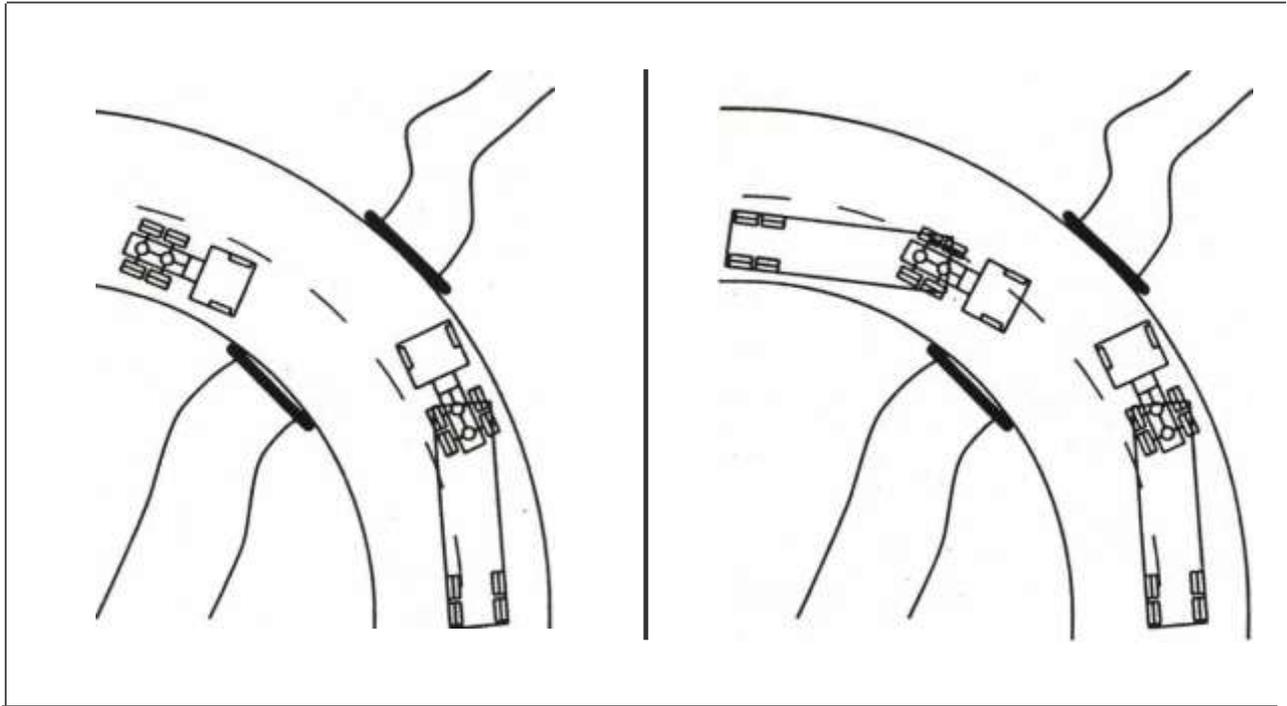


Figure 15-3. On narrow roads, curves can be dangerous when oncoming traffic is present. You do not have the right to place your vehicle out of your lane into another traffic lane if it is going to cause an accident.

Driver Condition

The person operating the vehicle is the controlling factor as to whether the vehicle will make it around the curve or end up in the ditch. Many hundreds of curves have been safely navigated by alert drivers that encountered some or several of the adverse conditions talked about above.

The key word in the last sentence is alert, and of course the driver must be safety minded also. An alert driver will be looking for signs of a dangerous curve long before entering any curve and when in doubt, will slow down slower than necessary just for safety.

Every driver will encounter times when they are not their best. You should learn to realize when those times are present and slow down an *extra* ten mph on curves just for safety.

Putting It Together

Curves/ turns should not be taken lightly and when traveling down the highway, Professional Drivers are constantly on the alert to the highway ahead. It is not just a matter of looking for curve/turns ahead, but also looking at the "five signs of a dangerous curve" and "five hostile conditions" discussed above.

Drivers should re-evaluate the curve as they travel through it. The curve may start with a good bank, solid gripping surface, gentle angle, and part way through, the curve may change enough to cause an accident.

The suggested safe speed on a warning sign does not include heavy trucks. There are too many variables involved with a truck to say that any one speed will be safe. The safest rule to follow is to watch as far ahead as you can see and study everything between you and that farthest point.

After thinking about it, you can realize that speed is what will make the difference between having an accident on the curve or not have an accident. Too much speed and you cannot use the brakes without losing traction/ control of the vehicle. Too much speed and you cannot dodge around the objects because of the increased turning angle. Also, the greater the speed, the greater the impact when the accident happens.

Interchanges

An interchange is an area where you can exit smoothly off the interstate highway onto another road on a ramp or series of ramps. These ramps may differ from one interchange to another.

An interchange may be a *full* or *partial* interchange. You may be able to exit the interstate highway, but not re-enter the same interstate at that interchange. Sometimes there will be an entrance at that interchange, but no exit, or you may have an exit that leads in just one direction.

Some states have information signs showing the type of interchange before reaching it. This gives a driver time to study their attack plan before entering the interchange area. Once in the ramp, things can happen so fast you do not have time to change your mind without creating an extremely dangerous situation in a dangerous area.

You should try to know what kind of interchange you will be encountering before entering it. Sometimes you can look at the landscape around the interchange and study the signs before entering the junction area and know about what to expect.

Let's look at figure 15-4 as though you are going north (north-south line) and are planning on going west on the crossroad. Remember, if you are facing north, west is to your left and east is to your right.

You should always know before the interchange whether you will be going to your right or to your left. Signs often help, but sometimes the signs are missing or do not tell you which *way* is east, west, north or south.

In the first drawing (A), you would have to exit on the ramp before reaching the crossroads, go to the crossroads and turn left.

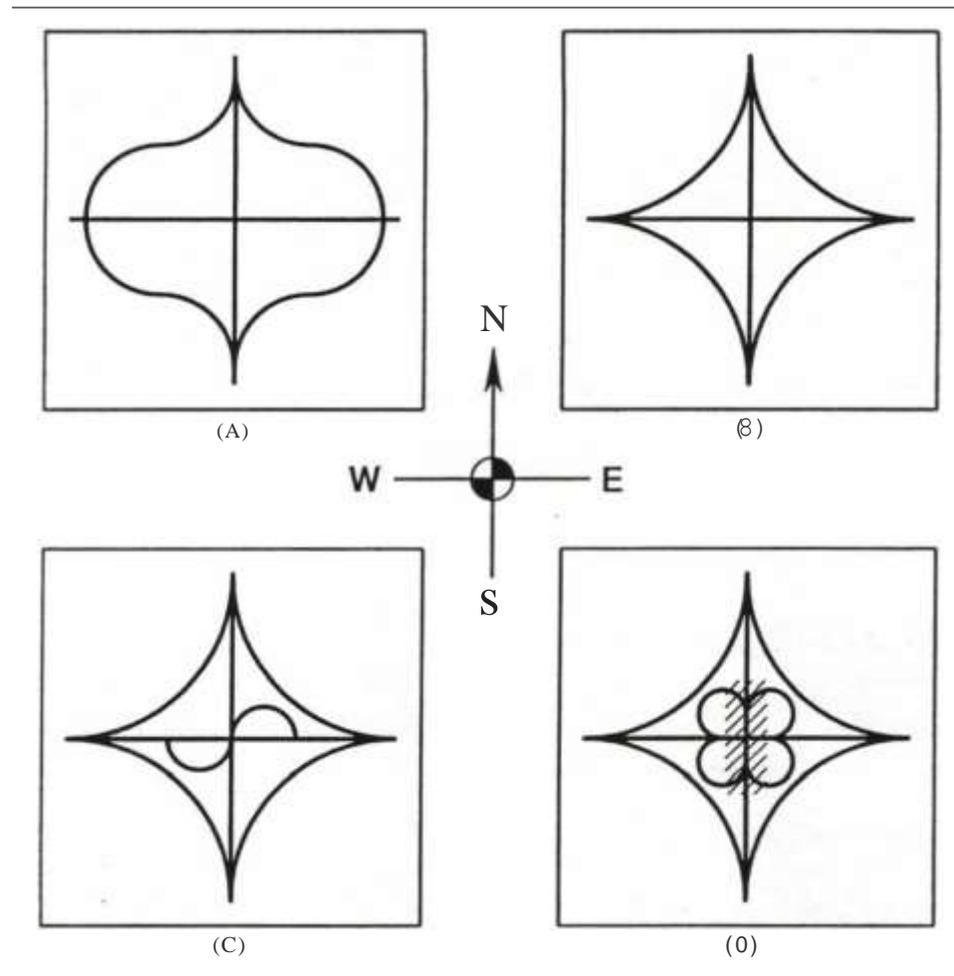


Figure 15-4. These four drawings show the basic types of Interchanges you will encounter. They may be shaped just like in the drawings or some variations close to it. Some areas have signs like these before each junction on the Interstate highway.

In drawing (B), you will have to exit on the ramp before reaching the crossroads, merge with the traffic on the crossroads going east and find a place to safely turn around and then go west. This is not a full interchange and there is not an exit ramp for west bound traffic when going north.

In drawing (C), you will have to exit on the ramp *after* passing the crossroads and make a right turn when reaching the crossroads.

In drawing (D), you will have to exit on the ramp after passing the crossroads and merge with the west bound traffic when reaching the crossroads. This interchange is sometimes called a cloverleaf, because it looks like a four-leaf clover. When there is a lot of traffic, it can be very congested in the center of the clover (shown as a shadow area).

Suppose you reached the interchange in drawing (D) and wanted to go back in the direction you were traveling? It is really simple if you plan ahead and take your time.

Interchanges are high accident areas partially because of surprises and confusion. If possible, know what you are getting into before entering the interchange.

Ramps

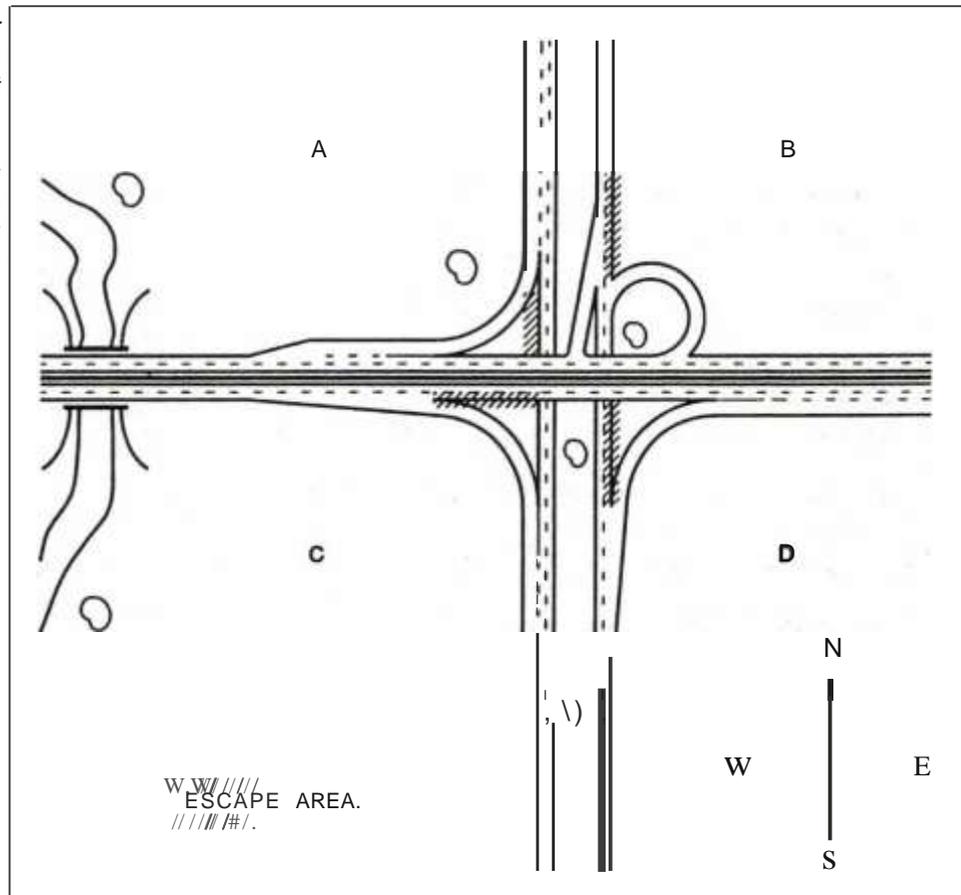
Entrance and exit ramps on interstate interchanges can present their own set of problems for the driver. The "five signs of a dangerous curve" and the "five hostile conditions" apply to the ramps also.

In addition to the previously mentioned problems with curves, ramps are generally merged into a traffic lane. They often have heavy vehicular traffic, often have blind areas where you cannot see a safe stopping distance ahead, and sometimes you must merge to the right into the fast lane of the highway.

Different areas of the country seem to have varying ideas on how to merge with the moving traffic when using an entrance ramp. There seems to be a general trend away from the *ramp traffic having to yield*, and having the *moving interstate traffic yield* to the ramp traffic.

Local area research has shown that enforcement officials do not always agree on the best way for a truck to enter into a moving stream of traffic on interstate highways. Research has also shown varying opinions on the responsibility of the driver in that moving stream of traffic when traffic is trying to merge.

Figure 15-5. Think of yourself approaching each one of the five different ramps shown. Each one presents its own challenge. The shadow areas can sometimes be used as escape areas at the last moment in an emergency.



It is no wonder there are so many accidents and near accidents at these areas when there is so much confusion. But you can be sure if there are stop or yield signs on your ramp, *you better obey them*. If there are no signs, the best advice is, do what ever is necessary to avoid an accident and try to keep the flow of traffic moving as smooth as possible.

Heavy trucks cannot maneuver as fast as smaller vehicles and require more room when merging with the traffic. Because of that Professional Drivers use all the advantages they can get on ramps.

One of those advantages is knowing what the ramp is like before using it if possible. Another is looking as far ahead as possible and studying the situation. There are as many different types of ramps as there are interchanges. Knowing some of the characteristics of the different types of ramps can save a lot of confusion when using them.

Notice the complex interchange in figure 15-5. This is showing an interstate highway crossing under a four-lane divided highway. Each one of the ramps shown is different than the others.

Braking Area

A brake area is a lane out of the main flow of traffic where vehicles can slow down without disrupting the flow of traffic on the main highway.

Look at figure 15-5 and think about entering each of the ramps shown. In ramp area (A), the right lane of traffic must all exit onto the ramp. In this ramp, a driver can slow down without much danger of slowing the traffic flow on the interstate.

In ramp area (B), traveling northbound and exiting on the ramp curving around to the right, it should be noted that there is no braking area provided. In such cases, it is important to be going slow enough to enter a sharp turn. It is also important to warn any following traffic in advance of the slow down to prevent an accident.

This type of ramp can sneak up on you very fast, causing you to enter the ramp too fast or a vehicle following to rear-end you. Keep in mind it might be best to go on down the highway, turn around and come back.

Never make U-turns at a cross-over on the interstate. You may have to go several miles out of your way to the next interchange and several miles back to the original intended exit, but that is better than having an accident or getting stuck.

Caution: Many people are killed each year from sliding under a trailer positioned crosswise in the highway while making a U-turn.

Ramp areas (C) and (D) both have a short brake area, but you should plan on slowing down some before entering the braking area. Always look ahead at the brake area before entering it and also look for an escape area in case you hit a slick spot or a small vehicle slips up beside you on the berm.

Escape areas (shadowed areas) could be called "what-if areas". That is, "What if I cannot make the turn onto the ramp".

Merge Lane

The merge lane is a lane out of the main flow of traffic where vehicles can speed up and merge with the flow of traffic on the main highway.

The merge lane can be several different types as can be seen in figure 15-5. Each one of the ramps shown has its own special merge characteristics.

In ramp area (A), the merge lane as you come onto the crossroad is short and there is no berm ahead of the ramp area that can be used in case of an emergency.

There are two ramps in area (B). One is merging from the left into the high-speed lane of traffic. This can be extremely difficult with a truck because of the limited visibility on the right side of the vehicle. Also, traffic in the high speed lane generally is going faster and is not willing to slow down and allow a slower moving truck in front of them.

The second ramp is equally difficult because the ramp has a sharp turning angle requiring a slower speed and it dumps you right into the west bound traffic without benefit of a merge lane.

Ramp (C) has a merge lane and a berm that could be used for an escape area if needed.

Ramp (D) does not need a merge lane because it creates its own lane and you do not have to merge with traffic.

Putting It Together

Interstate interchanges are very dangerous areas. Some are not engineered as well as others, but even though there are some engineering flaws, the interchanges should not have as many accidents as they do.

When we talked about the dangers to look for in curves, we summed it up by saying speed is the deciding factor as to whether the vehicle will make it around the curve or end up in an accident.

It is the same with the interstate ramps. Drivers get used to buzzing down the open, straight highway at a high speed and when they slow down for the interchange they do not realize how fast they are going. They feel as though they are going very slow but are still going very fast. Also, they are not used to things happening as fast as they do on the ramps in an emergency.

When approaching an interchange you should think of it as a danger area that must be entered alertly, cautiously, and slowly. It only takes a few seconds to navigate the ramp if you are going fast or slow. Of course if you are going *just a little too fast* it could take a *long time* to reach the end of the ramp.

Intersections

An intersection may be where two gravel roads come together or it could be an area containing several acres of land where several roads are connected together. Intersections differ from interchanges in that the "intersection" traffic must be controlled with a traffic controlling device to stop the flow of traffic. Interchanges on the other hand allow the traffic to flow continuously on and off the highway.

Intersections bring vehicles into the same path, which is okay if the vehicles are going in the same direction and maintain a space between themselves.

Intersections also bring these vehicles from different directions into that same path and sometimes at a great speed.

That too, is okay providing the vehicles do not use the same space at the same time. Too often a mistake is made and two or more vehicles occupy the same space traveling at different speeds and/ or directions. That, of course, results in an accident.

To prevent accidents at intersections there must be traffic controlling devices and laws concerning how each vehicle must respond.

Uncontrolled Intersections

This type of intersection may not have any traffic control signs or signals, but there are laws concerning driver behavior. In such cases, the driver of the vehicle on the left is to yield to the vehicle on the right.

This does not give you the right to charge through an uncontrolled intersection when you have traffic approaching from your left. Every driver should slow down before an intersection and it is advisable to place your foot on the brake pedal as you roll through the intersection. If the need arises that you must stop in a hurry, the foot on the brake pedal can possibly decrease the reaction time enough to prevent an accident.

Traffic Controlling Devices

Controlling devices at intersections can vary from lanes to move the traffic in the desired direction to a foot patrol person directing traffic in the middle of the roadway. No matter what device is used it is important to be alert and remember the other driver may not understand the device, may not see the device, the device may be damaged, or the other driver decides to beat you through the intersection.

For your safety, as well as others, keep your eyes open, slow down, be prepared to make an emergency stop, and do not insist on your right away. At intersections being dead right is not smart.

Intersections in the urban areas create more serious injuries because vehicles are moving faster. Watch all traffic carefully and make sure they are slowing down when approaching from the sides.

Traffic Circles

Some areas use traffic circles to control the flow of traffic of several roads coming together. The circle may be 200 ft. or half a mile around. The traffic coming onto the circle may have a stop or yield sign, stop and go light or merge lane for controlling entry to the circle. A few smaller circles may not have any controlling devices for entry to the circle. Generally, in this case traffic entering the circle must yield to the traffic on the circle.

Traffic circles are often one way only moving to the right as you enter. It is important to note if it is one way before entering. On small traffic circles, it is easy to make a mistake and take a short cut in the wrong direction to an adjoining roadway. This could lead to an accident or a citation.

Stop Signs

Stop signs mean just what they say. Coasting through a stop sign can be expensive and dangerous. A citation for not stopping will put points on your license, plus the cost of the fine. An accident will cost you more than a citation in time lost and damage to the equipment.

Drivers often slow down, look both ways, and pull out in front of a small vehicle. After the accident, they say they looked but never saw the vehicle. It is very possible they did not see the vehicle even though they looked in the right direction.

Humans have a blind spot in the side (peripheral) vision of each eye. For that reason, it is important to stop, turn your head, and look directly in both directions with a steady gaze for a moment. Glancing in each direction will not allow you to see everything.

Four-Way Stops

Four-way stops are safer in that they require everyone to stop, but they can be a real pain with a large truck when the traffic is heavy and no one wants to let you through.

The correct method for navigating through four-way stops can vary in different areas. Extreme caution must be used as you or another driver may not know the correct method for the area you are in.

Most areas require each vehicle to stop directly before entering the intersection even if they have stopped behind other vehicles several times before reaching the intersection.

Other areas require you to stop once even if it is several vehicles away from the intersection. When your lane of traffic starts moving, everyone in that lane can move through the intersection without stopping again.

Yield Signs

When truck drivers come upon an intersection with a yield sign, they generally give a sigh of relief and ease through the area . It is nice not having to bring the truck to a full stop and restart it, especially on an upgrade .

However, drivers should be more concerned with yield signs than stop signs. After an accident and in a courtroom, a person can argue that they stopped and drove on at a stop sign, but if there was a yield sign, they are required to yield even if it involves a full stop several times.

You can save yourself some problems if you keep in mind at yield signs, you are required to yield to all traffic, in all circumstances, and in an accident situation, a yield sign is more binding in a court of law than a stop sign.

Traffic Lights

The laws concerning traffic light-controlled intersections can vary from area to area and sometimes be interpreted differently by law enforcement officers in the same area. You can be sure though that if the light is red, you must stop. Where you stop, what you do after you stop, and what happens if any part of your vehicle is in the intersection when the light is red can vary.

Being able to stop in a controlled manner and behind the crosswalk with a truck is not as predictable as is with an automobile. If you do end up stopped on the crosswalk, never attempt to back up. Many tragic accidents have happened when this was done and a person walking behind the vehicle got crushed . It may cost you a citation from an overzealous officer, but that is better than injuring someone.

Right turns on red signals are legal in most areas, but not everywhere . In some areas, it *is legal* unless there is a sign stating that it is not legal at that intersection . In other areas, it *is not legal* unless there is a sign at that intersection stating that it is legal.

It is always necessary to come to a complete stop before attempting to make the right turn on red . If an accident does occur when you make the turn or immediately after making the turn, it will generally be considered as your fault.

With a truck, it is often not safe to make any right turn on red. Because of the longer time and space needed to complete the turn, it is often best to wait until you have everything you can get in your favor, green light included.

When making a right turn on red, officials sometimes cite truck drivers with an "unsafe turn", especially if there is pedestrian or automobile traffic involved. You are considered in violation if any traffic must yield to you including bicycle, pedestrian, or automobile.

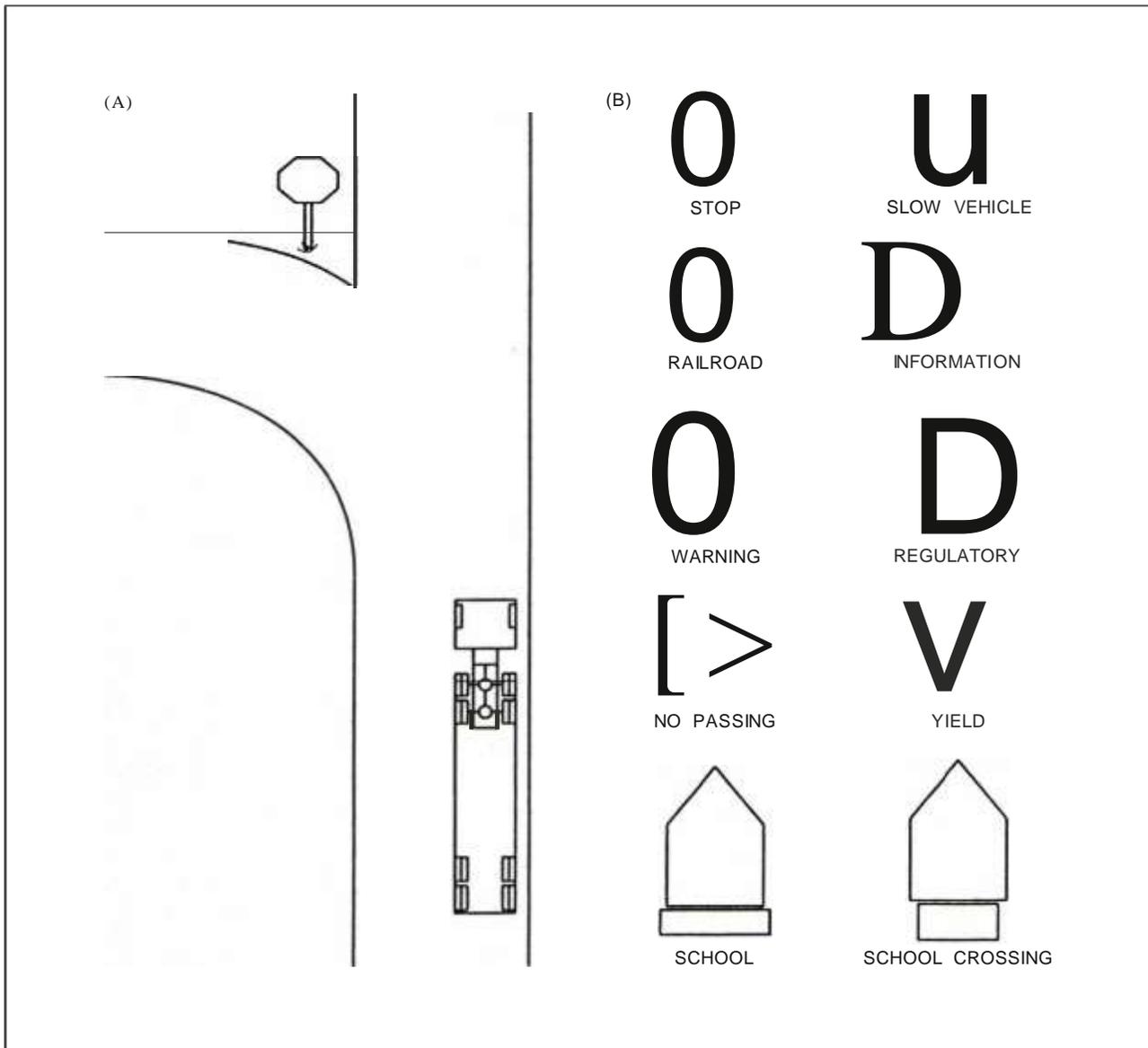


Figure 15-6. This driver, by looking at the shape of the back of the sign, knows that approaching traffic must stop on the road straight ahead. In the chart on the right, you should be able to cover up the Identification below each sign and then identify each sign by its shape.

Left turn on red is generally considered the same as a right turn on red, providing you are in the left lane of a one-way street and making a left turn into the left lane of another one-way street.

Shape and Position of Traffic Controls

Driving down the highway often presents one sign after another. Trying to read each of the different signs and understanding them while traveling at highway

speeds is impossible. That is why there are laws against putting advertisement signs close to the highway.

It still becomes a chore trying to read all of the traffic signs and understanding them. That is why all important traffic control signs are required to be the same shape.

Warning signs are diamond shaped and demand your attention above smaller rectangular information signs. Yield, railroad crossing, school, school cross walk, no passing, and slow moving vehicle signs each have their own shapes. Most of these shapes are used internationally to help motorists traveling from country to country.

Suppose you were traveling after dark in a snow storm and all the signs were covered with snow, and you could not read any of them. Now, if you came upon a strange crossroads with an eight-cornered sign on the right side of the highway just before the intersection, you would know it was a stop sign indicating you should stop.

Because of the shape, you can look at the signs controlling the cross traffic and know if they are supposed to stop, even though you are looking at the backside of the sign.

The shape of the signs is fairly uniform and on U.S. highways, the position of the signs can generally be counted on, however, in cities it is often another story. Traffic lights may be in the center of the intersection, on the far right corner, the near right corner, or draped with mistletoe or other decorations. It is important to train your eyes to pick out the traffic control signs and signals.

Each state often has some variations in the shape of some of their signs and we advise you to get a manual from your state and study the shapes of the signs.

Vehicle Turn Signals

Turn signals on the vehicle are just as important as traffic control signals along the highway. Many accidents could be avoided if all drivers would properly use their turn signals.

We have all had an approaching driver not use their turn signals when making turns and in the process of waiting on that driver to pass, we have been denied the opportunity to pull out from a stop. How are drivers going to know your intentions if you do not signal your turns?

Most drivers at one time or another, have had another driver turn into their path and cut them off. Sometimes the first indication that it is going to happen will be the turn signals, if the driver uses them.

Because they can be a warning to other drivers, it is important that truck drivers use their signals to warn other drivers that may not be seen in one of the many.

blind spots around the larger vehicles . This action may be enough warning to the hidden vehicle to move in time to avoid an accident. You owe it to yourself, as well as other drivers to use the turn signals every time.

The FMCSR says:

Section 392.15 (in part) Required and prohibited use of turn signals.

(a) *Turns.* Every motor vehicle turn shall be signaled for a distance of not less than 100ft. in advance of, and during, the turning movement by flashing the turn signals at the front and the rear of the vehicle on the side toward which the turning movement is made.

In addition to reading all of the above Section 392.15, you should read 392.18 and 392.22 concerning turn signals and flashers.

Drawbridges

Drawbridges may be raised at any time without much advance warning . Sometimes you can see a boat coming in advance and prepare for it, but at other times it is a small boat that only needs a small amount of clearance to pass under the bridge. In such cases, the bridge still must be raised and the highway traffic must stop.

The FMCSR states:

Section 392.12 Drawbridges; stopping of buses

Every motor vehicle transporting passengers shall, upon approaching any drawbridge, known or marked as such be brought to a complete stop, not less than 50 ft. from the lip of the draw, and shall proceed only when the driver has definitely ascertained that the draw is completely closed. A full stop need not be made at any drawbridge protected by a traffic "stop and go" signal giving positive indication to approaching vehicles to proceed, or where upon the opening of the draw, traffic is controlled by an attendant or traffic officer.

You know from the above if you are following a bus, you may have to stop at a drawbridge even if there is no boat traffic. But there is also a section that applies to vehicles other than buses.

Section 392.13 Drawbridges; slowing down of other vehicles

Any other motor vehicle, shall, upon approaching a drawbridge, be driven at a rate of speed which will permit said motor vehicle to be stopped before reaching the lip of the draw and shall proceed only when the draw is completely closed.

Drawbridges are intersections that cause accidents just as any other intersections. Traffic may have to come to a quick stop and on some major highways

the traffic will back up for many miles. Drivers are often looking at the boats and not alert to the problems on the highway in front of them.

Railroad Crossings

Train crossings are an intersection that should not be taken lightly. You can be sure trains will not stop for you. You must plan on stopping for them.

It is often hard to see or hear an approaching train in a truck and the crossings are often so rough a truck driver's attention is drawn to the skill necessary to safely cross the tracks without doing damage to the equipment. If the tracks cross the highway at an angle, it is easy to see in one direction and almost impossible to see in the opposite direction. The noise of your vehicle makes it difficult to hear the train sounds.

Even if you look directly at an approaching train, it may look as though it is sitting still or moving slowly. It could be approaching at a high rate of speed and overtake you before you can get across the track.

If there are two or more tracks, it is important that after a train passes, you wait until it is well past. Then you should be extra cautious that there is not another train approaching.

It is very foolish to depend on the warning signals to give you proper warning in time to avoid an accident. Not all crossings have signals and warning signals do not always work properly. That one time that they do not work may be the last chance you will ever have to cross any track.

Train crossings can cause accidents even if no trains are in the area. Rough uneven crossings can start a load swinging wildly from side to side, wet crossings are extremely slick, some crossings can high-center the trailer, and the smart truck driver that does slow down for the rough crossing may forget to turn on the warning flashers to attract the attention of those behind.

All trucks fall under Section 392.11 of the FMCSR that states: Railroad grade crossing; slowing down required.

very motor vehicle other than those listed in 392.10 shall, upon approaching a railroad grade crossing, be driven at a rate of speed which will permit said motor vehicle to be stopped before reaching the nearest rail of such crossing and shall not be driven upon or over such crossing until due caution has been taken to ascertain that the course is clear.

Some other vehicles fall under Section 392.10 (in part) Railroad grade crossings; Stopping required.

The driver of a motor vehicle shall not cross a railroad track or tracks unless first: Stops the vehicle within 50 ft. of, and not closer than 15 ft. to, the tracks; thereafter listens and looks in each direction along the tracks for an approaching

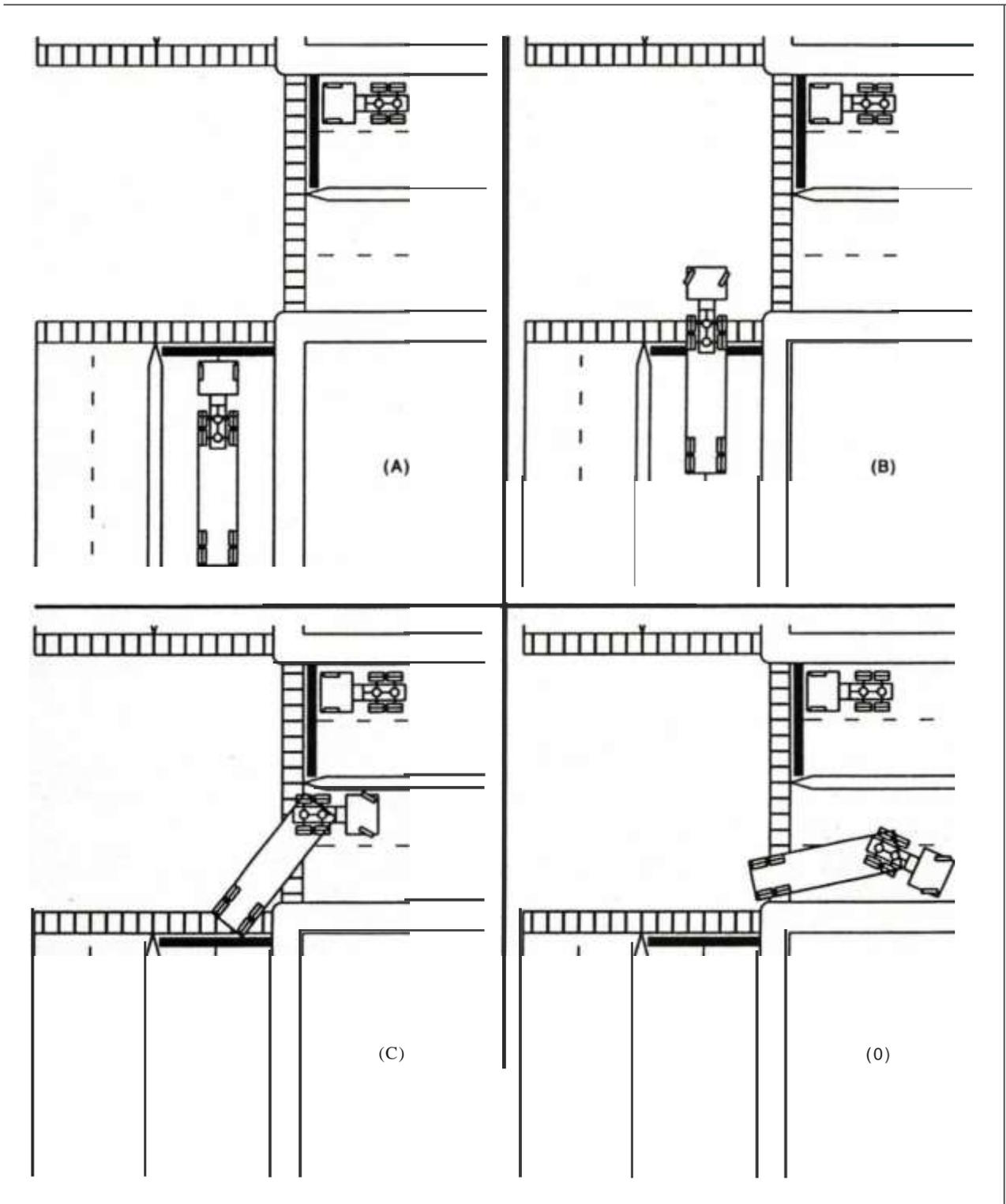


Figure 15-7. Here are the three steps to a safe turn: (A) "Proper setup" shows the truck blocking both traffic lanes to help keep vehicles from sneaking along the right side of the truck. (B) and (C) "Turning maneuver" shows the truck staffing the turn and carrying it through. Notice the trailer wheels are kept close to the curb all the way through the turn to prevent vehicles sneaking past on the right side. (D) "Getting it lined out" shows the driver quickly getting the tractor over into the right traffic lane.

train; and ascertains that no train is approaching . When it is safe to do so, the driver may drive the vehicle across the tracks in a gear that permits the vehicle to complete the crossing without a change of gears. The driver must not shift gears while crossing the tracks.

Making the Turn

One of the basics that drivers seem to miss is that right turns should be made from the right lane - into the right lane and left turns should be made from the left lane - into the left lane.

The only variation to that is when two adjoining lanes are turning in the same direction and *the inside lane has to turn*. The reason for this variation is that if you stay in the outside lane of traffic, you will have more control over the traffic if both lanes are needed to make the turn (see figure 15-7).

Turning a big, long truck at an intersection in heavy traffic takes skill, patience, acting, and sometimes diplomatic immunity (which you do not have).

In addition to the "five signs of a dangerous curve", and "five hostile conditions" mentioned before, you now need to think of "three steps to a safe turn".

1. The approach.
2. The turning maneuver.
3. Getting it lined out.

We will discuss the three steps as though making a right turn.

The Approach

Knowing that you are going to turn at a certain intersection before getting to it is sometimes a challenge in a strange city with heavy traffic. Getting into the proper lane to make the turn is even more of a challenge.

Knowing which way you are going to turn in advance can help as well as knowing when you are close to your turn. With that knowledge, you should be in the proper lane before reaching the intersection. You should also have your turn signals on to tell the drivers around you that you are turning.

In some cases, you can see that the turn is short and sharp and you will not have enough room to make the turn from using just the right traffic lane. In that case, it may be possible to move part way into the lane to your left.

If the lane to your left is going in your direction, you may be able to move part way into it and leave part of your vehicle in the right lane also. This is done to prevent traffic from pulling up along your right side and preventing you from turning.

If possible, on a sharp, hard turn, attempt to catch the light red. **NUS** will give you time to sit and look the situation over before making the turn. As you sit at

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If possible, on a sharp, hard turn, attempt to catch the light red. **NUS** will give you time to sit and look the situation over before making the turn. As you sit at

It is important when making a left turn at a traffic light, to watch the traffic in the lane next to the lane you are turning into. It is easy for the rear of the trailer to run over the front of an automobile that rolls forward as you are making your turn. The trailer wheels must be watched closely until the trailer is straight behind the tractor.

On four-lane divided highways, always make your left turn into the left lane and stay in that lane until it is safe to move into the right lane of traffic. If the traffic is heavy, it may take a while to build up speed and merge into the right lane.

While you are building up speed in the left lane, leave the left turn signal on to show traffic your intentions so they can safely pass on your right.

Your Part

Many needless accidents happen on curves, turns, ramps and intersections. They can generally be contributed to driver error. Speed, of course, is a contributing factor in all accidents, but the excessive speed accidents on curves and ramps should not happen.

It does not take much time to slow down for a short time to safely navigate these dangerous areas. If all drivers would slow down, they would not be the dangerous areas that they are.

Intersections are dangerous for everyone that passes through the intersection because of the different traveling direction of the vehicles. People are not perfect and you too, at some time in your driving career, will probably pass through a traffic control without seeing it until too late to stop.

If you, a good Professional Driver, can do such a thing, how many more drivers that are not professionals, or have not had training, are going to pass through an intersection while you are in it without stopping.

For that reason, Professional Drivers should *consider all intersections as uncontrolled intersections*. Every driver should slow down and be sure that the other driver is going to stop.

Drivers so often proceed into a curve/ramp without thinking about the five signs of a dangerous curve or the five hostile conditions that can wipe them out. Once a curve is entered, it is often too late to do much except slow down slowly and hope it can be done in time to avoid problems.

Vehicle upsets happen all too often because a driver was not aware that the load was not blocked properly or the driver was not alert to the loads tremendous G-force that is attempting to upset the vehicle at every turn.

Remember, you, the driver, must have the vehicle under control at all times.

QUIZ

These statements are designed to help you remember the most important parts of this chapter. They may or may not be true. Answer either "T" for true or "F" for false.

1. Often there are "tracks" around curves on the highway indicating that a driver should be extra cautious.
2. Interstate ramps are one type of curve that drivers do not have to be overly concerned about.
3. The safest way of knowing the correct speed to enter a curve is to observe the suggested speed sign before the curve and follow that suggested speed.
4. Some highway curves are banked in the wrong directions to help water run off.
5. Crowned roads are sometimes banked very well part way through the curve and then revert back to a crowned road, creating a dangerous dip in the surface.
6. Obstacles on curves are not as dangerous as on a straight road because drivers are traveling at a slower speed on curves.
7. When encountering animals on the highway, *it is always best* to blow your horn when you are right on top of them. This will scare them away from the highway.
8. There are too many variables involved with a truck to say that any one speed will be a "safe speed for trucks" on curves.
9. The "five signs of a dangerous curve" and the "five hostile conditions" _____ do not apply to the curves on interstate ramps.
10. Yield signs are a thing of the past and can generally be ignored.
- _____ 11. Knowing what the ramp area is like before entering it can help prevent accidents.
12. When traveling on the interstate, it is sometimes safer to pass your intended exit ramp, make a U-turn at the first cross-over and come back.
- ===== 13. Stop signs and yield signs mean the same except you never have to stop at a yield sign.
14. Humans have a blind spot in the side (peripheral) vision of each eye that can affect what you see at intersections.
- _____ 15. If you get stopped at a traffic control light and are sitting on the pedestrian crosswalk, you should quickly back up.

- _____ 16. Making a right turn on red may be legal, but is often not safe with a big long truck.
- _____ 17. Important traffic control signs are required to be the same shape even in different areas.
- _____ 18. All intersections should be considered as uncontrolled intersections.
- _____ 19. When turning at an intersection, it helps to watch where the steering axle is in relation to the traffic lane you will be turning into.
- _____ 20. When turning at an intersection, the trailer must be watched all the way through the turn to prevent the trailer wheels from possibly running over something.

MULTIPLE CHOICE

Read the comment section and then mark the correct answer (one only) with an X.

21. Railroad crossings

- A. are all required to have working, flashing signals when a train is approaching.
- B. can cause accidents even if no trains are around.
- C. are rough and create a good gripping surface when it is wet.
- D. All of the above.

22. Intersections can be considered safe to travel through

- A. when you have a green light in front of you.
- B. when you see that there are no traffic controls on your highway controlling you.
- C. if the traffic control light turns yellow when you are within 20 feet of the intersection.
- D. None of the above. Intersections should never be considered safe, and all vehicles should slow down and proceed through them with caution.

23. Interchanges are different than intersections in that

- A. interchanges generally have ramps.
- B. interchanges may not have traffic lights or stop signs.
- C. intersections generally have traffic lights, stop signs, or yield signs.
- D. All of the above.

24. When trying to merge with moving traffic onto the interstate highway,
- A. there is often confusion as to the safest way to merge.
 - B. merge laws are not consistently enforced from area to area.
 - C. the best advice is to do whatever is necessary to avoid an accident and try to keep the flow of traffic moving as smoothly as possible.
 - D. All of the above.
25. Interstate interchanges
- A. are always full interchanges, allowing you freedom to exit in any direction.
 - B. always have an area to slow the vehicle down before entering the ramp curve.
 - C. always have an area to merge safely with other traffic.
 - D. are not always the same and must be entered cautiously every time.
26. Trucks sometimes must use more than one traffic lane on curves/turns. When this is necessary, the driver using more than one lane must
- A. yield to all approaching traffic.
 - B. turn on emergency flashers and make the turn as fast as possible.
 - C. do not worry because the other traffic must yield to you.
 - D. None of the above.
27. When a bicycle or pedestrian is spotted on the highway, drivers should be alert to the fact that
- A. bicycles are not stable and may cut in front of you.
 - B. they may be young, inexperienced and do foolish things.
 - C. there may be a dog or other pet running with them.
 - D. you may be unable to pass them, causing you to slow down.
 - E. All of the above.
28. Professional Drivers should keep in mind when approaching a familiar curve that conditions change. Out of the following which is the best condition to remember?
- A. Brakes grab on one side of the vehicle.
 - B. Condition of tires.
 - C. Stability of load (will it move on the trailer?).
 - D. Mental condition of the driver (extra tired, thoughts distracted for various reasons, etc.).
 - E. All of the above.

Cwves, Tums, Intersections and Upsets

29. Some road surfaces are slicker than others. Which of the following would be considered as the (least slick) best gripping surface?
- A. Hot tar surface.
 - B. A new concrete surface with a rough look.
 - C. Brick surface.
 - D. A concrete surface with a black shiny look.
30. A driver required to stop at a railroad crossing should bring the vehicle to a stop not closer to the tracks than
- A. 5 ft.
 - B. 10 ft.
 - C. 15 ft.
 - D. 20 ft.
31. Shifting gears is not permitted
- A. when traveling faster than 35 miles per hour.
 - B. when moving across any bridge.
 - C. when crossing railroad tracks while hauling certain loads.
 - D. when traveling down a hill steeper than 10°.
32. A driver of a motor vehicle, not required to stop at drawbridges without signals, must
- A. drive at a rate of speed which will permit a stop before reaching the lip of the draw.
 - B. sound the horn before crossing.
 - C. proceed across without reducing speed.
 - D. slow down only if directed by an attendant.
33. When turning a vehicle, a driver should begin flashing the turn signals
- A. at least 50 ft. before turning.
 - B. at least 60 ft. before turning.
 - C. at least 75 ft. before turning.
 - D. at least 100 ft. before turning.
34. There are "five signs of a dangerous curve" that every driver should *learn to watch* for when approaching a curve. Which of the following is not one of them?
- A. Tracks.
 - B. Turning angle.
 - C. The horsepower of the engine.
 - D. Obstacles.
 - E. Gripping surface.

Curves, Turns, Intersections and Upsets

35. There are five hostile conditions" that *may change* the safe navigational speed when traveling the *same curve* from day to day. Which of the following is least likely to be one of them?
- A. Bank angle of the ditch.
 - B. Vehicle condition.
 - C. Load condition.
 - D. Driver condition.
 - E. Traffic condition.



VEHICLE INSPECTION

DRIVER'S DAILY VEHICLE CONDITION REPORT

TO BE COMPLETED DAILY IN ACCORDANCE WITH RULE 1,611
OF SAFETY REGULATIONS AS PRESCRIBED BY THE O. O. T. I

OWNER'S NAME Beck Trucking Co.

Wt. 4%0

.... 7-108.. --

DRIVER Frances Sanchez

DATE 2-22

ITEMS TO CHECK	DRIVER'S REPORT	MECHANIC'S REPORT	ITEM TO CHECK	DRIVER'S REPORT	MECHANIC'S REPORT
BEFORE STARTING ENGINE			AFTER STARTING ENGINE		
OIL - F. ADOEO INSERT I GALS.	V		FILL SYSTEM	/	
FUEL - F. ADOEO INSERT I GALS.	V		COOLING SYSTEM	/	
COILANT	/		ENGINE	J	
BRAKE LINES TO TRAILER	X		LEAKS	!!/	
ELECTRICAL W TO TRAILER	./		THROUGHTS	/	
DRIVE LINE	J		WARRANTS	/	
COUPLING DEVICES	V		STOP LIGHTS		
TURNS	V		CLEARANCE & MARKER LIGHTS	/	
SPRINGS	/		REFLECTORS	./	
BOOBY	J		AFTER STARTING ENGINE		
GLASS	J		AIR PRESSURE WARNING DEVI	./	
DRIVER'S EQUIPMENT			OIL PRESSURE	./	
TOWERS, LANTERNS OR REFLECTORS	./		GAS METER	J	
MIRRO	V		DOOR	/	
WINDSHIELD WIPERS	/		WINDSHIELD WIPERS	J	
SPARE TIRES			PARKING BRAKES	./	
MES			CLUTCH	./	
FR EXHAUST			TRANSMISSION	/	
THROTTLE /VIA			REAR WHEEL MOUNTS	J	
AFTER STARTING ENGINE	/		STEERING	./	
FW. SYSTEM			SERVICE BRAKES	/	
			SPEEDOMETER	./	
			OTHER ITEMS	N/A	

DRIVER'S REPORT IS SATISFACTORY
MECHANIC'S REPORT IS SATISFACTORY
DATE 2-22-08

MECHANIC: USE ONLY IF CORRECTED
00 SIGNATURE

Signature: 4B 9P.0

Signature: ZOS'

MADE INSPECTION AS REVIEWED ON LISTED ITEMS

DRIVER'S SIGNATURE: [Signature]
I CERTIFY THAT REPAIRS CHECKED TO BE MADE TO THIS VEHICLE MECHANIC'S SIGNATURE:

REPAIR MANAGER
HO:

NEED FOR INSPECTIONS

Part 396 of the Federal Motor Carrier Safety Regulations covers the vehicle inspections required by the Department of Transportation . You may wonder why the government makes such an issue of inspections . When you take a truck out, you have a responsibility to uphold. You are sharing the road with others, in vehicles large and small . You want to be sure that the truck will respond to your control so you can drive it safely.

Your truck must be in top running order for this to take place. And the only way for you to be sure your vehicle is in good condition before you get behind the wheel is to make a personal inspection of all parts and accessories.

Don't you think it makes sense to make sure everything is in order before taking off down the road with a large and very expensive piece of equipment? Certainly you would check your car before taking off on a cross country trip. You would want to make sure everything is in good running order so you can avoid any unnecessary trouble on your trip.

PERSONAL SAFETY

No one is more important to you than yourself. Therefore, to ensure your personal safety on the road should be your first concern . When you comply with the laws and regulations set down by the Federal Motor Carrier Safety Regulations, you ensure your safety as a driver.

After you inspect your vehicle, you gain a feeling of confidence . You are free from worry that something might break down and lead to further complications. This feeling alone can make a difference in your driving habits . If you 're not worrying about whether your brakes will hold or your lights will work, your mind is free to focus on the traffic. This simply allows you to be a better, safer driver.

REQUIRED BY LAW

Why are there laws requiring the inspection of vehicles you plan to operate? Laws are guidelines which have been set up to protect everyone: the carrier, the client, the public and you . They set standards

and provide some assurance that these standards will be met. If there were no regulations, what would stop a less professional driver from jumping in an unsafe truck and heading down the road? The fact that you completed a full inspection on your own vehicle would be small comfort if he plowed into you because his brakes failed.

Regulations also serve as a constant reminder of the steps which should be taken for the safe operation of the vehicle. Without a set of guidelines, it is too easy to forget all the steps that must be taken each and every time you head out on your trip.

CARRIER'S REQUIRED RECORDS

According to the regulations, it's actually the carrier who is charged with seeing that vehicles are inspected and that records are kept of these inspections. In practice, though, it's the driver who usually does the actual inspection and fills out the reports. In doing so, you're acting as the carrier's agent. And, if the vehicle you're driving is found to be unsafe, it's you, the driver, who is most likely to be fined. That's why you have to know what is required.

Regulations call for carriers to maintain a regular system of inspection covering all their vehicles. Also, they must keep a maintenance record on each of the vehicles.

DRIVER'S RESPONSIBILITIES

As a driver, you will inspect your vehicle before and after your run. Specifically, the regulations require you inspect your vehicle at the end of your run and report any repairs that should be made. Then, in your pre-trip inspection, you verify those repairs have been made.

But here's where practice differs slightly from policy. What usually happens is that the pre-trip inspection is more thorough than the post-trip. In the pre-trip, you not only check that repairs were made, but also make sure that various systems and components are in good working order. This makes sense when you consider that you may not always have the same truck today that you had yesterday. You want to be confident the truck you are about to drive is safe. We'll look at how these two inspections work together later in this chapter.

TYPES OF INSPECTIONS

There are several types of inspections. They each have a slightly different purpose.

OBSERVATION SKILLS TEST

You'll have to show you can perform a pre-trip inspection to get your CDL.

IN-TRANSIT INSPECTION

Your responsibility to make inspections doesn't stop once you move out on the road. In-transit checks are something you should include as part of proper road operations. Being aware of the condition of your vehicle while you drive can prevent a major problem from taking place.

The law does not require that you inspect your vehicle while you are in transit. However, it is good practice to do so. Your vehicle may have passed your pre-trip inspection, but problems can develop while you are out on the road. It is suggested you make a quick check at every meal stop.

There are circumstances which even warrant a stop alongside the road to make a check of certain conditions. A load of hazardous materials demands a tire check every two hours or every 100 miles of travel. Driving a reefer means you will want to stop and check the temperature periodically. This is the time to make an in-transit inspection just to remain on the safe side.

POST-TRIP INSPECTION

According to Section 396.11, a report of the vehicle's condition must be made at the end of each day's work. Section 396.3 details the parts and accessories which must be checked. Any defects must be reported and repaired. Whoever makes the repairs, be it you, someone in Maintenance, or an outside garage, must sign the report to certify repairs have been made.

This driver's vehicle inspection report (DVIR) then forms the basis of the next pre-trip inspection. You 'll verify that needed repairs were made and that nothing else is wrong with the vehicle.

DRIVERS' VEHICLE INSPECTION REPORT

AS ACQUIRED BY M. DOT FROM (OAI, ID) OR CAMCII WEN REGUATDIS. I SLIIT M. FILLIIGG

Tractor No.: _____ Tractor (Serial No.): _____

I detect the following or deficiency in this tractor vehicle which would be likely to affect the safety of its operation or result in its mechanical breakdown.

I detect the following defects or deficiencies in this motor vehicle that would be likely to affect the safety of its operation or result in its mechanical breakdown.

Indicate whether defects are on TRACTOR or TRAILER - U sufficient to delay the vehicle.

DRIVER'S SIGNATURE

0 Uovo dohels corrochd O A •lv1 dthch Rtel flot . clruhd for 1lh •••ratt..- If 11hcll•

MECHANIC'S SIGNATURE - _____

DRIVER'S SIGNATURE - _____

OFFICIAL ROADSIDE INSPECTIONS

Section 396.9 of the DOT safety regulations authorizes a special agent of the Federal Highway Administration (FHWA) to stop and inspect your vehicle. This agent could be a federal or state DOT representative, highway patrol officer, weigh master or other government official. This inspection could take place alongside the road, or at a port of entry station.

This is an inspection you definitely want to pass. If you don't, your vehicle can be declared "out of service" by the special agent. The inspection takes only about 15 or 20 minutes. If there are no problems found with your vehicle, you can be on your way once again knowing that you are behind the wheel of a safe vehicle. If your vehicle is declared out of service by the inspector, you cannot drive the vehicle until the repair has been made and the vehicle has been reinspected. If the vehicle cannot be repaired right where it is, it will have to be towed to a repair shop.

The roadside inspection is concerned with the most common violations that can take place as a result of the driver's failure to make the pre-trip inspection. The driver is also subject to inspection. The agent will check to see if you are keeping your logs up to date. Your condition is also observed to make sure you are truly able to operate the vehicle safely.

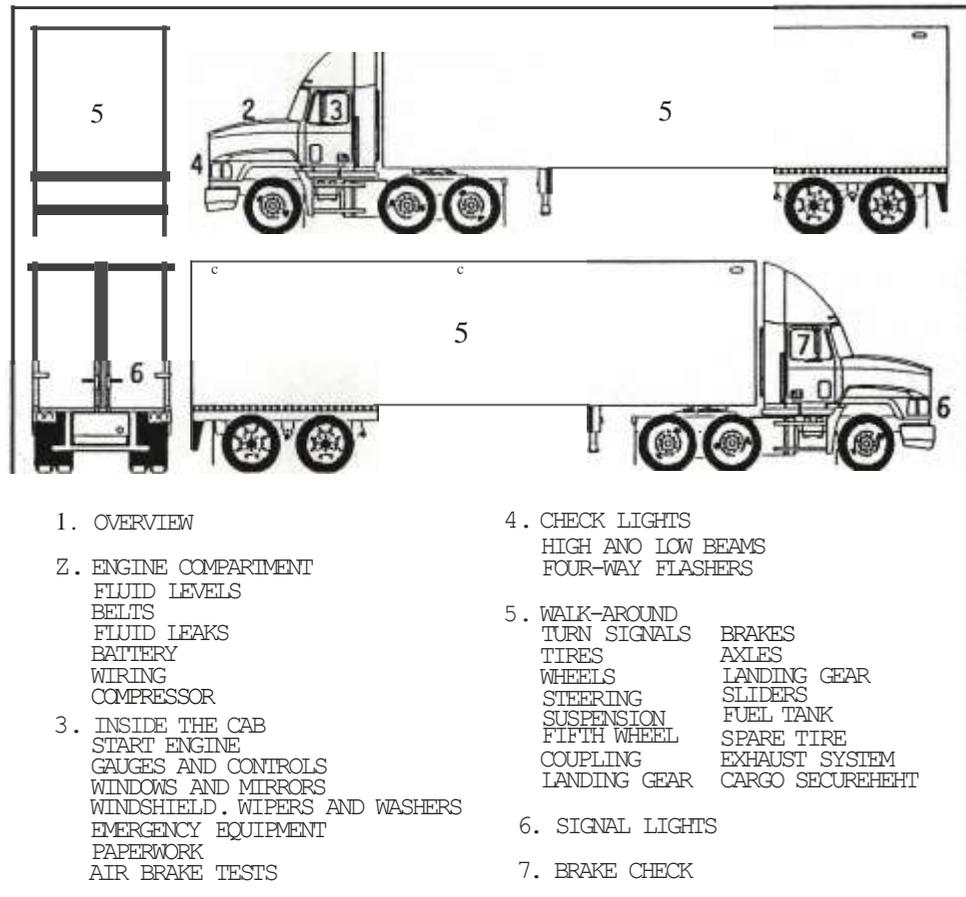
If your vehicle does not pass the roadside inspection, you must deliver the report to your carrier within 24 hours. Once the motor carrier has received

the inspection report, the carrier has 15 days to take care of the problems stated on the report.

To make the business of official roadside inspections more efficient, 48 states and Canada have joined an organization called the Commercial Vehicle Safety Alliance. The CVSA developed a standard inspection that can be conducted quickly by a mobile unit. That's the Critical Item Inspection, which involves checking the brakes and steering, tires and wheels, the fifth wheels, drawbars and suspension.

Once you pass the inspection, you will receive a sticker for your vehicle. The sticker is good for three months. It shows concerned officials that your vehicle has been inspected recently and passed. In CVSA member states, if you pass the Critical Item Inspection, you're not likely to be subject to another roadside inspection for 90 days unless the official notices something clearly wrong.

fig. 26-2
This is one procedure to use when inspect company may want you to use something slightly different.



Vehicle Inspection

When making inspections, it helps to follow a routine. That way you don't forget anything. One routine you might use has seven steps:

- Note the vehicle's condition in general as you approach it. Review the most recent vehicle inspection report looking for problems that require special attention.
- Check the engine compartment.
- Start the engine and inspect inside the cab.
- Turn off the engine and check all the lights.
- Walk all around the vehicle checking critical parts.
- Check the signal lights.
- Start the engine and check the brakes.

Here are some specific things to look for.

OVERVIEW

Make sure the vehicle is level, not leaning to one side or the other. Check the ground under your truck for puddles or wet spots, which mean something is leaking. Search until you find out where they are coming from. Are there any black streaks of oil on the inside sidewall of a tire? That likely means a wheel seal is leaking. Review the most recent DVIR.

IN THE ENGINE COMPARTMENT

Make sure the parking brakes are set or chock the wheels. Check fluid levels. You should be able to see the radiator water level just below the neck of the filler cap. Use the dipstick to check the oil. Check the tension and condition of belts by pressing down on them. There should be no more than $\frac{3}{4}$ inch of slack. Look for small oil leaks. Check the battery connections, the battery box and holddowns. Look for corrosion around the battery posts. Unless you have a maintenance-free battery, you should check the battery fluid level. Make sure all the vent caps are in place. Look for cracked or worn wiring insulation and broken or disconnected wires. Check the compressor oil supply and the supply of alcohol in the alcohol evaporator, if you have one.

INSIDE THE CAB

Put the gearshift in neutral ("park" if you have an automatic). Start the engine and listen for strange noises. Check all the gauges. Make sure they work and give normal readings. (Chapter 3 has details on what normal readings to expect.) Test all switches and controls to make sure they work.

Check the air brake system. The air brake system checks are described in Chapter 5. Unless you want an air brake restriction on your COL, you'll have to show the examiner you can perform these tests. Do them during the engine start part of the pre-trip inspection.

Clean and adjust your mirrors. Check your windows for cracks. If the glass is dirty clean it. Check the supply of windshield washer fluid. Make sure your wiper blades are in good condition, and that the wipers work. If there is anything (stickers, signs) that will obstruct your view remove it. Only stickers and decals required by law are permitted.

Make sure you have a properly charged and rated fire extinguisher. It must be rated at least 5 B:C. If you are hauling haz mat, it must be rated at least 10 B:C. You must also have three reflective triangles. Unless the truck has circuit breakers, you must also have spare fuses.

Make sure you have cargo manifests and any special permits you might need to haul your load, and supplies for doing your log.

CHECK THE LIGHTS

Turn off the engine. Turn on the headlights and the four-way flashers. Leave the cab (take the key with you) and make sure the headlights and four-ways are working. Make sure both high and low beams work. Turn these lights off. Turn on the parking, clearance, side marker and identification lights, and right turn signal before starting the walk around inspection.

WALK-AROUND INSPECTION

Start at the left front side. Walk toward the front of the truck, inspecting as you go. Inspect the front of the truck. See that all the lights there are clean and working. They should be amber in color.

Walk down the right side, inspecting critical areas there. Note that the right turn signal is working. It should be amber or white in color. If your tractor is a cabover, see that the cab lock is engaged.

Go on to inspect the back of the truck. Check all the lights and reflectors there. They should be red. If you have mud flaps, make sure they're not torn, dragging or rubbing on the tires. Make sure the license plate is securely in place and clean.

Work your way back to the cab, inspecting the left side of the truck. Check that all the lights and reflectors are clean and free of damage, amber color in front, red at the rear. If your battery is here instead of the engine compartment, inspect it now.

During the walk-around, closely inspect the following parts and systems:

TIRES . Check the tread depth . Remember, $\frac{4}{32}$ of an inch of tread are needed on the steering axle and $\frac{3}{32}$ of an inch on the rest of the tires. Are there any cuts in the rubber? Do any of the plies show? Are duals

touching? Are tire sizes, or radials and bias types mixed on the same axle? Check for cut or cracked valve stems. Check the tire pressure with a gauge.

WHEELS. Check the lug nuts for tightness. Look for any cracks starting to form around the lug nuts. Rust or bright metal are signs the nuts are loose and wheel is not mounted tightly. Look for damaged rims and missing parts. Check for welding repairs, which are prohibited. Check the hub oil level.

SUSPENSION. Check for cracked or broken leaves. Check for deflated or hissing air bags. Note spring hangers that allow the axle to move out of position. Look for damaged or missing torque rods or arms, U-bolts or spring hangers. Check the condition of the shock absorber.

BRAKES. Check for loose or missing parts and check the slack adjuster throw. Refer to Chapter 5 for more details on adjusting the slack. See that brake linings have not worn thinner than $\frac{1}{4}$ inch. Brake shoes and linings should not have oil, grease or brake fluid on them.

AXLES. Powered axles should not leak oil. Check the condition of the lift mechanism on retractable axles. If they're air-powered, check for leaks.

SLIDERS. Make sure locking pins are firmly in their holes and locking devices are in place.

AIR SYSTEM. Look for hoses that are kinked, nibbing or worn. Listen carefully for hissing noises. Search for the source of the leak. Drain water from the air tanks.

COUPLING. Make sure the trailer air and electrical connections are made properly and that lines are not dragging. Be sure to check all air and electrical connections throughout a double or triple combination.

FUEL TANKS. Double-check the fuel level in all tanks. See that the tanks are mounted securely, and that fuel crossover lines aren't hanging dangerously low.

FIFTH WHEEL. See that the coupling is secure. Make sure the fifth wheel release lever is locked. There should be no space between the upper and lower fifth wheel. Don't forget to check the fifth wheel, locking lever and safety chains on the dolly in a double or triple rig.

LANDING GEAR. If the trailer is coupled to the tractor, the landing gear should be up and the handle stowed away.

SPARE TIRE. Make sure you have a spare tire, that it's in good condition and that it's mounted securely in the rack.

EXHAUST SYSTEM. Look for loose, broke or missing pipes, mufflers or stacks. See that exhaust system parts aren't rubbing against fuel system parts, tires or other moving vehicle parts. Check for exhaust system leaks.

STEERING SYSTEM . Look for bent, broken or missing parts . If you have power steering, make sure you check the hoses, pumps and the level of power steering fluid. Check for leaks. Steering wheel free play should be no more than two inches to either side of a 20-inch steering wheel. Shake the steering arm, tie rod and drag link at each wheel to see they are not loose.

CARGO SECUREMENT. Make sure you have a tiedown for every ten feet of cargo, and that all bindings and chains are in good condition and secure. Check blocking and bracing to assure yourself that the load won't shift once the truck is in motion . Check the seals on sealed cargo. Check locks and latches on trailer doors. Check the tailboard or endgate, if you have one. Any canvas or tarp must be tied down so it won't flap or billow out. If you're hauling an oversized load , make sure you have the signs, lights and flags you need. If you have side boards or stakes, make sure they are free of damage and securely in place. Check the headerboard, if you have one. Make sure that it's in good condition.

CHECK THE SIGNAL LIGHTS

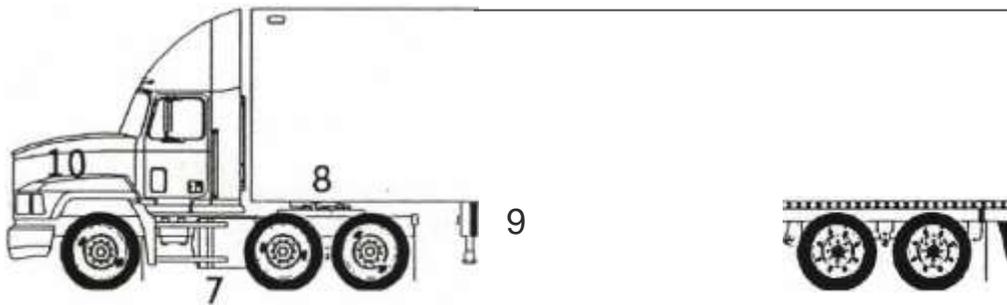
When you've been all around the vehicle, get back in the cab. Turn off the lights. Pull down the trailer brake hand valve. Next, turn on the front turn signal. Go out and make sure the stop lights are on and that front and rear signals are working. The front signal should be amber or white, the rear signal red, amber or yellow.

CHECK THE BRAKES

Checking the brakes means checking the foot and parking brakes, as well as the air brake system. Put on the trailer brakes, then try to move forward in the lowest gear. If the trailer brakes are working and the coupling is secure, they should hold you back. Use a similar method to check the foot brake. Release the parking and trailer brakes . Then test the foot brake's power to stop the truck while moving forward in low gear. Test the parking brake by applying it while stopped. Then see if it holds as you try to move forward.

Vehicle Inspection

6. You must fill out a vehicle inspection report form
- A. only on the first vehicle you take out each day
 - B. only if the vehicle you takeout is different than the one you had the day before
 - C. only if you're an owner-operator
 - D. on each vehicle you operate during the day



Refer to the illustration above to answer questions 7 through 10. The numbers in this illustration indicate some of the sites you would check in your required inspection. Match the inspection activities listed in Column B with the numbered sites in Column A.

Column A Inspection Sites

7. _____

8.

9. _____

10. _ _ _ _

Column B Inspection Activities

A. Landing gear is up and the handle is stowed away.

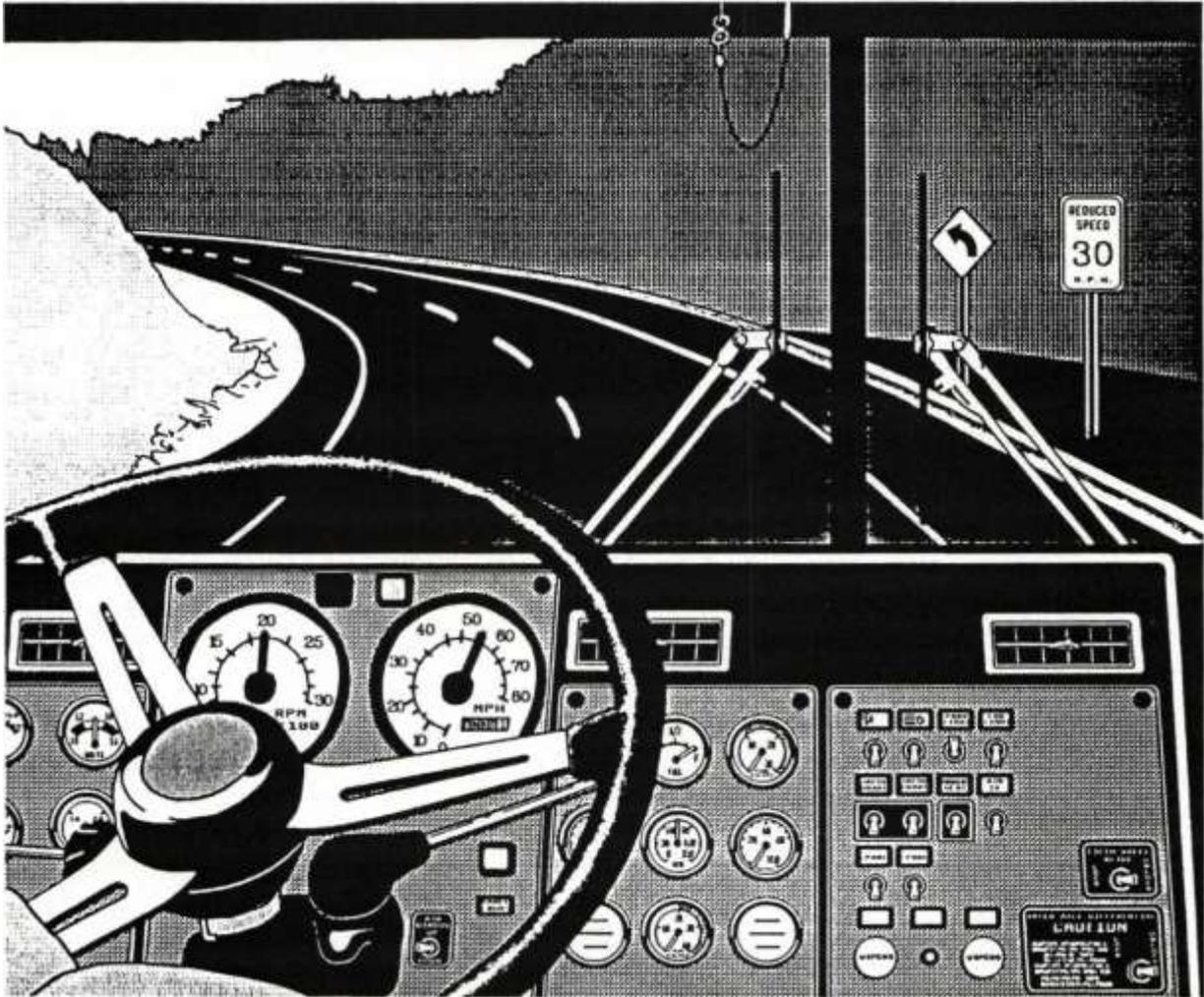
B. Coupling is secure and the release lever is locked.

C. Turn signals and emergency flashers work properly.

D. Fuel level is correct.



AIR BRAKES



YOUR BRAKES ARE YOUR BEST FRIEND

You learned in Chapter 4 that the transmission is the part of your truck that turns engine power into the torque that will make your wheels turn and move your vehicle down the road. Now that you understand what makes your truck go, you need to understand what makes it stop: the brakes.

You must be familiar with the parts of your brake system and how the system works so you can use and inspect the brakes properly. If you can do this, you can pass the COL Air Brake knowledge and skills tests.

(If you don't pass the tests, you'll have an air brake restriction on your license. With this restriction, you won't be allowed to drive a vehicle with air brakes.)

The ability to use your brakes properly could save your life and the lives of others. A three-year study conducted by the Bureau of Motor Carrier Safety (BMCS) showed that brake failures are the leading mechanical cause of accidents. The ability to detect problems with your brakes during inspections will ensure that the brakes will be there when you need them. When you're driving an 80,000 pound rig down the road at 50 mph, your brakes are your best friend. In this chapter, you'll learn how to treat them right.

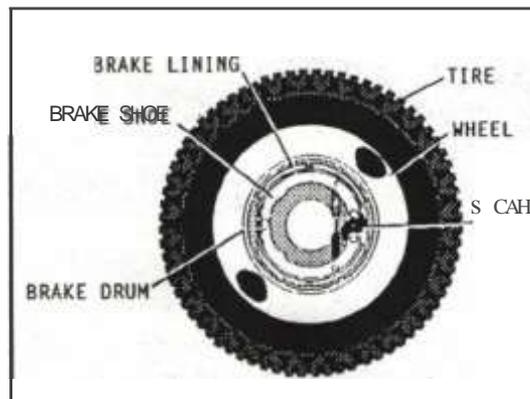
THE BASICS OF BRAKES

The most basic thing you can learn about any system is its purpose. The purpose of the brake system is to slow, stop and park the vehicle, of course. But you may not realize that it's not enough just to stop a heavy duty truck. If damage and injury occur during a braking procedure, it can hardly be called a successful stop. By the time you begin your first job as a driver, you will have learned how to slow, stop and park your vehicle in a predictable, controlled way.

The basic parts of the brake system are the service brake and the emergency or spring (parking) brake. All heavy duty highway trucks and trailers manufactured after 1975 must have both.

fig. 5-1

Friction between the brake lining and the brake drums slows the wheels and stops the truck.



You control the service brake system with the brake pedal and the trailer hand valve. Chapter 3 introduced these tractor controls. The emergency or spring brake system comes into play when you park or if the brake system air pressure drops below 45 pounds per square inch (psi). This would

happen if an air line breaks. If it does happen, the spring brake becomes an emergency brake that automatically brings the truck to a stop.

The basic theory of braking includes four factors: friction, heat, weight and speed.

Air Brakes

Friction between the brake linings on the brake shoes and the brake drums stops the truck. Varying the amount of air pressure applied to the brakes changes the amount of force the brake shoe applies to the brake drum, and the amount of friction that's created. Since the brake drum is bolted to the wheel, if the drum slows, so does the wheel. This is how you control the slowing and stopping of the truck.

As you probably know, where there's friction, there's heat. Applying more air pressure means creating more friction, bringing the truck to a stop sooner. But it also means creating more heat. Repeatedly applying and releasing the brakes, known as pumping or fanning the brakes, also means creating more friction and more heat. If brakes are applied with a great deal of force or too often, heat can build up. This can cause poor brake performance, or what is known as brake fade.

Weight affects how much energy it takes to stop. The more the truck weighs, the more energy it takes to stop. If you double the weight, the energy needed to stop is also doubled. The more energy it takes, the more air pressure is needed. More air pressure means more friction means more heat, and we're back again to causing brake fade.

To come to a safe stop, you must have more than good brakes. You must have enough stopping distance. You don't come to an immediate stop the minute you hit the brake pedal. Your vehicle travels some distance before stopping. This is the stopping distance. Three things make up stopping distance: perception distance, reaction distance and braking distance.

Perception distance is how far your vehicle travels from the time your eyes see a hazard until your brain registers the need to stop. This takes about $\frac{3}{4}$ second. At 55 mph perception distance is about 60 feet. Reaction distance is how far the vehicle travels from when your brain registers the need to stop until your foot actually presses the brake pedal. This usually takes another ~~3~~4 second, or 60 feet at 55 mph. Braking distance is how far the vehicle travels until the brakes bring it to a complete stop. At 55 mph on dry pavement with good brakes, you'll travel about 170 feet. Total stopping distance at 55 mph under good conditions is 290 feet. Add to this brake lag, the distance you travel before your brakes actually apply. You could travel as much as 32 feet from the time you press the brake pedal until the brakes apply. There's little you can do to shorten this total stopping distance. To stop safely, you must always give yourself at least 290 feet. Often, you'll need more.

Speed affects how long it takes to stop the truck. If you double your speed from 20 to 40 mph, it takes four times the distance to stop. But the effect of speed is geometric. That means as you go faster, the relative time

it takes to stop does not stay the same. It multiplies. For example, if you double your speed from 30 to 60 mph, it will take you not twice as much, but six and one-half times the distance to stop.

THE AIR BRAKES

Air brakes are controlled by compressed air. So the parts of the system must be designed to maintain a supply of compressed air, plus direct and control its flow. These parts must also be designed to use the energy of compressed air to apply the brakes.

In this section, we're going to take a close look at the parts that perform these tasks. First let's list them to get an idea of the scope of the material we'll be covering.

- the compressor (1)
- the air governor (2)
- the air dryer (3)
- the alcohol evaporator (3)
- the air reservoir system (4)
- the system protection valves (5)
- the operational control valves (6)
- the warning devices
- the gauges
- the brake chambers (7)
- the slack adjusters (8)
- the brake drums
- the braking mechanism
- the glad hands (9)
- the stop lights

Many of these components have subparts. For instance, there are five system protection valves. You can see this is a complicated system. Once you know the parts, where they're located and what they do, you'll be on your way to being able to use and inspect the system properly. The numbers in the list above match those in Figure 5-2.

THE COMPRESSOR

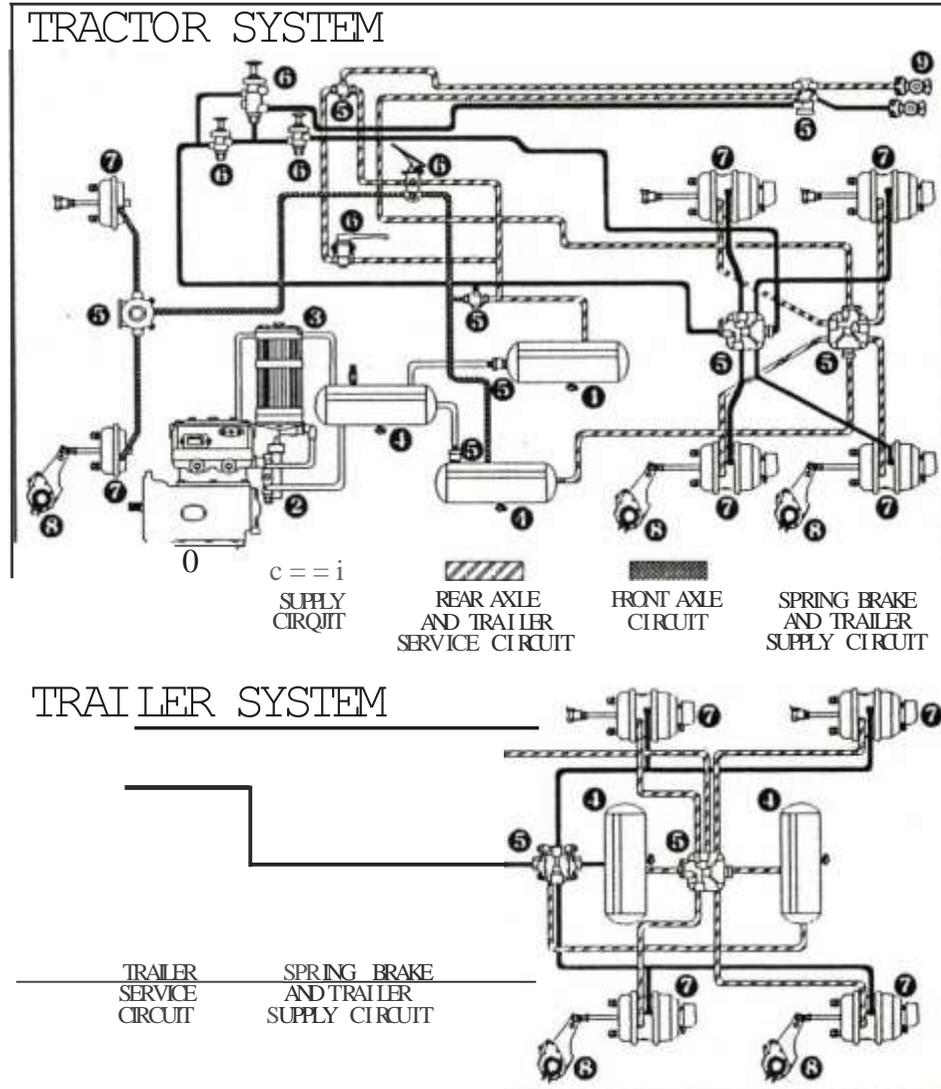
The compressor is a machine that draws in the air around it, pumps that air into a smaller space to increase its pressure and then pumps it into the air reservoir system where it is stored in air tanks until it is needed. The engine provides the power for the compressor, so it is usually mounted on the side of the engine. Compressors can be gear- or belt-driven, and may have their own oil supply or be lubricated with engine oil.

THE AIR GOVERNOR

Located on the compressor, the air governor controls when the compressor will pump air into the reservoir system. It regulates the amount of air pressure in the system. When pressure reaches the cut-out level (around 125 psi), the governor stops the compressor from pumping air. When the

Air Brakes

fig. 5-2
A typical air brake system for a tractor trailer.



pressure in the tank falls to about 100 psi, the governor signals the compressor to cut in (begin pumping again).

THE AIR DRYER

When the air leaves the compressor, it flows through the air dryer. This cleans and removes moisture and vaporized oil from the compressed air. When you compress air, you also heat it up. As it cools off, any moisture in it condenses. Also, small amounts of oil from the compressor are vaporized and travel out of the compressor with the air. When the compressed air cools, this oil also condenses. The result will be a sludge that can clog and corrode valves if it's not removed from the system. In cold weather, this sludge can freeze in the lines and the valves. The air dryer does a pretty good job of removing this condensed moisture and oil. But the dryer doesn't get it all. You'll need to finish the job. We'll tell you how later.

THE ALCOHOL EVAPORATOR

Some vehicles have an alcohol evaporator. Putting alcohol in the air brake system keeps the moisture in the compressed air from freezing. Ice in the system could cause brake failure.

THE AIR RESERVOIR SYSTEM

From the air dryer, the compressed air goes to the reservoir system, which stores the air until it is needed.

The first tractor reservoir tank in a dual circuit air brake system is called the main supply tank, or the wet tank. A second tank holds compressed air for the rear axle supply. A third tank holds compressed air for the front axle supply. Both these tanks are also called dry tanks. Wet tank and dry tank simply refers to how much condensed moisture and oil might still be found in these tanks.

You can see the tractor air reservoirs and the front and rear axle trailer reservoirs in Figure 5-2.

There are three types of valves in the air reservoir system: safety valves, check valves and air tank drain valves.

Safety valves protect the air tanks by releasing excess pressure if the air governor fails. Safety valves are usually set to open at 150 psi. If the safety valve releases air, that's a sign something is wrong.

Check valves allow air to flow in one direction only. All air tanks must have them. If there is a leak in a supply tank or in the air compressor discharge line, these valves prevent loss of pressure in the rest of the system. Check valves are placed in the lines going into the tanks.

An air tank drain valve is located at the bottom of each supply tank. The petcock, or draining mechanism, on these valves must be opened manually so moisture can drain from the tanks. Many new systems have spit valves or automatic moisture ejectors which can also be opened manually. From what you already know about the damage and problems condensed moisture and oil can cause in a brake system, you can see how important it is that the tanks be drained daily. There is, in fact, no more important maintenance you can do. If your tractor-trailer is equipped with automatic moisture ejectors, make sure you check them for proper operation weekly.

Let's take a minute now and look at an explanation of how the service air brake system works. The spring brakes work differently. You'll learn how those work later in this section.

The compressor draws in surrounding air, compresses it and pumps it to the air dryer. The air dryer removes moisture from the compressed air, which then flows into the air reservoir system. When you operate one of the air control valves (the foot valve or the hand valve), the compressed air flows to the brake chambers. In the brake chambers, the compressed air moves the service brake linkages that press the brake shoes and linings against the brake drums. You'll get a more detailed look at how things work in the brake chamber later in this section.

THE SYSTEM PROTECTION VALVES

Four types of valves provide various kinds of protection in air brake systems.

- quick release valves
- relay valves
- tractor parking valve
- parking brake valve

Quick release valves are found near the brake chambers. When you apply the brakes, the air passes into the brake chambers. That compressed air applies the brakes and continues to apply them. Once you release the brakes, that air must be released very quickly so the brakes will release. The quick release valve lets this air escape very quickly from the brake chamber.

Air brake systems on tractors that have dual air brake systems, as in Figure 5-2, and on trailers, use relay valves. The relay valve functions somewhat like a quick release valve in that it causes the air to be delivered more quickly. With a relay valve, pressure is stored not only in the supply tanks but also in the lines that go up to the relay valve. This means that full pressure is closer to the brakes than on systems without relay valves. When you apply the brake valve, a signal is sent to the relay valve. The relay valve opens and sends the air pressure to the brake chambers immediately. When you release the brakes, the relay works just like a quick release valve. You can see why tractors and trailers with long service brake lines benefit from the use of relay valves. The relay valves help reduce the brake lag time.

Emergency or spring brakes are required on all heavy duty highway vehicles manufactured since 1975. You'll find spring brakes on all the trailer wheels and on at least one set of tractor drive wheels. They are both parking and emergency brakes. Figure 5-3 shows you how the spring brake rides on the back of the service brake air chamber.

The service brake part of the brake in Figure 5-3 works in the way we've already described. This is how the spring brake works. The pressure that applies this brake is provided by a spring. The spring is held back (the released position) by air pressure. When you apply the parking brakes,

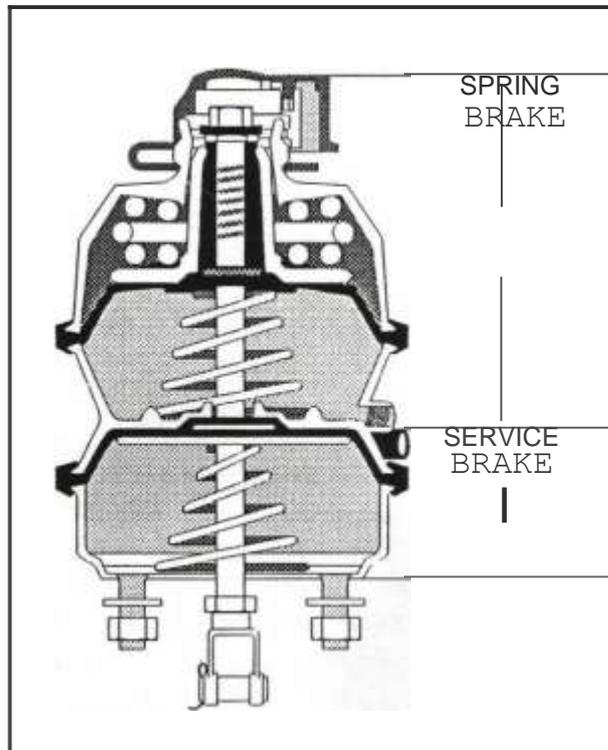
you release that pressure and the spring presses forward to apply the brakes.

The spring brakes are applied by pulling out the parking brake valve. All air brake systems have this valve. It's used to park the tractor and the trailer when they are coupled. It's a yellow push-pull diamond shaped knob that you'll find on your dashboard. It's pictured in Chapter 3.

When you apply the parking brakes, you intentionally release air pressure from the brake chambers. However, in an emergency, if the brake system air pressure drops to a range between 20 and 45 pounds per square

fig. 5-3

This is the type of brake you'll find on tractor drive wheels and trailer wheels.



inch (psi), the spring brakes will automatically apply, bringing the truck to a stop. The parking brakes become emergency brakes. At the same time, the eight-sided trailer air supply control knob and the diamond shaped parking knob on your dashboard will pop out.

To release the parking brakes automatically and recharge the system, you must push the parking brake and the trailer air supply

knob back in. When the system recharges, the spring in the spring brake chamber is pushed back and held back by compressed air.

Never push the brake pedal down when the spring brakes are on. The combined force of the springs and the air pressure could damage your brakes. However some trucks are equipped with a compounding valve that would prevent the added pressure from damaging the chambers. Your safety supervisor or operator's manual can tell you if your vehicle is equipped this way.

Your tractor may have a tractor parking only valve for use when you're bobtailing (driving your tractor without a trailer). We pictured this control in Chapter 3, too. It's a push-pull blue round knob.

THE OPERATIONAL CONTROL VALVES

These controls are the brake pedal, the trailer hand valve control and the tractor protection valve (trailer air supply control).

The brake pedal is also called a treadle or foot valve. It operates a valve that supplies air pressure to both the tractor's and the trailer's braking system.

When you press on the treadle, air pressure is sent through the air lines to the brake chambers. If your vehicle uses relay valves, then the air is near the brake chambers being held back by the relay valves. When you press on the treadle, the relay valve opens and air speeds into the chambers. When you release the treadle, the air exhausts through the quick release valves and the brakes are released. This applying and releasing lets some compressed air escape out of the system and reduces the air pressure in the tanks. Then pressure must be built up again. This is why fanning the brakes leads to brake failure. You exhaust the compressed air faster than the compressor can replace it.

Your tractor may have a trailer hand valve. It operates the trailer brakes only, letting you control the amount of air directed to the trailer brakes. This must never be used as a parking brake. The brakes will hold only if there is air pressure in the trailer air tank. When that leaks away, the brakes will release. You can use the trailer hand valve to lock the trailer brakes when coupling or uncoupling, or to test the trailer brakes.

The tractor protection valve (TPV) is controlled by the trailer air supply control. That's the push-pull, eight-sided red knob on your dashboard. You see one in Chapter 3. This TPV's job is to protect the tractor air tanks in case of air pressure loss. The TPV itself is located at the point where the flexible air lines that go to the trailer are connected. The valve separates the tractor air supply from the trailer air supply.

If anything goes wrong with the trailer system that causes it to lose air pressure below around 20 to 45 psi, a spring in the trailer air supply valve on the dashboard pops the valve out. This action sends a signal to the tractor protection valve between the tractor and trailer. It then closes off the air supply to the trailer. This has two effects. One, it protects the tractor air supply from loss, ensuring that the tractor's service brakes will work. Two, because the trailer is losing air pressure and no more is coming from the tractor, the trailer emergency brakes activate. So, the trailer spring brakes are on and you have control over the tractor service brakes. This lets you bring your rig to a controlled, safe stop.

All this happens automatically, but only after you have been warned by the low air pressure warning devices, which you'll learn about in just a minute.

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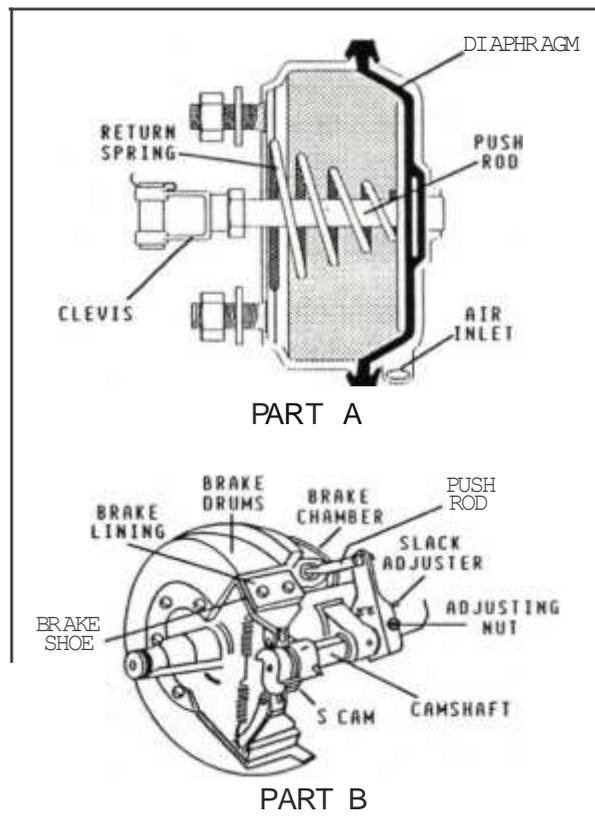
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the chamber. The clevis assembly provides a mechanism for attaching the slack adjuster to the push rod.

Besides the brake chamber, a slack adjuster, a brake drum, brake shoes and linings, a brake camshaft and S cam make up a service brake. You know in general how service brakes work. As we cover each of these parts, you'll learn more specifically how they work. As you learn about each part, find it on Figure 5-4. Do this each time you read about a new part. Study the figure to see how the parts fit together and work.

fig. 54
The parts of a service
brake air chamber.



THE SLACK ADJUSTERS

Slack adjusters adjust the brakes to make up for brake lining wear. A slack adjuster is a lever arm attached to the push rod of the brake chamber at the clevis assembly. You can see the clevis assembly on Part A of Figure 5-4. You can see the slack adjuster on Part B. Its job is to adjust the position of the S cam which then adjusts the distance of the brake shoe and lining from the brake drum.

Slack adjusters can be adjusted manually or automatically. Hand adjusted slack adjusters have an adjusting nut. To adjust this type, push in on the locking nut with your wrench and turn the nut clockwise until it is tight. This pushes the brake shoe and lining tight against the drum. Then you turn the nut counterclockwise one-fourth turn. This puts the brake shoe and lining the proper distance from the drum. Remember to make sure that the locking ring comes up around the nut so that the nut does not loosen further.

Automatic slack adjusters make an adjustment whenever the brakes are applied. They sense the distance the push rod travels each time and keep the brakes in constant adjustment. They can be manually adjusted, if

necessary. There are many makes and models. Get proper instruction for the type on your vehicle before you try making a manual adjustment.

THE BRAKE DRUMS

Brake drums are made of iron or steel. They are bolted to the wheels, so the wheel and the drum rotate together. The inside surface of a brake drum should be smooth and uniform. If there are scores or ridges cut into the surface more than half the width of the friction area, the brake linings may not make complete contact with the drum. That could result in poor brake performance.

THE BRAKING MECHANISM

The braking mechanism, which consists of the brake shoes, the brake linings, the brake camshaft and the S cam, is found inside the drum. You can see this in the cutaway view in Figure 5-4. It is the action of the brake shoes pushing the brake lining against the brake drum surface that produces friction and stops the vehicle.

THE BRAKE SHOES AND LININGS. Each brake drum contains two brake shoes with attached linings that are made of metallic mineral fiber. Linings must be secure on the shoes and free of oil or grease. They should be no thinner than $\frac{1}{4}$ of an inch at the thinnest point.

THE BRAKE CAMSHAFT. The brake camshaft is attached to the slack adjuster. The slack adjuster converts the pushing motion of the push rod into the twisting motion of the brake camshaft. The brake camshaft turns the S cam.

THE S CAM. The S cam is part of the brake camshaft. As the brake camshaft twists, it turns the S cam. This action pushes the brake shoes and linings against the brake drum.

Now you know enough to take a close look at how the service brakes work. You press on the treadle. This sends a signal to the relay valve. The relay valve opens and air enters the brake chamber through the air inlet. The pressurized air pushes the diaphragm. The diaphragm pushes the push rod. The push rod pushes the slack adjuster. The slack adjuster twists. This twisting action turns the brake camshaft, turning the S cam. The turning S cam pushes the brake shoes and linings against the brake drum. This creates friction which slows and stops the turning of the brake drum. Because the brake drum is attached to the wheel, the wheel also stops turning. When you release the treadle, the signal to the relay valve stops. The relay valve closes the air inlet and quickly releases the air inside the brake chamber.

Brakes

Instead of S cam brakes, your vehicle may have wedge or disc brakes. In a wedge brake, the push rod pushes a wedge between the end of two brake shoes. The wedge pushes the shoes apart and against the inside of the brake drum. A disc brake has a power screw instead of an S cam. Air pressure acting on the diaphragm pushes the slack adjuster. The slack adjuster turns the power screw. The power screw clamps the disc between the brake lining pads of a caliper.

THE GLAD HANDS

Glad hands are the coupling devices on the ends of the air hoses on the back of your tractor and on the front of your trailer. These hoses connect the service and emergency brakes of your trailer to the tractor air supply system. They must be connected properly. Often they are color coded. In that case, the service brake glad hands are colored blue and the emergency brake glad hands are colored red. The coupling device is a push, snap-lock type, similar to a radiator cap. When you're bobtailing, you can connect the hoses to the couplers on the back of the cab provided for that purpose. These couplers are often called dummy couplers. They protect the lines and keep water and dirt out. If your tractor doesn't have dummy couplers, just connect the lines together and secure them to the back of the tractor.

STOP LIGHTS

Although they don't help you stop your vehicle, your stop lights are part of the brake system. Air pressure works a switch that turns on the brake lights when you step on the brake. This tells drivers behind you that you are stopping or slowing.

OBSERVATION SKILLS TEST

Recall the illustration that began this chapter. Turn to the Observation Skills Test Grid at the back of the book to see if you noticed all the important features of the picture.

EMERGENCY BRAKE SITUATIONS

You know now what happens when the spring brakes are automatically activated because of an emergency situation. You also know what happens when the tractor protection valve activates. In this section, we're going to look at the emergency situations that call for the activation of these brakes.

If the trailer breaks away from the tractor, the air hoses for both the service and the emergency brakes will break away from the trailer. This will activate an immediate application of the tractor protection valve to protect the air pressure in the tractor. You need that air pressure to bring your tractor to a safe stop. A trailer breakaway will also activate the trailer emergency brakes and this will bring the trailer to a stop. Trailer breakaways are very, very rare. What is more likely is that one of the air lines will rupture.

If a service brake air line ruptures, nothing will happen until the brakes are applied. Then air will escape from the service line, causing a rapid pressure drop. When the pressure falls below about 45 psi, the emergency brakes apply automatically and bring the vehicle to a stop.

If an emergency brake air line ruptures, there will be an immediate and rapid loss of pressure in the emergency brake lines. The tractor protection valve will activate, as will the trailer emergency brakes, just as if there had been a trailer breakaway.

If the discharge line from the compressor to the main supply tank ruptures, there will be a loss of air from this tank. The one-way check valve between the main tank and the dry tanks will prevent the loss of air from those tanks. When the main air tank air pressure drops below 60 psi, a low pressure switch will activate a warning device. There should be enough air pressure left in the tank to bring the vehicle to a stop. There will be enough for a limited number of brake applications.

FOUR TESTS FOR YOUR BRAKE SYSTEMS

What causes emergency brake situations? Rarely, a road hazard will rupture an air line. For instance, you might run over a two-by-four that could then flip up and rupture a line. But the more likely and most frequent cause of emergency brake situations is poor maintenance.

What follows are four tests that will help you make sure your air brake systems are functioning properly before you need to rely on them.

TEST 1

This procedure tests pressure build-up time, the low pressure warning indicator and the air governor.

- Open the petcocks and drain the wet air tank first: Then the dry air tanks until the gauges read zero and close the petcocks.

Brakes

- Start the engine and run it at a fast idle (600 to 900 rpm). The compressor will start to fill the tanks.
- When the pressure reaches 50 psi, start timing. Also watch the low air pressure warning device. If the warning stops before pressure reaches 50 psi or comes on when pressure is over 70 psi, it needs to be adjusted.
- If the pressure goes from 50 psi to 90 psi within three minutes, build-up is okay. If the build-up takes longer, the pressure build-up time needs improvement.
- Keep filling the tanks until the governor stops the compressor. If the compressor stops filling below 100 psi or continues above 125 psi, the governor needs to be adjusted.

Report the results of failed tests to the Maintenance Shop. See that all indicated adjustments are made before you take your rig on the road.

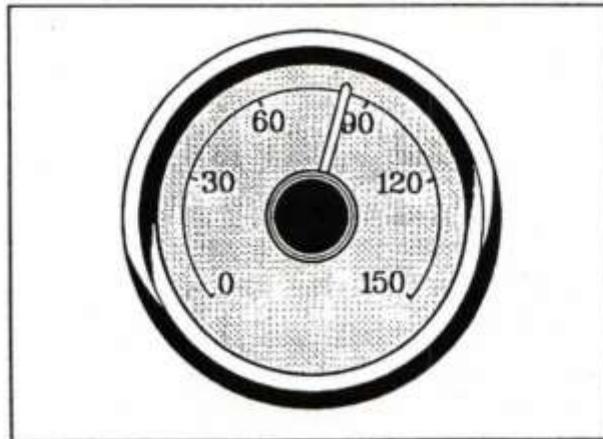
TEST 2

With these three simple steps, you can test the brake system's ability to hold air pressure.

- Now that the pressure is fully built up, turn off the engine, release the brakes and let everything stand for one minute.
- Notice the reading on the pressure gauge and start timing.
- After two minutes, note the pressure again.

The pressure should not have dropped more than 2 psi per minute for the tractor only. If you are coupled to one or more trailers, the pressure should not have dropped more than 3 psi per minute. If the pressure drop is greater, something is wrong. Find out what is wrong and see that it's fixed before you drive your rig.

fig. 5-5
The air pressure
gauge.

**TEST 3**

This procedure tests the service system's ability to hold air pressure.

- With full pressure, the engine turned off and the brakes released, press hard on the brake pedal and wait for one minute.
- Note the reading on the pressure gauge and keep pressing on the brake pedal. After two minutes, note the pressure again.

If you're testing your tractor only, the pressure drop should not be more than 3 psi per minute. If you're testing a tractor-trailer combination, the drop should not be more than 4 psi per minute. For a double-trailer combination, it should not be more than 6 psi per minute.

TF.ST 4

These two steps test your low air pressure warning device and your spring brake emergency application.

- Bring the air pressure to 90 pounds and shut the engine off. Push and release the foot brake until the low air pressure warning comes on.

If the warning device comes on above 60 psi or fails to come on below 60 psi, get it adjusted before you drive your rig. The warning should come on before the spring brakes are automatically applied.

- Continue pushing and releasing the foot brake until the spring brakes apply automatically.

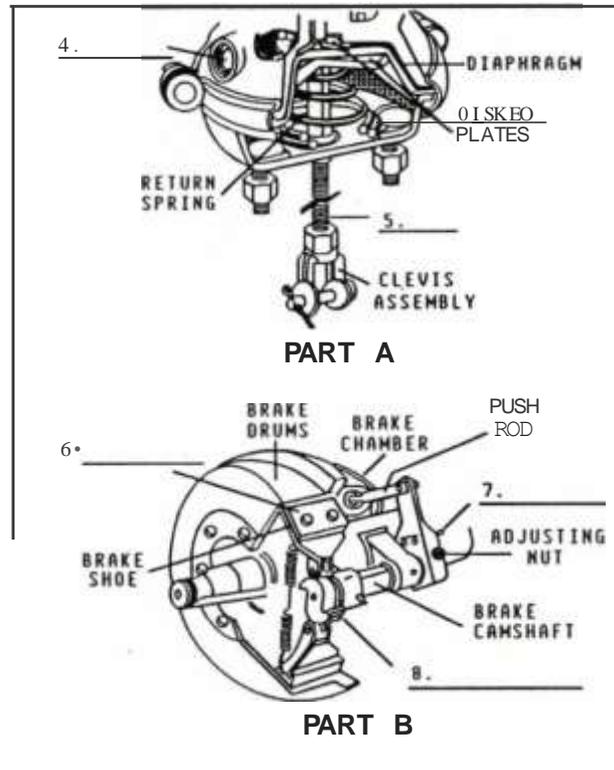
Spring brakes should apply between 20 and 40 psi. If they apply above 45 psi, something is wrong.

QUIZ

1. Brake failures _____
 - A. are the leading mechanical cause of accidents
 - B. are most often caused by road hazards
 - C. often lead to trailer breakaway
 - D. are most often caused by brake fade
2. The purpose of the service brake system and the emergency brake system is to _____
 - A. slow, stop and park your vehicle
 - B. prevent breakaway trailers
 - C. slow, stop and park the vehicle in a predictable, controlled way
 - D. prevent the loss of air pressure from the tractor's braking system
3. The four factors of the basic theory of braking are heat, weight, speed and _____
 - A. air pressure
 - B. how many trailers you're pulling
 - C. moisture content in the wet tank
 - D. friction

Air Brakes

For questions 4 through 8, please fill in the blanks in the illustration to the right with the correct labels.



9. "The slack adjuster twists. This twisting action turns the brake camshaft, turning the S cam." The quoted text is part of the explanation of how the spring brakes work.
- A. True
 - B. False
10. If _____, nothing will happen until you apply the brakes.
- A. the trailer breaks away .
 - B. a service brake air line ruptures
 - C. the discharge line from the compressor to the main supply tank ruptures
 - D. a spring brake air line ruptures

PREVENTIVE MAINTENANCE AND SERVICING

INTRODUCTION

A tractor-trailer that is well cared for will do its job much better than one that is neglected. To keep it in good shape, a driver must know how to inspect the

vehicle and its parts.

While some routine servicing tasks can be done by the driver, most service and repair work should be done by trained personnel. When someone who is trained for the job does the servicing, it costs less and takes less time. If someone who is not trained attempts to work on the rig, the work may not be done right. This can result in:

- Accidents.
- Injuries.
- Death.

A driver must know and understand what should be and what should not be part of his or her job .

This chapter has three goals.

1. To teach you the basic checks and servicing needed for the engine and vehicle.
2. To show you how perform some preventive maintenance and simple emergency repairs.
3. To show you that drivers are not expected to be mechanics. They should not try to do any maintenance or repair work unless they have been taught how to do it and have had experience repairing it under the guidance of a trained person .

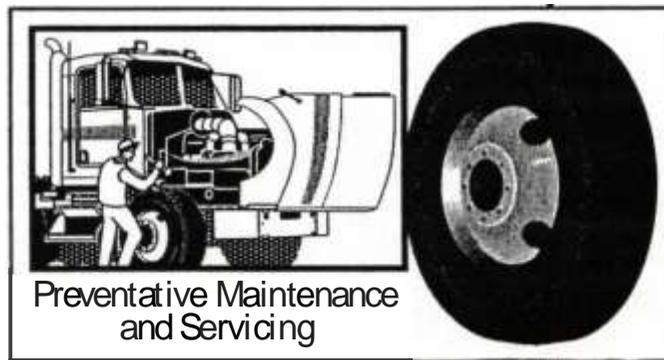


Figure 20-2

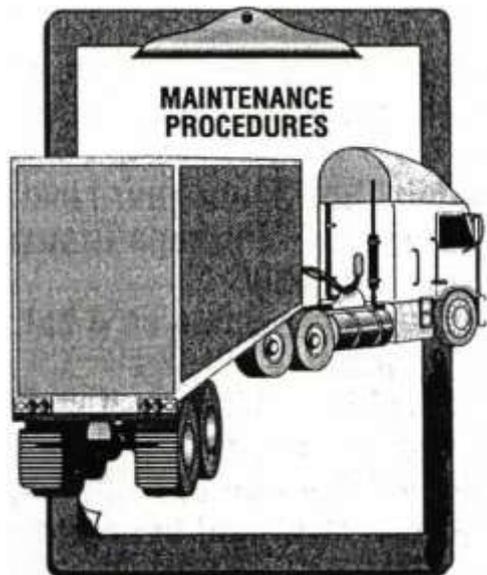


Figure 20-1

PREVENTIVE MAINTENANCE

Preventive maintenance is the servicing that is done at regular intervals on a truck. By servicing the truck regularly, many costly emergency repairs are avoided. Small problems can be fixed before they develop into big ones.

In many fleets, even the most routine maintenance is performed by the fleet's maintenance department, the dealer, an independent garage, or a truck leasing company. Drivers are not permitted to do any maintenance.

Other carriers, however, require drivers to perform certain maintenance tasks as part of their job. Independent owner/operators generally do more preventive maintenance than do drivers in larger companies. Owner/operators also have some work done by a garage or dealer.

TYPES OF MAINTENANCE

Maintenance includes:

- Routine servicing.
- Scheduled preventive maintenance.
- Unscheduled maintenance and repair.

Routine Servicing

Routine servicing tasks can be done by drivers. Drivers often:

Add fuel.

Add oil.

Add coolant.

SCHEDULED PREVENTIVE MAINTENANCE

- **Based on Time or Mileage or a Combination of Time/Miles**
- **Usually Set Up on Four Levels**
 - **Level A- Perhaps Grease and Oil Change Only**
 - **Level B- Same as A but Does More Things**
 - **Level C- All of A, plus B and an Engine Tune-Up**
 - **Level D- All of A, B, and C plus a Major Overhaul of Engine**

Drain moisture from fuel and air systems.

Scheduled Preventive Maintenance

Scheduled preventive maintenance is servicing that is based upon time or mileage since the last scheduled maintenance. Most fleets have a regular preventive maintenance schedule. This maintenance is often set up under four levels and is not performed by drivers.

Figure 20-3

PREVENTIVE MAINTENANCE AND SERVICING

Level A	Level C
Grease job	Includes all of Level A and Level B
Oil change	Grease job
Filter change	Oil change
Checking all fluid levels	Filter change
	Checking all fluid levels
Level B	Inspection and maintenance of key components
Includes all of Level A	Lubricating water pump shaft
Grease job	Engine tune up
Oil change	Detailed inspection and maintenance of all major components
Filter change	Road test
Checking all fluid levels	
Inspection and maintenance of key components such as	Level D
Lubricating water pump shaft	Complete overhaul of the engine
	Rebuilding parts
	Fuel pump
	Alternator

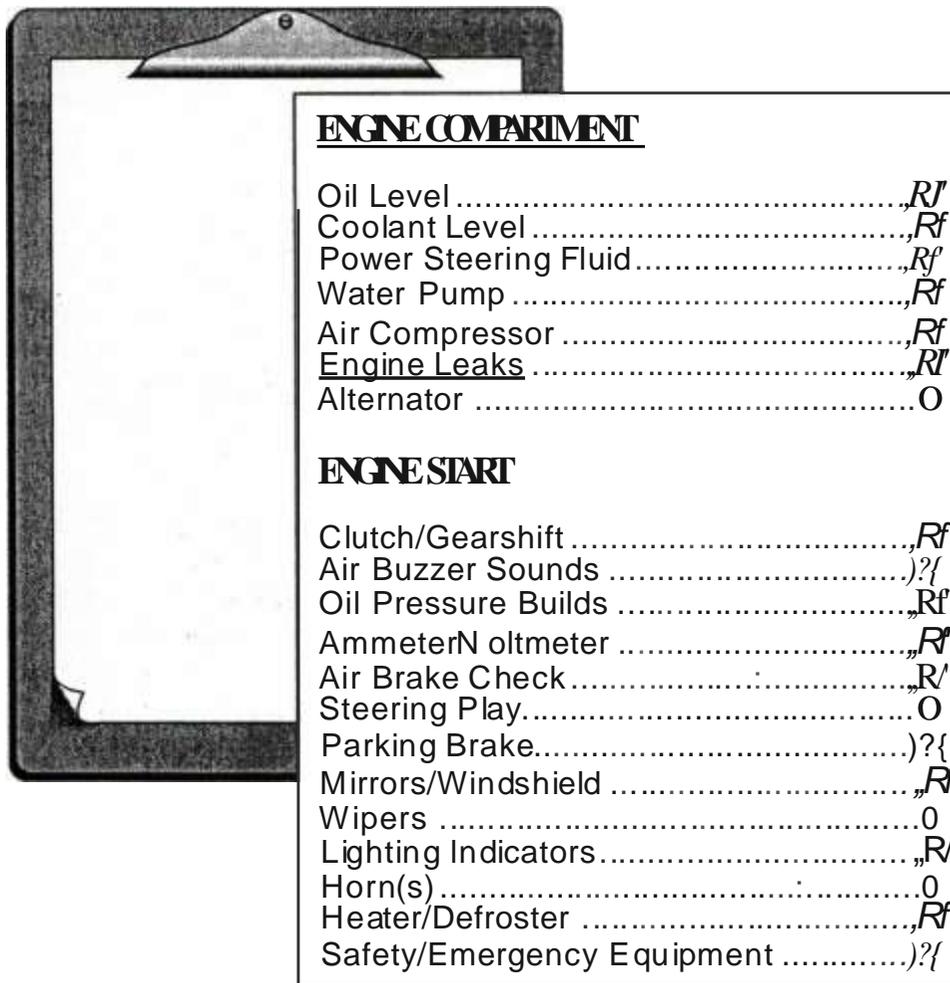


Figure 20-4

Unscheduled Maintenance and Repair

Unscheduled maintenance and repair occurs when unexpected breakdowns or emergencies require immediate maintenance.

- Breakdowns on the road
- Repair of accident damage
- Problems listed in a driver's pre-trip or post-trip inspection report

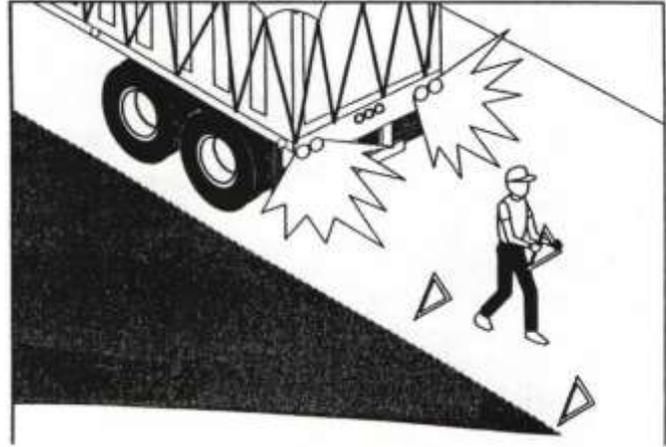


Figure 20-5

FEDERAL MOTOR VEHICLE INSPECTION AND MAINTENANCE REQUIREMENTS

All drivers must learn what the Federal Motor Carrier Safety Regulations (FMCSR) say and follow them.

Part 392 and Part 396 of the FMCSR require drivers to:

- Perform a pre-trip inspection before operating a vehicle.
- Review the last daily vehicle inspection report.
- Sign the report to indicate they have reviewed it. The driver also confirms that a mechanic has completed any needed work on the rig.
- Perform enroute inspections (see section 392.9) after the vehicle has been driven for 3 hours or 150 miles - whichever occurs first. If the driver is hauling hazardous materials, see part 397 for more requirements.
- Perform a post-trip inspection on the:
 - Service brakes.
 - Parking brakes.
 - Steering mechanism.
 - Lights and reflectors.
 - Wheels and rims.
 - Tires.
 - Hom.
 - Wind shield wipers.
 - Rear-view mirrors.
 - Coupling devices.
 - Emergency equipment.

DAILY VEHICLE CONDITION REPORT

Results of the post-trip inspection must be entered on an official daily Vehicle Condition Report (VCR) form. The report must be completed even if no defects were found. The driver must make an accurate report of everything he or she finds. Then he or she must sign it and date it. It must then be delivered to the supervisor. Every day all drivers must complete this report for each vehicle they drive. Laws and the report help the mechanics keep equipment in top condition.

PREVENTIVE MAINTENANCE AND SERVICING

VEHICLE CONDITION REPORT

DRIVER'S INSPECTION REPORT
(SEE INSTRUCTIONS ON REVERSE SIDE)
CHECK DEFECTS ONLY. Explain under REMARKS
COMPLETION OF THIS REPORT REQUIRED BY FEDERAL LAW, 49CFR 396.11 & 396.13.

Mileage (No Tenths) _____

Truck or
 Tractor No. - - - - - Trail8' No. _____

Dolly No. - - - - - Trail8f No. - - - - - Location: - - - - -

POWER UNIT

<p>GENERAL CONDITION</p> <p>O 02 Cab/Floors/Windows</p> <p>O 02 Body/COCOs</p> <p>O _____ Dilleak _____</p> <p>O _____ Grease Leak _____</p> <p>D 42 Coolant leak</p> <p>O 44 Fuel Leak</p> <p>O _____ Other _____</p> <p style="text-align: center;">(IDENTIFY)</p>	<p>INCAB</p> <p>O 03 _____ ning Indicators</p> <p>O 02 Windshield Wipers/Washers</p> <p>O S4 Horn(s)</p> <p>D 01 Heater/Ce/roster</p> <p>O 02 Mirrors</p> <p>O 15 Steering</p> <p>O 23 Ck/Ch</p> <p>O 13 Service Brake</p> <p>O 13 Parking Brake</p> <p>O 13 Emergency Brake</p> <p>O 53 Triangles</p> <p>D 53 Fire Extinguisher</p> <p>O 53 Other Safety E _____ pment</p> <p>O 34 Spare Fuses</p> <p>O 02 Seat Belts</p> <p>O _____ Other _____</p> <p style="text-align: center;">(IDENTIFY)</p>	<p>EXTERIOR</p> <p>O 34 LIQU</p> <p>O 34 Reflectors</p> <p>O 16 Suspension</p> <p>O 11 r es</p> <p>O 18 Wheels/Rims/tugs</p> <p>O 32 Battery</p> <p>O 43 Exhaust</p> <p>O 13 Brakes</p> <p>O 13 Air lines D</p> <p>34 light line O</p> <p>49 Fifth-Wheel</p> <p>O 49 Other Coupling</p> <p>O 71 f ie-Covns</p> <p>O 14 Rear-End Protection</p> <p>O _____ Other _____</p> <p style="text-align: center;">(IDENTIFY)</p>
---	--	--

NO DEFECTS

TOWED UNIT(S)

<p>O 71 Body/COCOs</p> <p>O 71 f ie-Covns</p> <p>O 34 lights</p> <p>O 34 Reflectors</p>	<p>O 16 suspension</p> <p>O 17 Tires</p> <p>O 18 WheelSRims/tugs</p> <p>O 13 Brakes</p>	<p>O 77 Landing Gear</p> <p>O 59 Kingpin Upper Plate</p> <p>O 59 Fifth-Wheel (Dolly)</p> <p>O 59 Other C _____ ting Devices</p>	<p>D _____ I _____</p> <p>a _____ R _____</p> <p style="text-align: center;">(IDENTIFY)</p>
---	---	---	---

DEFECT _____

REMARKS

REPORTING DRIVER: _____ Date _____

Name _____ Emp. No. _____

MAINTENANCE ACTION: _____ Date - - - - -

_____ Repairs Made No Repairs Needed

ROIs _____

REVIEWING DRIVER: _____ Date - - - - -

Name - - - - - Emp. No. _____ Certified By: _____

Location: _____

SHOP REMARKS

Figure 20-6

Importance of Preventive Maintenance

Failure to perform preventive maintenance can increase the cost of operation. For example, breakdowns on the road may include these extra costs:

- Cargo transfer charges
- Late delivery charges
- Expensive road services (towing; out of town repair)
- Driver expenses (salary while not driving; living expenses)

Preventing part failure costs less than repairing or replacing a damaged part. Unscheduled maintenance disrupts the schedule of preventive maintenance for other parts and vehicles.

Operating Costs

Vehicles that are poorly maintained cost more to operate. For example, fuel costs are higher. A poorly tuned engine gets fewer miles per gallon and has longer trip times.

A breakdown on the road can result in an accident. Of course, this adds to expenses and decreases trip efficiency. The extra costs can include:

- Repairing the damage.
- Lost work time.
- Medical expenses.
- Increase in company insurance rates.



BASIC SERVICING AND ROUTINE MAINTENANCE

Drivers should understand and be able to perform some basic servicing and routine maintenance. They should be able to:

- Inspect and change the engine fluids, certain filters, lights, and fuses.
- Change a tire (change a wheel) in an emergency.
- Drain the moisture from air reservoirs and the fuel system.

Why should drivers learn this if they are going to work for a carrier that has a policy of not allowing drivers to do any servicing or adjustments to their trucks? A few good reasons are:

- If a mechanic is working on your rig and is doing something wrong, you should be able to recognize the error.
- If your rig breaks down at 2:00 a.m., it is -100 F., and you are 15 miles from the nearest telephone, you will be glad to have some basic mechanical knowledge.
- As a professional driver, you should know as much about your rig and its parts as possible. In this way, you can detect systems or parts that are in danger of failing.
- You may not always work for a carrier that does not permit the driver to do maintenance. You may go to work for one who expects the driver to do basic servicing.

CHECKING AND CHANGING ENGINE FLUIDS, FILTERS, LIGHTS, AND FUSES

This section will explain the correct maintenance procedures for the:

- Fuel tank, fuel level, and filter.
- Oil level and filter.
- Coolant level and filter.
- Battery fluid level.
- Power steering fluid level.
- Air filter element.
- Lights and bulbs.
- Fuses and circuit breakers.



Figure 20-8

in them.

- Tighten all fuel tank mountings and brackets. Be careful not to tighten them so much you crush the tank. These systems are designed with some flexibility.
- Check the seal in the fuel tank cap. Check the breather hole.

Fuel Level

- Park the rig on level ground.
- Open the fuel tank cap.
- Check the fuel level by looking at it.
- Make sure the level matches the gauge reading in the cab.

Changing the Fuel Filter Element

- Turn the fuel filter element counter-clockwise until it comes off of the base. If you use a filter wrench, be sure to use it at the bottom of the filter, so you will not crush the filter shell.
- Discard the filter element according to EPA standards.
- Clean the surface of the seal on the filter base. Be sure to always remove the old seal and use a new one.
- Wipe up any fuel that spilled when you took off the filter.
- Fill the new filter with clean fuel.
- Coat the seal of the new filter with clean diesel fuel or engine oil.
- Screw the filter onto the base until the seal touches the base.
- Tighten the filter 1/2-turn.
- Start the engine. Check for leaks.

Replacing the Filter

The following method of replacing the filter is general in nature. There are many types of fuel filter systems. To find the correct way to replace your filter, read the instructions on the filter.

- Turn off the fuel supply from the fuel tanks.
- Place a container under the filter.
- Open the drain cock in the filter housing base.
- Drain the filter.
- Remove the filter body with the element. If you use a filter wrench, be sure to use it at the bottom of the filter, so you will not crush the filter shell.
- Discard the filter element according to EPA rules.
- Clean the housing. Make sure the old filter came out.
- Close the drain cock.
- Install a new filter in the housing.
- Fill the housing with clean fuel.
- Install the filter housing containing the new filter element with a gasket. Always use a new seal. An old seal can leak.
- Lubricate with fuel or engine oil and tighten.
- Open the fuel line shut-off valve.
- Start the engine.
- Check for leaks.

Draining the Fuel Filter

To drain a fuel filter:

- Locate the filter and water separator.
- Remove the drain plug at the bottom of the filter.
- Allow the water to drain.
- Replace the drain plug.

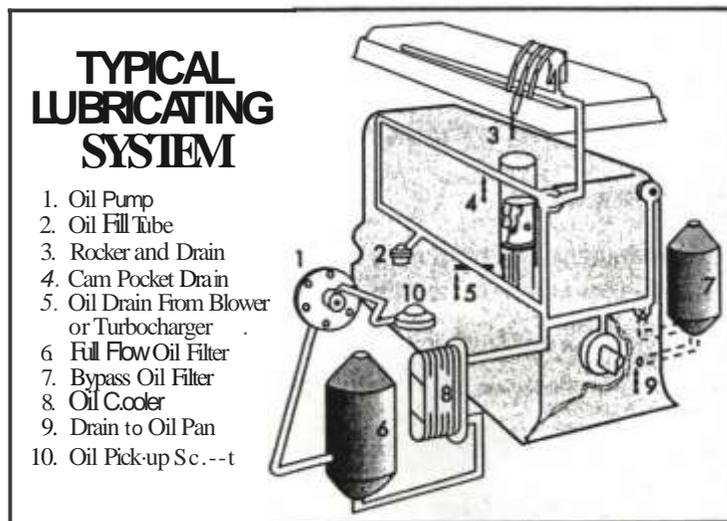


Figure 20-9

the oil level is below the add mark. Be careful not to overfill when you need to add oil.

Checking the Oil Level

To check the level of the oil:

- Park the vehicle on level ground.
- Shut off the engine.
- Wait a few minutes for the oil to drain down.
- Find the dipstick.
- Remove the dipstick.
- Wipe it clean and replace it.
- Pull it out again.
- Check the oil level.

The level should be between the full and add marks. Do not overfill or drive when

Changing the Oil Filter

Changing oil filters on a truck is messy. It is far harder than changing a car's filter. Like fuel systems, what is right for changing the filter on one system may be wrong for another type of system. Change filters only after you have been trained and checked out by your supervisor or a mechanic.

- Remove the drain plug from the bottom of the filter housing.
- Drain the oil.
- Remove the filter housing that contains the filter element. Consult the manufacturer's guide for how to remove the filter element. Most filters today are one piece and disposable.
- Discard the filter according to EPA standards.
- Fill the new filter element with clean oil and install it.
- Secure the housing.
- Replace the drain plug.
- Start the engine.
- Check for leaks.
- Turn off the engine.
- Wait 10 minutes.
- Check the oil level.
- Add enough oil to bring it to the proper level on the dip stick.

Checking the Coolant Level

To check the coolant level:

- Shut off the engine.
- Wait until engine is cool.
- Put on thick cloth gloves to protect your hands.
- Remove the radiator cap very carefully.

Turn the cap slowly to the first stop. Step back while pressure is released from the cooling system.

- When all of the pressure has been released, press down on the cap and remove it.
- Look at the level of the coolant.
- Add coolant if needed. Check the operator's manual for specific instructions for your truck.

Some trucks have sight glasses or see-through containers for checking the level of the coolant. If your rig has one, you will not need to go through the previous routine to check the level of the coolant.

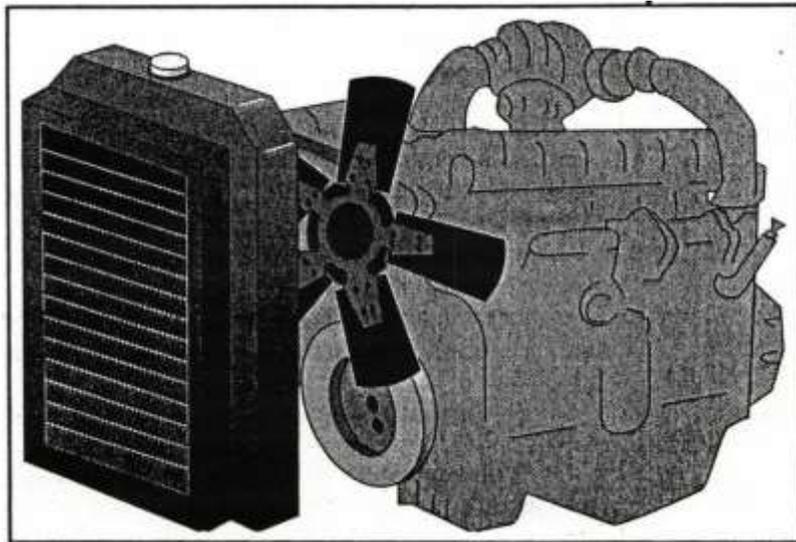


Figure 20-10

Changing the Coolant Filter

To change the coolant filter, follow these steps.

- Shut off the engine.
- Wait until the engine is cool.
- Put on thick cloth gloves. Do not handle a hot filter with your bare hands.
- Turn the filter element counter-clockwise to remove it.
- Replace it with a new filter element and a new cover gasket.
- Start the engine.
- Check for leaks.

Checking the Battery Fluid Level

You must be very careful when you are checking the level of the battery fluid. Follow these safety rules.

- Protect your eyes with goggles or glasses.
- Protect your hands. Batteries contain acid. It can severely burn you if it touches your skin.
- Do not smoke. Batteries give off explosive gases.

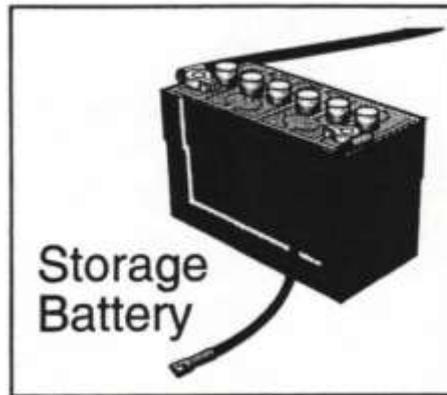


Figure 20-11

Some batteries are maintenance free and do not need to have the level of the fluid checked. Others are not and must have the level of the fluid in the battery checked. To check the level of the fluid in the battery:

- Open the battery caps.
- Check the fluid level.
- If the battery needs fluid, use distilled water.
- Fill to the bottom of the split ring in the cell filler well.

Checking the Power Steering Fluid Level

With the engine running at normal operating temperature, turn the steering wheel back and forth several times to stabilize the fluid level. To check the fluid level:

- Turn off the engine.
- Remove the dipstick.
- The fluid should be between the bottom of the dipstick and the full mark.
- If fluid is needed, add enough to raise the level to the full mark. Do not overfill.

Changing the Air Filter Element

On air cleaners with a restriction indicator, change the element or clean it. Dust, dirt, grease, or other grime can get into an engine when you change the air filter. Be careful to keep things as clean as you can.

when the indicator shows red. On trucks that have an air filter restriction gauge, replace the element when the gauge reads 25" for Cummins and Caterpillar engines and 20" for Detroit Diesel engines.

PREVENTIVE MAINTENANCE AND SERVICING

To change the air filter element:

- Remove the end covering from the housing.
- Make sure your hands are clean.
- Remove the filter element.
- Inspect the end cover and gasket surfaces for dents or possible air leaks.
- Check the outlet tube to be sure it is clean and undamaged.
- Check the filter element for wear.
- Replace it if it is damaged.
- If the filter is not damaged, clean with compressed air. Always blow the air in the opposite direction of the normal cleaner flow. Some filters should not be blown out. If your unit does not have an indicator or air filter restriction gauge, find out how often to replace it.
- Wipe away any dirt in the filter housing.
- Install the filter element.
- Replace the end cover and secure it.



Figure 20-12

Always handle the filter element carefully to keep dirt from shaking loose onto the clean side of the filter system.

Changing a Bulb in a Headlight or Clearance Light

To change a headlight bulb or a bulb in a clearance light (sealed beam):

- Park the rig and turn off the engine.
- Remove the trim ring from the burned out light .
- Unfasten the mounting screws.
- Disconnect and remove the light from the socket.
- Clean any dirt or bugs off of the socket area.
- Plug in the new headlight bulb.
- Test the light to see if it works properly.
- Fasten the mounting screw.
- Make sure the new light is clean.

Some lights have lenses that snap off to let the bulbs be replaced.

Note: Do not touch the headlight adjusting screws when you are changing the bulb.

Changing Fuses and Resetting Circuit Breakers .

Fuses: Always use a fuse that is the right size and has the same amp rating as the fuse it replaces. To change a fuse:

- Check the fuse and clip holder to be sure they are clean and do not have any burrs.
- If the holder is dirty, touch up the contact points with a coarse cloth.
- Gently but firmly snap the new fuse into the clip holder.
- Make sure there is a good connection between the fuse ends and the clip holder.

Circuit breakers: To reset a circuit breaker:

- Remove the circuit breaker cover panel.
- Flip the circuit breaker switch back. This will reset it.
- Replace the panel.
- Some circuit breakers reset themselves .

CHECKING THE AIR PRESSURE AND CHANGING TIRES

This section explains the correct way to check tire inflation pressure and change a flat or damaged tire and wheel assembly. Actually changing a tire (wheel) - removing it from the rim and installing a new one on the rim - is not taught in this book. Only a trained mechanic with the proper tools and safety equipment should replace wheels. Drivers, however, must know how to remove a flat tire and replace it with a spare tire in a roadside emergency.

Checking the Air Pressure

Check the air pressure when the tires are cool. Readings made when the tires are heated (immediately after a trip) do not give the correct pressure.

When the tires are cool, the correct way to check the pressure is to:

- Remove the valve stem cap.
- Place the air gauge over the valve stem opening.
- Read the inflation pressure from the gauge.
- Compare the tire's pressure with the correct pressure listed on the sidewall of the tire or in the operator's manual.
- Replace the valve stem cap.

Changing a Wheel With the Tire Mounted

Drivers can learn the right way to change a tire from watching someone else do it. Changing a tire can be dangerous. If possible, it should be done by a trained professional. Remember, a driver should change tires only in an emergency.

Drivers should, however, know what type of tire and wheel style their rig has. They should also know the manufacturer's specs for them. Drivers must understand great care is needed when handling an inflated tire/wheel assembly. Tires explode with great force.



Figure 20-13

To change a tire:

- Park the rig on level ground.
- Put on the parking brake.
- Place the transmission in the lowest forward gear.
- Chock the front tractor wheels.
- Inspect the tires.
 - Check for over-inflation.
 - Compare the side and lock rings.
 - On duals, check the seating of the inner tire.

NOTE: If the tire seems over inflated or the seating does not look nonnal, do not attempt to change the tire. Get the help of an expert.

- Refer to the owner's manual for the correct way to place the jack.
- Put a hardwood plank or block under the base of the jack, no matter what type of surface you have parked the rig on.

To remove the wheel/tire assembly:

- Jack up the truck enough to remove the weight from the studs. Be sure to stand clear of the truck when you use a jack. The truck could slip and hurt you.
- Loosen the stud nuts.
- Observe direction of rotation.
- Examine the thread. On some wheels, the direction is indicated on the end of the stud (R means right, or clockwise; L means left, or counter-clockwise).
- Stand to one side of the tire because parts of the wheel assembly can fly off and hurt you when the stud bolts are loosened.
- Turn the stud nuts by hand until they are flush with the end of the stud.
- Loosen the clamp on cast type wheels. Tap with a hammer. Don't remove the stud nuts until the clamp is free so it will not fly off the studs.
- Remove the air lines from any wheels that have a tire pressure sensor. Cap the line and actuator.
- Jack up the truck to let the tire clear the surface. Stand clear of the rig while raising the jack. The truck can slip off and severely hurt you.
- Remove the wheel assembly by removing the stud nuts and pulling the wheel from the hub.

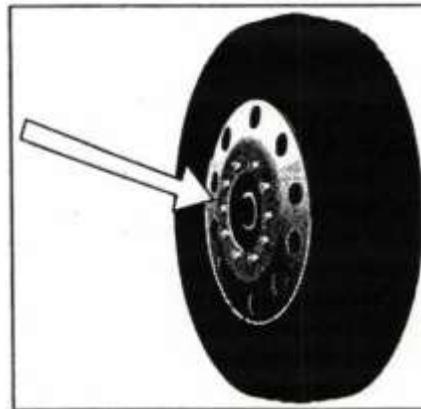


Figure 20-14



Figure 20-15

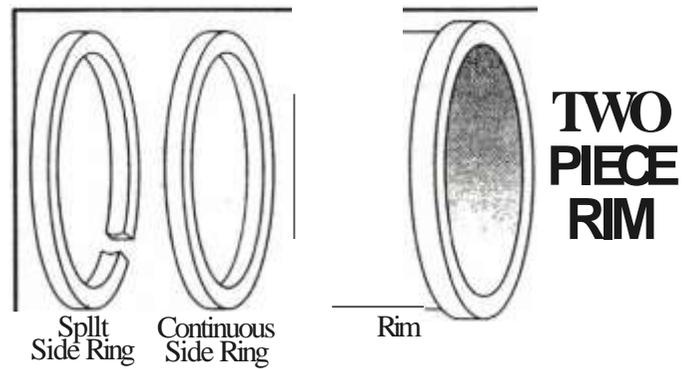


Figure 20-16

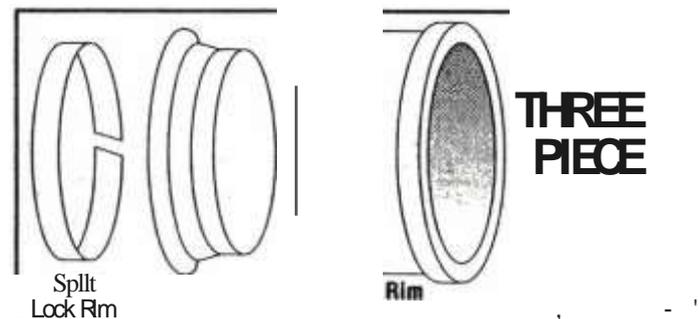


Figure 20-15

You can remove the inside wheel of a dual wheel assembly by following the same steps.

Replacing Wheels

You should replace the inside wheel of duals first To do this:

1. Mount the wheel by placing it on the hub.
2. Push the wheel all the way back.
3. Place the spacer ring on the hub. Push it back against the wheel.
4. Mount the outer wheel on the hub. Push it all the way back.
5. Install the spoke rim clamp on cast-type wheels.
6. Install and tighten the stud nuts.

Use steps 1,2,5, and 6 for single wheel units.

To mount Budd type wheels (shown in Figure 20-13 and Figure 20-14), follow these steps. Replace the inside wheel of the duals first.

- Mount the wheel's concave side in by placing it on the studs.
- Install and tighten the flair stud nuts.
- Mount the outside wheel's concave side out.
- Install and tighten the nuts.

Check the owner's manual for the right way to tighten the stud nuts. If you do not have an owner's manual, tighten them by following these steps.

- If the wheel is free to rotate,

move the wheel until

the nut to be tightened is on top.

- Tighten with a lug wrench.
- Use a torque wrench for the final tightening. Don't over-tighten or under tighten.

If a tire has a pressure sensor:

- Remove the caps and connect the air line to the actuator.
- Lower the cruck until the tire supports the weight of the vehicle.
- Remove the jack.

Be sure to put away all equipment you have used.

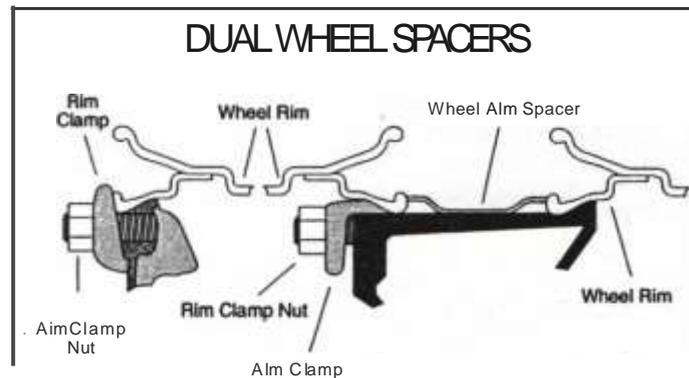


Figure 10-18

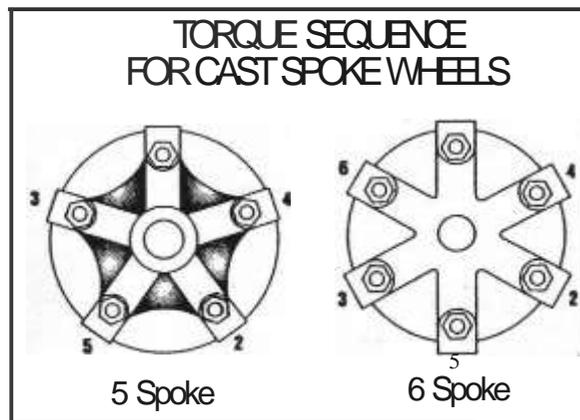


Figure 20-19

PREVENTIVE MAINTENANCE AND SERVICING

The rotation of the wheel usually loosens the stud nuts. They will fall off unless they are tightened. To recheck the torque:

- Stop after you have driven a few miles.
- Check the stud nuts.
- If the nuts need to be tightened, use a torque wrench to tighten them.
- Stop again in 100 miles.
- Tighten the nuts if needed.

NOTE: Never use oil or grease on the stud nuts.

DRAINING THE AIR RESERVOIRS

To drain the air tanks:

- Park the truck on level ground.
- Chock the wheels.
- Open the drain cocks by twisting the valve on the bottom of the tank.
- Allow all of the air pressure to escape. The air pressure gauge will read 0 psi. This will let the moisture drain out.
- Close the valve.

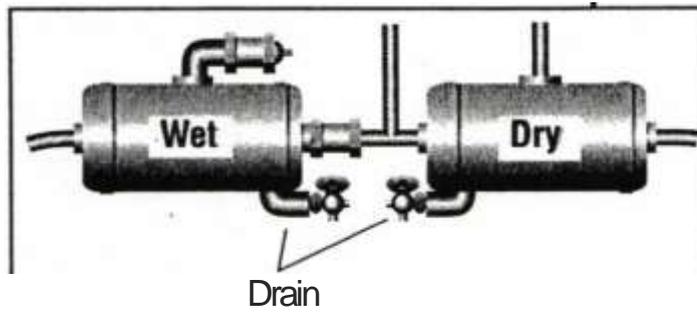


Figure 20-20

ADJUSTING THE TRACTOR-TRAILER BRAKES

Some carriers want their drivers to make certain minor adjustments to the brakes. Others do not. Because instruction in this area is lengthy and manufacturer-specific, this book will not attempt to teach you how to adjust your brakes.

Learn what your employer expects from you as a driver in adjusting the brakes. Learn what type of braking system your rig has. Remember, a person who is well-trained for one type of braking system may not understand what is required for another system. Be sure the person who works on your brakes is qualified for the type of braking system your rig has. Brakes that have not been adjusted correctly can cause an accident.

SUMMARY

In this chapter, you have learned what types of maintenance are needed for the various systems on your rig. You have learned that preventive maintenance keeps unscheduled or emergency maintenance to a minimum. The types of reports that you, as a driver, will be expected to fill out and turn into your carrier were described. You also were taught how to do the basic, routine servicing expected of a driver. You now know how to change a tire if an emergency arises.

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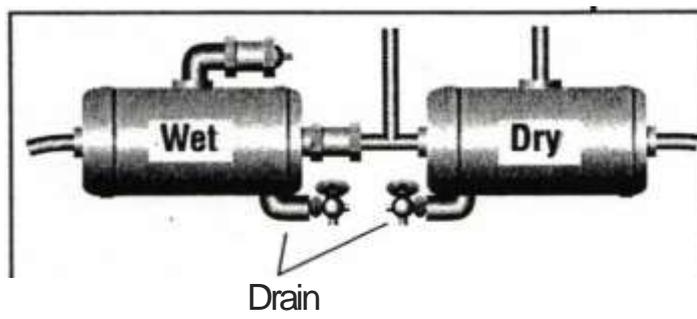


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PREVENTIVE MAINTENANCE AND SERVICING

Lab Exercise

For this exercise, you will need a truck or models of truck systems provided by your school. Divide into groups of three. Each group is given a part to be serviced or examined.

The first person is to have a paper with the correct steps to complete the servicing operation written on it. The second person is to actually perform the routine, explaining each step as it is done. The third person is to carefully watch the second person and correct any mistakes that are made. If the third person does not catch an error, the first person should read the correct step from the paper. The second person corrects his or her error and continues with the servicing.

When the servicing is complete, the three people change roles and repeat the routine. This continues until all three people can perform the servicing correctly. Then the group goes on to another system. This continues until all groups can correctly service each system.

True-False Questions

If the statement is true, circle the T. If the statement is false, circle the F.

- T F 1. Future tractor-trailer drivers must know how to perform inspections and authorized maintenance and repairs.
- T F 2. Once a student has learned the repairs presented in this lesson, he or she must always handle such repairs on a tractor-trailer.
- T F 3. It is the driver's responsibility to insure the vehicle is safe to drive and will operate economically.
- T F 4. Some carriers require drivers to perform certain routine maintenance tasks as part of their jobs.
- T F 5. In some fleets, drivers cannot do any of the routine maintenance tasks.
- T F 6. The Federal Motor Carrier Safety Regulations (FMCSR) require drivers to perform a pre-trip inspection and to review the last daily report (VCR) on the rig.
- T F 7. Most drivers can safely remove a tire from the rim after they have been taught how.
- T F 8. Most drivers have the skill to adjust tractor-trailer brakes because it is not hard to do.
- T F 9. Brakes that are not properly adjusted can result in accidents.
- T F 10. Air tanks should be drained only by a trained mechanic.



SAFE DRIVING



THE SAFE DRIVER

Competent drivers are those who have excellent control of their vehicle. This enables them to react quickly to sudden surprises or dangerous situations.

A safe driver is something else. A safe driver is all the things we just mentioned and more. The safe driver never gets into trouble in the first

place. Safe drivers are calm, cautious and respectful. They take the time to see what is going on all around them. Safe drivers are so alert, so observant and so well prepared, that they don't get "surprises." They can perform evasive maneuvers, but rarely have to. They see dangerous situations developing long before they happen, and can take steps to avoid the danger. Safe drivers simply don't have accidents.

To become a good, competent driver takes a little bit of work. To become a safe driver takes just a little bit more. In this chapter, we'll teach you the techniques you must master to become a safe driver.

OBSERVATION SKILLS TEST

The truck driver in the illustration at the top of this chapter will get into an accident if he isn't observant. What dangerous conditions did you notice? Turn to the Observation Skills Test Grid at the back of the book to check your answers.

VISUAL SEARCH

Perception is being able to see and know what is going on around the truck. You must not only see objects, vehicles or situations, but must also understand the situation. For instance, you must not only see that a vehicle is approaching the intersection. You must also realize that means the vehicle will soon be in the intersection, and decide if that calls for any response from you.

A safe driver is able to see and recognize potential problems quickly. It takes time for the mind to process information the eyes and ears send to the brain. To avoid a potentially dangerous situation, this information must be processed quickly, because you'll also need time to act. That means you must keep your mind on your driving.

Watch for dangers by scanning, moving your eyes back and forth over an area. You must know what's happening- and what's likely to happen- at these areas around your vehicle.

- ahead
- to the sides
- to the rear

Visual search helps you keep from getting boxed in behind slower moving traffic. By watching ahead you will see traffic jams in time to slow down

or change lanes safely. Keep your eyes moving and you will avoid unpleasant situations and surprises.

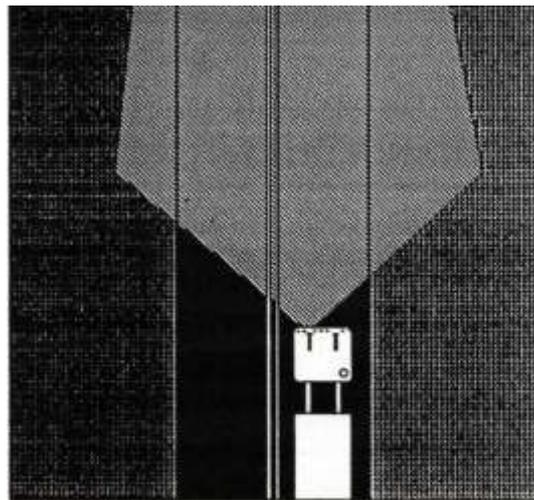
SEEING AHEAD

Distance scanning is looking ahead of the truck while driving down the road. Scan ahead the distance the vehicle would move in about 12 to 15 seconds. At highway speeds, that's about a quarter-mile. This gives you time to understand and react to any situation. A truck requires both space and time for safe lane changes, slowing or stopping.

Distance scanning also helps you position the truck properly in the lane. You'll tend to guide the truck along whatever path you focus your eyes on. So, don't focus on the center line. That will cause you to travel too much to the left of your lane. Instead, imagine a line down the middle of your lane and focus on that.

Distance scanning is important in turns as well as straight roads. Look ahead into the turn and start planning how much space your vehicle will need to complete the turn safely.

fig. 20-1
Always be aware of what is going on in this area.



While distance scanning, watch the road surface also. Pavement markings will tell you of a change in width and alert you that you may have to move over. You'll see any changes in the road surface which could affect your truck.

SEEING TO THE SIDES

Scanning ahead is important, but don't lock your eyes on the road in front of you and leave them there. Your scanning must include the sides of the road. There could be vehicles

coming from side roads, or vehicles trying to pass you from either side.

Scan the sides by moving your eyes from the front of the truck to one side of the road, then to the other. Refer to Figure 20-1, which shows the area your scanning should cover.

SEEING TO THE REALT

Be aware of what's going on behind you, as well as to the front and the sides. This is where your mirrors become important.

Use of Mirrors

There are two basic types of mirrors, plane and convex (sometimes called the "spot mirror"). When you first get in the cab, position both mirrors so that while in the driver's seat you can see properly. The plane mirrors should reflect the trailer body from the inside vertical edge to a depth of about one inch. The rest of the view is the road about 15 feet out to the side of the trailer. The inside vertical edge of the convex mirrors should show you part of the trailer. The view in the top horizontal edge should overlap that of the plane mirror. You should not have to lean forward or to the side to get these views.

Note that everything you see in the spot mirrors seems smaller than it really is. Things also seem farther away than they really are. Remind yourself that what you see in the spot mirrors is closer and larger than it appears.

Use the mirrors to scan the area behind the truck. Check them every five to ten seconds. Note who's coming up behind you. When you check again, see if they're still there. If not, where did they go? Did they pull off the road, pass you or are they tucked into your blind spot? It's like counting cards in a card game. Use your mirrors often, and keep track of who's on the road with you. This will help you make lane changes or merge.

This keeping inventory is especially important with regard to the vehicles that are directly behind the trailer or on the right side of the tractor. Your mirrors aren't much help here, you simply can't see these areas well. You have to have made note of who was behind you on the road. If they haven't exited, or passed you, it's a pretty safe bet they're in these blind spots. Your spot mirrors will help you see these blind spots.

COMMUNICATION

All drivers, no matter the type of vehicle they are operating, must communicate with each other. This is especially important when you're driving an 18-wheeler. Other drivers may not understand how much room you need to turn, how long it takes for you to stop, and so on. It is important to communicate clearly, early and long enough so other drivers are aware of what you are doing.

COMMUNICATING INTENT TO CHANGE LANES

Let other drivers know when you plan to change lanes. Remember, you have a blind spot right behind the truck and it's difficult to see any

vehicles that are alongside the truck . So give other drivers on the road time to adjust their speed or lane position to make room for the truck to move safely. FMCSR 392.15 (c) requires you to signal for not less than 100 feet in advance of any lane changes. In bad traffic, you may want to give an even earlier warning .

COMMUNICATING INTENT TO SLOW OR STOP

You also need to communicate your intent to slow down, turn or stop. For example, many automobile drivers don't realize how fast they are coming up behind a slower moving vehicle, such as your truck. When you are driving a truck slowly up a steep grade, using the emergency flashers will alert others that you are moving slowly (check local laws which may prohibit using the flashers for this purpose) .

FMCSR 392.15 (a) requires you to turn on the turn signal at least 100 feet before the turn . This warns other drivers that you'll be slowing down, and gives them plenty of time to respond safely. Signal your intent to stop by flashing your brake lights.

COMMUNICATING PRESENCE

There are times when you may need to let other drivers know that you are there. Some drivers communicate their presence with the air horn . A truck's air horn often only offends or frightens other drivers. It gets their attention, but may cause them more alarm than necessary . There's better ways to let others know you're on the road .

Communicate your truck's presence by flashing your headlights. Definitely have the headlights on in rain or snow and on cloudy days. A truck can't be seen more easily than a car just because the truck is bigger. Remember, if you are having a hard time seeing other vehicles, they are having a hard time seeing you. Lights will help others to see you. At night, have lights on from on-half hour after sunset through to one-half hour before sunrise.

MISUSE OF COMMUNICATION

Every driver, no matter what the kind of vehicle, relies on the accuracy of communication from other drivers. If you give the wrong message, the wrong message will be received .

For instance, it is just as important to turn off the turn signals after a lane change or after completing a turn as it is to turn them on in the first place. Keep in mind, the turn signal in a truck doesn't automatically snap off when a turn is completed. Make turning it off a part of the turning process . As you shift gears as the trailer straightens out after a corner, turn off the turn signals. Else, other drivers will think you plan to turn even though you don't. They may speed up, thinking you'll soon be out of their way, or

try to pass you on the other side. Don't use turn signals to signal to other drivers that it's safe to pass.

Don't misuse the horn. Don't use it to tell another driver to speed up or get out of the way. It is dangerous to lay on the horn. A loud blast can scare other drivers and cause an accident. We suggest you use it only in emergency. Then we'll add that if you're a good, safe driver, you should have that emergency to begin with.

The CB radio is a useful communication tool. It can be used to call for help in case of an accident, emergency stop or to ask for directions or other needed information. But it's a misuse of this important device to treat it like a toy. Don't clutter up the airways with useless chatter, especially when another truck driver may be genuinely in need of it for help or information. Besides, while you're shooting the breeze on the CB, you're not paying attention to your driving.

COMMUNICATION FROM OTHERS

Communication is a two-way street. You communicate to others, but you must also pay attention to the communication of others to you. A truck may be the biggest vehicle on the road, but the road is still shared by:

Look for and respond to the communication of other drivers, correctly and safely. Let's say the car in front of you is signaling for a turn. Notice the signal, and respond. Understand the car will likely be slowing down for the turn, so you should, too. You may even want to be prepared to stop in case the car driver runs into trouble. It would be incorrect to respond by speeding up, thinking the car will soon be out of your path. What if the car changes his mind and tries to return to the road in front of you?

SPEED MANAGEMENT

You must realize the importance of speed management. Speed management means to know how fast to drive according to the:

- stopping distance you'll need
- condition of the road surface
- shape of the road
- visibility conditions
- traffic flow
- speed limit

STOPPING DISTANCE

You must know how long and how far it will take for your vehicle to stop safely after you have decided to stop and have stepped on the brake. Stopping distance is described in detail in Chapter 5. This distance

vary based on road conditions, the weight of the vehicle and your traveling speed.

ROAD SURFACE

The speed at which the truck can travel safely will depend on the condition of the road surface. The following conditions demand slower speeds of travel.

- rough road surface
- snow
- rain
- ice

You can get the feel of the road when starting out before you work up to any great speed. Check traction (the friction between the tires and the road) by testing the steering control and the braking friction while you're still going slowly. Friction and traction problems get worse at faster speeds, so maintain that slow speed on poor roads.

Hydroplaning occurs when water or slush is on the road. Your tires are no longer in contact with the road but are actually riding on the surface of the water. This can result in you losing control of the vehicle. Several factors, such as worn or underinflated tires and the amount of water on the road, can make hydroplaning worse. Another factor is your road speed.

Wet roads can double the stopping distance. Be especially careful just after a rain begins. Rain mixes with oil on the road, resulting in a very slippery surface. Maintain a slower speed on wet roads. Reduce your speed by one-third.

Snow and ice can also reduce traction. Be aware that shaded areas, bridges and ramps can ice up before the main road surface does. Feel the front of your outside mirror. If it is starting to ice up, so is the road.

The inter-axle differential lock can give you more traction on slippery surfaces. Lock in the inter-axle differential on snow- and ice-covered roads and when black ice is present. Black ice is a film of ice too thin to see but thick enough to be slippery. Melting ice is even more slippery than ice that is frozen solid.

Icy and snowy roads also demand slower speeds. Again, travel at slower speeds when these weather conditions dictate it.

SHAPE OF ROAD

Slow down before entering curves. Going into a curve too fast can cause skidding or cause the truck to roll over. The danger is especially great when you're hauling liquid loads. Centrifugal force will tend to push your vehicle to the outside of the curve. High speeds increase the effect of

centrifugal force, so respect posted speed limits on curves. These signs guide cars to the maximum speed that is safe for the curve. This may be too fast for your truck. Because of their higher center of gravity, trucks must take curves slower than cars.

Also, slow down enough so that you don't have to brake while in the curve. Braking in the curve may cause a skid or jackknifing.

A truck will lose speed while going up a hill and may have to be downshifted. You should get into the right lane, or truck lane. This allows the other traffic to keep moving safely at highway speeds.

You'll tend to pick up speed when traveling downhill. Somehow, you'll need to brake to control the vehicle's speed. You should downshift before starting down, use the auxiliary brake or the service brake.

1. Apply the brakes just hard enough to feel a definite slow down.
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.

SPEED AND VISIBILITY

Your speed should be based on how far ahead you can see. Figure out your stopping distance at your current speed. Do you have a clear view of the road to where your final stopping point would be? If not, slow down.

Let's look at this problem from another angle. Say you're approaching a curve or hill or crossroads. What if a problem were to develop just around the bend, over the crest or in the intersection? Your speed should be based on how long it would take you to see the danger and respond.

In all cases of reduced sight distance, slow down. You must be able to see ahead the distance it would take to make a safe response—change lanes, slow or stop. "Don't over-drive your vision" is how this concept is sometimes phrased.

SPEED AND FLOW OF TRAFFIC

Maybe the best advice about speed management is "go with the flow." You may be on the interstate, but if traffic is moving at 35 mph, so should you. This gives you more time to avoid potential hazards.

You may think that if you drive faster you will get where you're going sooner. Perhaps you will get there just a couple of minutes sooner. The extra couple minutes aren't worth the risk of injury. The faster you drive the more risks you are taking. When you are going too fast for the rest of the traffic, you have to do more



Safa Driving

Driving that fast is also tiring and causes fatigue, and that, too, leads to accidents. At this point, you probably also realize you've increased your stopping distance. That makes it harder to stop safely.

By the same token, watch your speed when traffic is moving smoothly. If the traffic is moving at a steady 50 mph, you will only create dangerous situations by moving too slowly. Again, match your pace to the flow of the traffic within posted speed limits.

Speed Limits

The speed limit is the top speed anyone should ever use on that road. It is not necessarily the safest. Speed limits take into account the design and construction of the road and the type of traffic the road is meant to bear. To a certain extent, the speed limit is an ideal. You don't have to drive as fast as the speed limit allows, and shouldn't if a slower speed would be safer.

Certainly, you should never exceed the speed limit. If what we've said about safety didn't convince you, a speeding ticket certainly will. You, the driver, will pay that speeding ticket, not your employer. Some insurance companies will drop you if you get two moving violations in as few as three years.

Entering and Exiting Traffic

The ramp used to enter a freeway gives you time both to build up to highway speed and to find an opening into which to merge. In a truck, you may run out of ramp before you've reached highway speed or found an opening in traffic. All you can do is be patient and make the best of a bad situation. You'll call upon all your communication skills to alert the traffic in the right hand lane to your presence.

Slow down when exiting a freeway, particularly if the exit is curved. Don't neglect to communicate to drivers behind you that you are slowing down. Flash your brakes and use the turn signal. Allow yourself time to slow down in order to exit on the ramp safely. Remember that ramp speed limits are for cars, not 18-wheelers.

SPACE MANAGEMENT

The space around the truck is one other factor you should be aware of. As a truck driver you can't control how close other vehicles are following you. But there is something that will help. Keep free space - a space cushion - around the truck.

As with scanning, you're concerned with three areas:

- space ahead
- space behind
- space to the side

If a dangerous situation develops, you should have enough space around the truck to respond safely.

SPACE AHEAD

You manage the space ahead by keeping a safe following distance. Here's how to determine your following distance.

- Identify a stationary object ahead, such as a mileage marker, or seam in the road.
- Note when the rear bumper of the vehicle in front of you passes that object.
- Begin to count the seconds aloud: "one thousand and one, one thousand and two," and so on.
- Stop counting when your vehicle's front bumper arrives at the stationary object.

This distance will vary with the speed being maintained and conditions of another second if you're going faster than 40 mph. Add yet another road surface and visibility. Basically, for every 10 feet of vehicle length, you should allow one second if you're traveling at 40 mph. Add

second for bad weather or poor visibility or road conditions. For night driving, always add one second to the basic formula. Some states have specific requirements for safe following distance.

SPACE BEHIND

You must learn how to judge distances of other vehicles behind your truck. This is important when changing lanes. You have to determine how fast another vehicle is coming up from behind. Only then can you choose when to change lanes so you can do it safely.

Tailgaters challenge your ability to manage the space behind. Here are a few tips on how to handle tailgaters safely.

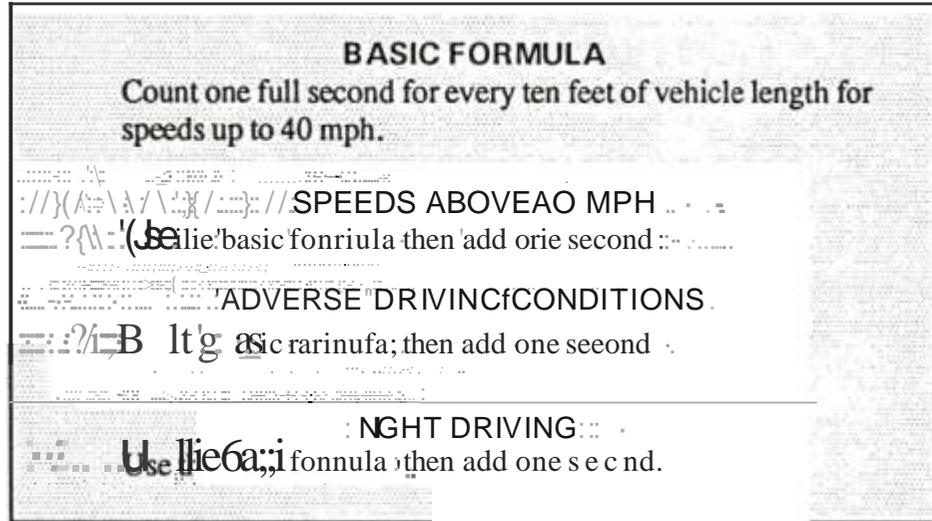
- Slow down gradually to let them pass.
- Don't slow down or turn quickly.
- Don't speed up, the tailgater will still stay with you.
- Don't turn on your tail lights or flash your brake lights to shake up the tailgater.

If you're being tailgated, leave a bigger following distance in front of you. That way, you'll be less likely to have to stop suddenly, and less likely to be rear-ended by the tailgater.

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fig. 20-2

Use this formula and these figures to compute your following distance.



SPACE TO THE SIDES

Make sure you always have an "out" in case you have to change lanes. Keep the truck centered in the lane. Aim to keep a space cushion on one side of your vehicle. Keep as large a space cushion as possible.

SPACE ABOVE AND BELOW

Don't forget to leave space above and below your vehicle to clear hazards. Make sure you can get safely over a grade crossing or under an overpass before you attempt it. Be aware that posted clearances may not always be correct. Recent pavement improvements can raise the roadbed and decrease the clearance.

SPACE FOR TRAFFIC GAPS

A traffic gap is the following distance between two vehicles other than your own. These are some situations in which you need traffic gaps:

- crossing or entering traffic
- passing
- merging
- railroad crossings

The size of gap needed for safe operation of a truck is bigger than gaps needed for safe operation of a car. A truck is bigger in size and slower in accelerating and so needs a bigger gap.

You'll need to apply the principles of space management to decide if a gap is large enough for you to change lanes, merge or complete the other maneuvers mentioned.

GIVING SPACE TO OTHERS

Road space is shared by all drivers with all types of vehicles. This is what's known as right-of-way. There is no situation in which any driver automatically has the right-of-way. There are times when, in the interest

of safety, you will give space to another driver so the way will be clear. Yes, you may have arrived at that four-way stop sign first. But if the safest thing to do would be to let all the other vehicles proceed through the intersection first, that's what you do.

If you fail to be observant, if you fail to receive and act on the communication of others, you risk hindering traffic. All drivers have a responsibility to keep traffic flowing smoothly. You help by opening gaps in traffic so others can merge or make their lane changes smoothly. You can see that if you slow down a little to create a gap, you contribute to a safer situation and perhaps prevent an accident.

NIGHT OPERATION

Earlier we had said that you must automatically increase your following distance for night driving. That's because night driving presents special challenges to the safe driver.

These three main factors are involved in night driving:

- driver factors
- roadway factors
- vehicle factors

DRIVER FACTORS

You start out at a disadvantage just because it's night. Drivers' night vision (how far or how well they can see at night) simply isn't as good as their vision during the day. Plus, night is the usual time for a person to sleep. You can more easily become tired or fatigued at night. Be well rested before beginning your trip. The following are a few hints on how to fight off fatigue.

- Avoid heavy or large amounts of food.
- Keep your eyes moving.
- Keep the cab ventilated.
- No alcohol at least eight hours before driving!
- Stop at least every two hours to rest or move around.
- Don't drive when you're fatigued, day or night.

ROADWAY FACTORS

Road conditions can affect night driving. Street lights don't light roads as well as sunlight does. When streets are lit, the lighting may vary from very dim to very bright lighting. Outside the city limits, some roads may not

Safe Driving

even be lit at all. This worsens the visibility problems we've already mentioned. Use the high beams to increase your field of vision whenever you can without blinding oncoming traffic.

Familiar roads make night driving less stressful. You 'll know well ahead of time where your turns are and can get ready for them. But trying to find your way on a strange road at night can be tiring, and that can add to your fatigue. Plan your route ahead of time to present the fewest problems. This way, you 'll encounter fewer "surprises" that could lead to accidents. You'll feel a little more familiar with the road, and that will be less stressful.

Other drivers on the road at night can affect your driving. Adjusting your eyes to oncoming lights can tire you. Sometimes other drivers don't dim their headlights for approaching traffic. It is dangerous to flash your high beams to get other drivers to dim theirs. The best thing to do is avert your eyes from the bright light until the car is past.

Be aware that other drivers are having the same night driving problems you are. Avoid blinding others. Dim your headlights within 500 feet of oncoming traffic and when there is traffic within 500 feet ahead of you.

At night there is a greater possibility of meeting drinking drivers. Look for drivers who are going way too fast or too slow, stopping without reason or who are weaving across the road. Alertness and a good following distance will help you respond safely to the actions of other drivers.

VEHICLE FACTORS

Make sure your headlights, high and low beams, are clean and working properly. Replace burned out lights before driving. Clearance lights need to be working so that you can be seen by other drivers on the road.

Communication is especially important at night. Make sure your turn signals are clean and work properly. At night it's especially important that your mirrors and all lights and reflectors are clean and properly positioned.

As we've noted, vision is limited at night. Low beams let you see only about 250 feet ahead. A dirty windshield will impair your vision further. Then glare on the windshield from the dashboard or other lights in the cab can reduce visibility even more.

Dim the dash lights so there isn't glare on the windshield from them. Don't dim them so much that you can't read the speedometer and other gauges, though. Turn off the other lights in the cab, such as those in the

sleeper, to avoid glare. If the light is being used by your partner, close the curtain of the sleeper.

The safe driver is willing to adjust speed and driving techniques to fit the situation. When vision is limited, slow down to ensure your safety and the safety of others on the road.

EMERGENCY MANEUVERS

OK, let's say you've done everything we've discussed so far and you still get into a potential accident situation. Emergency maneuvers are the steps you take to avoid turning the possible accident into a real one. As a safe driver, you should be able to perform these maneuvers. But your aim should be never to need them.

EVASIVE STEERING

Evasive steering is steering to avoid an accident. You can often turn more quickly to avoid an accident than you can stop. Start turning as soon as possible. To reduce the chance of rolling or jackknifing, turn only as much as necessary. Be careful you do not over-steer.

Don't use the brake during an evasive steering maneuver. If possible, brake before steering. As soon as the front of the trailer is past the obstacle, you can begin counter-steering. Counter-steering is steering the truck back toward the intended path of travel.

EMERGENCY STOP

Another emergency maneuver is emergency stopping. There are two procedures. The first is controlled braking. This involves applying the brakes just short of them locking up, then maintaining steady pressure. It takes practice to know where that point is. Until you learn it, use the stab braking method.

Stab braking means applying the brakes fully, then releasing them slightly when the wheels lock. Releasing the brakes prevents a skid. Repeat this stab braking and allow the brake system to recover between stabs until the vehicle slows.

OFF-ROAD RECOVERY

If you have to go off the pavement and onto the shoulder, you still want to maintain control of your vehicle. Try to keep one set of wheels on the pavement. Avoid using the brakes until your speed has dropped to about 20 mph. Then brake very gently to avoid skidding on what may be a rough

surface. Stay on the shoulder until you have your vehicle under control. Signal, then check your mirrors before pulling back onto the road.

When you return to the road, don't try to edge gradually back onto the pavement. Turn assertively back onto the road. Don't try to edge gradually back onto the road. If you do, your tires will grab and send you out of control. When both front tires are on the pavement, counter-steer immediately. The turn onto the pavement and the straightening back out should be made as a single "steer-counter-steer" movement.

BRAKE FAILURE

If the service brakes fail, downshift. You may have no other choice but to

use the parking brake to help downshift. This could lead to skidding so be very careful. Release the parking brake if the vehicle starts to skid or veer. Then look for an escape path that will provide the friction that you don't have from your brakes to stop the truck.

The downshifting procedure should be used until the truck can be stopped with the parking brake. Before you go any further, check the brakes and get them repaired.

BLOWOUTS

A blowout on a tandem or tractor drive axle tire should not cause you to lose control. Simply slow down and find a safe place to pull off and

assess the damage. You won't know which one of your duals has gone flat unless you make a visual inspection.

A blowout on a tractor steering axle tire requires some extra effort to maintain control. When a blowout happens, keep a firm grip on the steering wheel. Quickly apply a little power. Don't apply the brakes, as this would allow the side force to overpower the forward momentum. The forward momentum must be maintained because that helps you to steer. Make steering corrections the same as if there were a sudden, strong crosswind. Keep going until there is a safe place to pull off.

Instability from blowouts worsens as the truck slows to 50 mph.

Vibration and noise is the worst when the truck is going between 50 and 40 mph. Don't let the noise scare you. Don't worry about the tire or wheel. It is more important to avoid an accident and injury.

SKID CONTROL AND RECOVERY

If skidding isn't controlled, the truck could jackknife. Once a rig has completely jackknifed, it takes a wrecker to straighten it out. You can see

it's crucial to stop the jackknife before it goes too far. So let's look at how skids happen, and how to get out of them.

SKID DYNAMICS

A skid occurs when the tires lose their grip on the road. The heat created by rolling at high speeds can soften rubber and cause tires to lose friction. Speeding on snow or ice can also result in loss of friction. Front wheel skids are caused by lack of tread on tires and improper cargo loading. Using the brakes too much causes brake fade.

Skids can be caused by wheel load. When there is too much heavy cargo too close to the front of the trailer, not all the wheels have a good or an equal amount of traction.

Skids can be caused by the force of motion. An object in motion tends to stay in motion. When a truck is moving down the road, it doesn't stop on a dime. The momentum keeps the vehicle moving even after the brakes are applied. When wheels are locked, the momentum keeps the vehicle going, resulting in a skid.

THREE BASIC TYPES OF SKIDS

There are three basic types of skids.

BRAKING. Skids are caused by braking. This happens when the brakes are applied too hard and the wheels lock up. Skids can also be caused by using the auxiliary brake while driving on slippery roads.

TURNING. Another type of skid is caused when the wheels are turned more sharply than the vehicle can safely turn.

ACCELERATING. Skids caused by acceleration occur when too much power is sent to the drive wheels, making them spin.

Most skids result from driving too fast for the existing road conditions. If your speed is correct, you simply don't have to over-accelerate, over-brake or over-steer.

SKID RECOVERY

As we said, an uncontrolled skid could lead to a jackknife. But you can recover from a skid before it's too late. Recovering from jackknife skids involves four steps:

- speed control
- counter-steering
- corrective steering
- braking to a stop

TRAILER JACKKNIFE. A trailer jackknife is caused when the wheels of the trailer lock. The trailer then swings around until it hits something. This is more likely to happen when the trailer is empty or has a light load. Trailer jackknife skids can be recovered by a slight increase in speed to pull the trailer behind the tractor. Don't use the brakes or the trailer hand brake to recover from this skid.

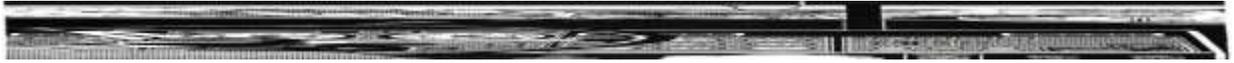
TRACTOR JACKKNIFE. When the rear of the tractor wheels lock, they slide sideways. The trailer pushes the rear end of the tractor sideways. The trailer swings around until it hits the cab. To recover from a tractor jackknife skid, first stop braking. This allows the rear wheels to roll again. When the vehicle begins to slide sideways, steer in the direction you want the vehicle to go. As the vehicle is back on course, counter steer quickly.

When the front wheels skid, the front end tends to go in a straight line no matter which way the wheels are turned. When a front wheel skid happens, the only way to stop the skid is to slow down. Here you do use the brakes and stop the vehicle as soon as possible.

QUIZ

1. To be a safe driver, all you really need is to be in good control of your vehicle.
A. True
B. False
2. An area you cannot observe by scanning _____ is
A. the front of the tractor
B. the sides of the truck
C. the rear of the truck
D. directly behind the trailer
3. The plane and convex mirrors will help you do many things except _____
A. scan ahead the distance the vehicle would move in about 15 seconds
B. keep an eye on the traffic out behind your vehicle
C. determine if someone is alongside your trailer
D. find opportunities to change lanes and merge

4. Failing to cancel your turn signal is about as bad as forgetting to use the turn signal in the first place.
A. True
B. False
5. GOOD speed management is _____
A. always doing the maximum speed legally allowed
B. driving at the speed that's best for conditions
C. keeping a space cushion around your vehicle
D. scanning to the front and to the sides
6. The following distance for a 50-foot rig traveling at 55 mph in the rain at night should be _____ seconds.
A. 1
B. 6
C. 7
D. 8
7. You must automatically increase your following distance for night driving.
A. True
B. False
8. Evasive maneuvers are the first steps the safe driver takes to prevent accidents.
A. True
B. False
9. To prevent skids, _____
A. brake hard so the brakes lock up
B. turn the wheels sharply
C. hit the throttle and make the wheels spin
D. drive at the speed proper for the conditions
10. It takes _____ to straighten out a rig that has completely jackknifed.
A. speed control
B. corrective steering
C. counter-steering
D. a wrecker



MEETING THE CHALLENGE

Mountains, hilly terrain and adverse weather -conditions will challenge you as a cross-country truck driver. Mountains and hilly terrain will

challenge your shifting skills. In fact, this type of driving is so challenging that you'll need to learn how to use a runaway ramp just in case.

Sometimes weather conditions are so bad that there's simply not enough traction or not enough visibility to drive. Snow and ice force many drivers to sit it out in a warm, safe truck stop. Fog and dust storms can make driving even a short distance very risky. Headwinds and crosswinds make driving tough, too.

In this chapter, we'll show you how you can deal with these special driving challenges.

DRIVING IN MOUNTAINS AND ROLLING TERRAIN

A great many mountain ranges in this country create natural barriers. If

you become a long distance driver, you'll probably have to cross some of

The Appalachians in the eastern part of the United States stretch over a thousand miles. The great Rocky Mountains run from the Canadian border south. Idaho, Utah, Colorado and New Mexico are some of the states where giant snowcapped peaks can be seen year-round. In the Pacific Northwest, the Cascade Range crosses Oregon and Washington and the famous Sierra Nevadas of Gold Rush fame form a major barrier in California. Many smaller ranges are found in other regions of our great country.

There are the Adirondacks in mid-state New York and the Alleghenies in Pennsylvania. The Great Smokies in Tennessee and the Black Hills of South Dakota pose special problems for the truck driver. And of course, much of our Midwest consists of hilly terrain.

Maybe you've heard of some of the great trucking grades in the USA. The famous Donner Pass between Sacramento, California, and Reno, Nevada, is just one of them. Heading west from Reno, you are faced with about 60 miles of a 6% grade, all uphill. However, Donner Pass has one extra feature the other famous grades don't have. There were so many accidents on this grade that professional truck drivers were hired to help develop signs that help truck drivers get safely to the top.

There are a number of driving skills you must master and possible problems you need to know about to meet the challenges of driving in mountains and rolling terrain successfully. We'll cover the skills needed

for uphill and downhill operation first. Then we'll cover brake fade and how to use a runaway ramp.

WHAT GRADE MEANS

A small grade may be only a 4% grade. This means there is a 4-foot change in altitude for every 100 feet of roadway. In a thousand feet, there will be a 40-foot increase. A mile is 5,280 feet. That means the increase (or decrease, for a downgrade) will be about 200 feet. The grade will climb (or fall) about 200 feet per mile of roadway.

fig. 21-1
On a 4% grade going (or down), there is a 4-foot increase (or decrease) every 100 feet of roadway.



UPHILL OPERATION

Going uphill, your challenge will be to maintain as much of your speed as possible while fighting the natural force of gravity that wants to pull you back down. Check the route for the day by looking at a road map to

see what kind of terrain you are headed for. You'll want to be prepared for uphill grades because you know a sudden uphill grade can cut your steady

driving down to 35 mph very quickly.

Upgrades will require you to shift into lower gears. Gravity will be slowing the wheels of your truck. If you don't downshift, you will lug the engine and eventually stall.

The problem is downshifting on an upgrade is different from downshifting on level ground. On level ground, when you put the clutch in to shift, the truck will slow very little. But on a grade, as soon as you take your foot off the throttle, the truck will slow down much more quickly. You will really lose speed then. So you need to shift fast and your double-clutch technique must be very accurate. You may have to downshift a few gears to reach the top of a grade. If it is a steep grade or if you haven't been paying attention and the hill surprises you, you may have to skip a gear or two when you downshift.

Until you get good at this, you may have some trouble double-clutching and shifting at all, much less while maintaining speed. You may not even be able to get back into gear because the hill is slowing the truck faster than you expect. If you do "miss a gear," your only choice may be to bring the truck to a stop, shift into first gear and continue up the hill. Try to get off on the shoulder before you stop.

Now your challenge isn't downshifting, it's upshifting on an upgrade. Be careful when you start up again. The truck is going to want to roll backwards. You probably won't be able to upshift many gears so your trip up the hill will be a long and slow one.

Uphill Problems

You can see that maintaining uphill speed can be very difficult. Good drivers are proud when they are able to manage it. They have reasons to be proud. Traffic, poor driving habits and the wear and tear on the rig on upgrades all present special problems.

On many upgrades, you'll find a right lane full of traffic, all kinds of cars and trucks. If one driver slows down, all the traffic in the right lane will have to slow down. That includes you, of course. A good driver always shows courtesy to other drivers.

Poor driving habits can also hurt the engine. Some drivers tend to run the engine at either too high or too low an rpm on a hill. This happens because they downshift too far or not far enough. When you downshift too far, you may over-rev the engine. This makes the engine spin too fast and that will damage it. When you don't downshift far enough, the engine will work hard at too low an rpm. That will damage it, too.

To help reduce wear and tear on your rig, you should watch the engine, transmission, and differential temperatures. On upgrades, going uphill makes everything work harder, creating more heat. Your temperatures may go up a little. However, if they continue to rise above the manufacturer's recommended limits, you need to downshift and slow down so everything is not working so hard.

DOWNHILL OPERATION

The challenge in downhill operation is still controlling your speed. Only now gravity is forcing you to go faster, not slower. Many accidents

happen on downhill grades because the driver could not control the vehicle's speed. After an accident on a downhill grade, such a driver will almost always say, "The brakes failed."

No, the brakes didn't fail. The driver failed. Brakes can only do so much. The rest is up to the driver. Did the driver pull off at the top of the grade

Challenges

and check the brakes? If they needed to be adjusted, were they? Did they ever know how to use the brakes? But most important of all, did they ever know how to drive downhill? Let's start with gear selection.

 OBSERVATION SKILLS TEST

What did you notice about the illustration that began this chapter? Go to the Observation Skills Test Grid at the back of the book and how your observation skills are improving

Gear

The old rule of thumb, used for many years in the trucking industry - "use the same gear going downhill as you used going uphill" is not true anymore. Many of today's engines can pull a truck uphill faster than it can go down the same hill. Also many hills are the same slope on both sides.

The new rule of thumb is to use one gear down from what you used to climb the hill. Be in the right gear before you start heading down. The way to select a gear for a particular downgrade is to get advice from a driver you trust who has been down that hill. Then proceed very cautiously. You know from experience what speed and gear you can safely.

Checking the Brakes

Heading south on I-17 from Flagstaff to Phoenix in Arizona, there is the famed 16-mile hill. From ice cold pine country over 7000 feet up, this interstate drops to about 3000 feet into hot cactus country.

There are plenty of warning signs at the top of this downgrade. They instruct the driver to pull out. This means you need to pull off the road and check your brakes. Don't just step on them hard and decide they work OK. Get out of the truck and inspect your brakes. Check the slack adjusters on all the brakes for excessive travel, and look for any other loose or broken parts. Be sure no brake has more than one inch of push rod travel. If the brakes need adjustment, this is the time to do it. Refer to Chapter 5 for a complete discussion of brake adjustment.

Select the gear for your descent. The signs will tell you the grade (5%) and the distance down the hill (16 miles). Choose a gear that will set the truck's speed at 20 mph while keeping the rpm just under rated engine speed (top rpm).

Let's go down this hill. Your mind is alert and you are ready. You drive out of the pull out area and upshift a few times until you reach the gear you

have chosen. Your truck is moving at 20 mph. If the road is not slippery, you turn on the auxiliary brake.

You resist going any faster than your chosen speed. You have chosen the correct gear for the grade and the distance and you do not change the gear position once the truck is going downhill.

It is almost impossible to select another gear then, anyway. There is great pressure on the drive train. If you are foolish enough to shift out of gear into neutral, chances are that's where the gear shifter will remain until you manage to stop the truck. You can imagine what a dangerous situation it would be to be halfway down a hill stuck in neutral. Do not attempt to change gears on a downhill run!

Once you have selected your gear and speed, you are free to drive safely and concentrate on how to use the brakes.

With the engine retarder on, you will probably not need the service brakes. They should be used only when either the engine rpm or the truck speed exceeds safe limits. Don't expect the service brakes to cool much between the applications. Once the brakes get hot, they take a long time to cool. If used, do not fan or pump the brakes. Instead, apply the brakes for short periods, using a slight, even pressure.

fig. 21-2
When brake fade occurs, the brake drum expands away from the brake lining.



NORMAL



BRAKE FADE

BRAKE FADE

Brake fade occurs when the brake temperature gets so high the brake drum cannot absorb it or get rid of it. Then the brake lining surface begins to melt. The surface of the lining is no longer solid, it's a liquid or gas. It offers little or no friction, and therefore no braking power. The lining will look glazed. Eventually, the brake lining does no good at all. The truck is rolling with no braking power at all, service or emergency. Overheating the brakes can also cause one or more of the following conditions:

- the brake drums get red hot and crack
- the brake linings bump up

Challenges

- the wheel grease seals get hot and leak grease
- the wheel grease heats to 900 degrees Fahrenheit and ignites

You can see that if you get stuck in neutral, you can't rely on your service brakes to stop you on a long downhill grade. If you encounter brake fade, or if you lose your brakes, look for a runaway ramp.

Runaway Ramps

Interstate highways now have runaway ramps on long downhill grades. If the driver cannot stop the truck, there is only one safety option left. The runaway ramp must be used. This is a matter of life and death to other motorists as well as to the driver. Runaway ramps stop up to 80% of out-of-control trucks.

Steering your truck to a runaway ramp takes strength and courage. Your truck may be traveling at high speeds, perhaps even as high as 100 mph, past other traffic: If this happens to you, turn on your lights and flashers. Blow the air horn in short blasts. Look for runaway signs. They will show you how far away the ramp is.

As you enter the ramp, shift to neutral if you're not already in neutral. Then hold the steering wheel firmly. Runaway ramps are usually made of sand and gravel and slanted uphill to slow your truck. After about 500 feet, there is a large sand pit. Your truck will roll into it and stop very quickly in the midst of a giant sand and dust cloud. You'll strain against your seat belt, but you'll remember to shut off the engine. Then turn off the lights, climb out and take the fire extinguisher with you. You may need it.

ROLLING TERRAIN

Hilly country (hills with one valley after another) describes rolling terrain. You'll rarely find grade percent signs in rolling terrain because the grades are not that severe. The challenge in covering rolling terrain is to maintain a steady speed despite the hills. The problem with this kind of driving is selecting the correct gears for one hill after another. Each hill is a different height and length. You must anticipate each hill and you will be changing gears constantly. That means you must always be thinking ahead to the next hill and the next valley. Rolling terrain will demand the best of you in terms of shifting gears, but it is rewarding driving.

Gear Selection

Picture yourself driving from San Antonio to Austin in Texas. This is rolling terrain country. Your truck begins to slow on an upgrade. You quickly shift down a gear. As you top a small hill, you see a long gentle grade, then another hill. You know what to expect because you can see for miles. You can anticipate your gear changes. You have time to figure

out your gear changes and your speed . You upshift and increase your speed . This speed will take you almost to the top of the next hill. You will have to downshift near the top. Watching the tach closely, you can plan ahead for each gear change and maintain a steady speed .

Maintaining Speed

As you go down one hill, you'll pick up speed. You can use this momentum

to get up the next hill and thus maintain a steady speed . At the same time, you don't want to exceed the legal speed limit.

Another consideration is other traffic which will frustrate you r at tempts to maintain an even speed. If you are in hilly country on a free access highway, there will be cross traffic . A driver going fast downhill is always surprised when a farmer pulls out from a field. The farmer is never surprised. The farmer has pulled out on this highway in this old green John Deere tractor a thousand times, usually at dusk and usually without lights . Someti mes the farmer wonders why the tmcks come so close as they pass . Someti mes they blast thei r air horns. The farmer smiles and waves back.

A final consideration is to control you r speed as you top sharp hills . Drive trying to maintain speed will sometimes top sharp hills at 55 mph. This is like playin g R ussian Roulette wi th other peopl e. How far can you see when your long nose conventional tractor wi th a 6-foot hood tops a sharp hill? For a split second, you may not be able to see the road continue at all. What is on the road ? A pair of pickups parked on the pavement with two cowboys talking it over? A cow or a horse? A flock of sheep being herded across the road? A school bus letting out children? If there is an

accident , some drivers will say, "I didn't see them ." These drivers are as smart as the ones who say, "The brakes failed ."

fig. 21-3

Never top a sharp hill at full speed. You can't see what's on the other side.



Iri rolling terrain, always be thinking ahead to what may be over that hill where you can't see.

Challenges**ADVERSE
CONDITIONS**

There are many kinds of adverse conditions. However, in the trucking industry, those words refer to weather conditions that slow you down and make driving more dangerous. The challenge here will be to make good progress while traveling at a safe speed and maintaining control of your vehicle.

Chapter 20, Safe Driving, takes a detailed look at some of the problems presented by adverse weather conditions and night driving. We'll review them briefly here, and present some new information.

COLD WEATHER STARTING

A diesel engine is more difficult to start in cold weather because of the increased drag of moving parts in cold oil. Also, the cold air entering the cylinders takes longer to reach combustion temperatures.

If temperatures are consistently below 40 degrees Fahrenheit, you may need a starting aid to get the engine going. Your tractor may be equipped with a plug-in block heater, glow plug, air pre-heater or ether aid. All are effective during cold weather. Make sure you know which starting aid your tractor has and how and when to use it.

Operating a cold diesel engine can lead to excess wear of internal surfaces which have moving contact, such as bearings, bushings, the camshaft and piston rings. Bringing your engine up to operating temperature is important. If you try to accelerate before the lubricant is circulating well, your truck may experience:

- camshaft lobe damage
- crankshaft and bearing damage
- turboshaft and bearing damage

After starting the engine in cold weather, don't start your trip until the needle of the water temperature gauge starts to move up.

White smoke coming from your exhaust stack during cold starts is a sign of incomplete combustion and will clear up when the engine warms up.

For easier cold weather start-ups, allow an idling period to:

- establish an oil film on the cylinder walls
- lubricate the turbocharger bearings
- allow time for the pistons to expand to fit the cylinders
- allow coolant temperature to increase

SNOW

Unless it is very cold, new snow will melt on the road and reduce traction.

It may stick to the windshield and limit your vision. Slow down and be alert for other vehicles sliding out of control. Don't use the retarder. Lock the inter-axle differential to get more traction if you need it. Every winter, snow is expected in many parts of the nation. Often unexpected snowstorms occur in areas that are not accustomed to snow. In your pre-trip inspection before leaving on a trip during the expected and unexpected snow season make sure you have tire chains in good condition. You should have one set of chains and extra cross links for at least one driving wheel on each side.

As you start into some mountain ranges, state highway signs will direct you to have tires chains mounted. If you fail to comply with the signs, you could receive a citation and a fine. Plus, you could receive the embarrassment of getting stuck and tying up traffic. If your company runs through cold country where chains are required, there will likely be policies about having and using chains.

Until you have a lot of experience with tire chains, practice mounting and removing a set. The practice will pay off when you have to install chains in freezing temperatures or in the dark.

ICE

Ice on the road reduces traction and your truck can slide and jackknife. On ice, trucks take ten times more distance to stop. An empty truck is worse. Black ice occurs when water seeps into the pores of the road

surface and freezes. The road looks dry. In fact, except for the patches of black ice, most of it is dry.

If you must drive on ice, start gently and go slowly. Use the foot brake. If your brakes are adjusted properly, you will have better braking than trying to control braking with the trailer brakes only. Do not use the retarder. You may have to Jock the inter-axle differential if you have stopped and poor traction makes it hard to get started again.

RAIN

When a rain starts, the first few minutes are the most dangerous. The rain mixes with a buildup of dirt and oils on your windshield and on the road. This will reduce your visibility and reduce traction.

Use the washer control before you turn on the wipers. Get some cleaning fluid on the glass so the wipers can do their job. Drive as if you are on ice until the rain washes the oil and dirt away.

NIGHT DRIVING

Night driving means reduced visibility. Don't overdrive your vision.

That is, drive at a speed that will let you stop if an object moves into the area of your headlights. You should be well rested and have a clean windshield when you drive at night.

Twilight, or dusk, is a dangerous time to drive. The sun is below the horizon. Glare, shadows and reduced light will play tricks with your vision. Day becomes night in 15 to 30 minutes. Your truck can cover 25 miles during this period.

Changes in light that occur at sunrise and sunset affect the vision of all drivers. Care and caution is needed.

WIND

Wind can be a friend. Driving hundreds of miles with the wind behind

your truck can mean a good trip. It can mean you'll change gears less often and use less fuel. You should be sure to check the engine temperature often, though.

Headwinds mean you and your truck have to work harder. Driving west across Nebraska into a 35 mph wind is almost the same as climbing 3% grades.

Crosswinds mean trouble. Both crosswinds and wind coming from another angle make steering hard work. Long high trailers have as much side surface as some highway billboards. You have seen these large signs blown over in a windstorm. Trucks get blown over in the same way. Empty trucks get blown over more easily than full ones.

With moderate crosswinds, you should steer into the wind slightly. When the wind is broken by trees or overpasses, you must be quick to allow straight line steering. As soon as the truck is in the open again, the wind will attempt to force the truck away. It is tricky, but a trained driver can master this type of driving.

Truckers often take refuge under overpasses when the wind is severe.

FOG

Fog, mist, fluffy snowfall, white outs, downpours and blizzards all have one thing in common. You'll barely be able to see the road or the

vehicles on it. You must make a decision whether to continue on at a slow speed or get off the highway. Most drivers will continue on until they spot

a safe pull out such as a rest area.

If this is not possible and you are on a two-lane highway, pull off the roadway as far to the right as you can. If you can, get completely off the road. Turn on your four-way flashers. Turn off all your other lights. If you leave your taillights on, a driver coming from behind might try to follow them and too late realize you are stopped on the side of the road.

OTHER ADVERSE WEATHER CONDITIONS

Some parts of the country present weather condition problems that are unique to that area. For example, the Southwest has dust storms that create havoc on the highways. Very hot weather can cause tar to melt, causing very slick roads. States often have information for travelers advising them on how best to cope with local conditions. Your company may also have extra training or instructions regarding special weather conditions you might encounter on your run.

TRAFFIC JAM

A traffic jam is a sort of man-made adverse condition. The challenge here is probably to try to keep from losing your patience. If it's brake lights as

far ahead as you can see and traffic is at a complete standstill, shift into neutral and keep your right foot poised over the brake. If whatever's causing the tie-up doesn't appear likely to clear up soon, look for an opportunity to pull off that road. If the traffic jam is going to take hours to unsnarl, check with your dispatcher for another route or somewhere comfortable to wait out the problem. It's no use burning up fuel and your patience if the traffic situation is out of your control.

CONSTRUCTION ZONES AND ACCIDENT SCENES

Roadwork zones and accident scenes are two more man-made adverse conditions. At first sight of a yellow sign warning you that a construction zone is ahead, slow down. Highway Departments must close lanes and create detours to repair and improve highways. They go to great length to

mark construction zones with warning signs. You must obey these cautions just as you must obey traffic lights.

Accident scenes cannot always be marked with large warning signs, but accident scenes are very obvious when you approach them. There is normally a lot of emergency personnel in the road trying to provide assistance. Again, as soon as you recognize an accident scene, slow down. Don't endanger the emergency crews by blasting through the area. Be watchful of other drivers who are gawking and not paying attention to their driving.

QUIZ

1. A 5% grade means there is a _____
 - A. five foot increase in grade for every 100 feet of roadway
 - B. .05 foot increase in grade for every 100 feet of roadway
 - C. 50 foot increase in grade for every 100 feet of roadway
 - D. 5 degree angle to the road

2. If you miss a gear on an upgrade, you should _____
 - A. downshift quickly
 - B. stop off the roadway and start again in low gear
 - C. coast to the bottom of the hill
 - D. stop on the roadway and start again in low gear

3. Running the engine at either too high or too low an rpm on a hill indicates _____
 - A. an upgrade traffic problem
 - B. too high an engine horsepower
 - C. too high a differential temperature
 - D. a poor driving habit

4. To help reduce _____ on upgrades, you should watch the engine, transmission and differential temperatures.
 - A. wear and tear on your rig
 - B. traffic problems
 - C. shifting
 - D. poor driving habits

5. Many of today's engines can pull a truck up the hill faster than it should go down the same hill.
 - A. True
 - B. False

6. Do not change the gear position once the truck is _____
 - A. parked
 - B. going downhill
 - C. going uphill
 - D. in a head wind

7. If you must use the service brakes when you're going down you, you should _____
 A. snub braking
 B. pump them C: use a slight pressure on the brake pedal and keep it the same
 D. use heavy pressure on the brake pedal and let it up from time to time
8. When you drive in rolling terrain, you should _____
 A. use the service brakes rather than the brake retarder
 B. always be thinking ahead
 C. try to maintain your speed so you are at top speed at the top of hills
 D. lose speed as you go down hills
9. When the road looks dry but is in fact slippery, you may have run into _____
 A. snow
 B. rain
 C. black ice
 D. black ice
10. Match the adverse weather condition in Column A with the remedy in Column B.

Column A Condition

Column B Remedy

A. traffic jam

1. Take refuge under an overpass.

B. rain

2. Shift into neutral and keep your right foot poised over the brake.

C. severe winds

3. Use the washer control to remove any buildup of dirt and oils so you have better visibility.

D. night driving _____

4. Drive at a speed that will let you stop if an object moves in to the area of your head-lights.

CHAPTER 12
CARGO DOCUMENTATION

STRAIGHT B U OF LADING-ORIGIN A LOT NEGOTIABLE		PAGE / OF 2				
M . . DATE TEAMS CAAAR	APPLY PRO LABEL HERE					
SHIPPER DISCOUHT SUPPLY SECOND In'RUI' WXST PHOIIDIX, AZ	CONSIGNEE	(On Order or delivery, the letters "C.O.D." must appear before consignee's name or address) DISCOUNT STORE 1234 WEST Err. DBNVRR, CO				
811. TO DIBCOUHT SUPPLY SECOND STRUT WB8T PHOBNIX, AZ		GENERAL COMMENTS				
PIECES	PKT	DESCRIPTION	QUANTITY (GROSS OR NET)	RATE	CHARGES	CLASS
22 PALLETS OF 100 CAATONS		<i>CHANGED GOLF Equipment 10 Cartons Open Cartons Approx 100 lbs</i>	3200 0			
50 CART<Hi		<i>TVs 10 Cartons damaged</i>	375 0			
50 CARTONS		<i>TV STANDS 5 Cartons short</i>	500			
SHIPPER DISCOUNT SUPPLY		CARRIER OFG TRUCKING SERVICES, INC.				
PER		DATE				

FROM DELIVERY RECEIPTS TO EXPENSE REPORTS

Cargo documentation is simply the paperwork needed for every shipment of freight. Not many people like doing paperwork, but there is a saying that is as true as it is old: "The job is not finished until the paperwork is done." Today's professional truck drivers must do their paperwork, and they must do it precisely and accurately. From log books to bills of lading to trip reports, you must learn them all. And, it's really not as bad as it might sound. In this chapter, you'll learn what's involved.

There are four different kinds of bills you will work with as a driver:

- the bill of lading
- the waybill
- the freight bill
- the manifest

THE BILL OF LADING

This is basically a contract between the trucking company and the shipper. The shipper says what the load is, what it weighs and where it is going. The trucking company promises to deliver it in good condition to *its* destination .

Every interstate shipment of freight by a common carrier is covered by a bill of lading and its conditions. A common carrier of goods must comply with the conditions . The shipper and the consignee must obey them as well.

When it's filled out and signed, the bill of lading is a legal and binding contract. It's a contract between the owner of the shipment and the carrier. Its legal name is the Uniform Domestic Straight Bill of Lading. Created by an act of the U. S. Congress a long time ago, it covers interstate shipments by railroads and barge lines as well as trucks. There is also an Order Bill of Lading and an Export Import Bill of Lading, but most truck drivers see only the most used Straight Bill of Lading. For short, it's called a bill of lading. Its abbreviation is BIL.

When you arrive at a shipper's dock, you'll be shown a bill of lading. It may be the long form with all the conditions and rules printed on the back, but most likely it will be the short form.

The BIL shows to whom the shipment is going (the consignee), the destination (the city or town) and the delivery address. The shipper fills out the date, the shipping number and the company name and complete address. The shipper also fills in the spaces to show if the freight charges are collect or prepaid. In most cases, the carrier bills the shipper for the freight charges.

If the space or box "Collect On Delivery \$..." is filled in by the shipper, then the carrier must collect the amount of money shown. This is also called a cash on delivery or COD, and the money must be paid to the carrier upon delivery of the shipment. In other words, you must collect the money when the shipment is unloaded . If you must deliver a COD

When the truck is loaded you will affix a pro number to the BIL. You will also be asked to sign the BIL. Once it has been signed, the shipper keeps the original and you take two other copies with you. One copy, called the shipping order, is for your carrier's records. The memorandum copy is for the consignee. No freight charges show on the bill of lading.

The BIL cannot be changed once it is signed. A Corrected Bill of Lading must be issued if there is an error. This is federal law. Signing a BIL is like signing any other contract. You cannot state at a later time that you did not read it or understand what it said. The BIL becomes a binding contract between the owner of the goods, the carrier and you, because you are acting as the carrier's agent. Smart drivers treat the BIL with the same care as a large personal check.

It is very important to be sure the BIL is accurate when you sign it, because when you do, you are saying, "I accept the count and description on the BIL as given to me." In other words, you sign for the exact count. If for some reason you are unable to count the load, you must write alongside your signature that the load is the shipper's count.

Making sure of the count is very important. And, it's your responsibility. If the difference in a count is just a couple of cans of soup, it wouldn't cost you much. However, if the difference is half a dozen TVs, you'll be in the soup!

Also, a smart driver will always weigh the load before starting a trip. The BIL may say 48,000 pounds and you know you can haul that legally. But a five percent error on a 48,000 pound load may be a 2,400 pound overload for the truck driver. That can mean a fine of \$250 or more. The shipper will not pay the fine. The overload ticket will be written against the driver. Who do you think pays the fine?

THE FREIGHT BILL

The freight bill is more like an invoice. Information on the bill of lading is used to prepare the freight bill. So, the freight bill has much the same information that the bill of lading has but it also includes the freight charges. These freight charges are the price the shipper must pay to have cargo shipped by the trucking company.

When you turn in the BIL copy to your office, it is sent to the Rate Department. The Rate Department assigns the correct rate to the shipment from a tariff, or rate, book. All the charges are figured from the BIL. These

Documentation

charges may be for extra deliveries, collection, special services and can include cooling or heating the load. After a rate auditor checks for errors, the BIL is sent to the Billing Department where a freight bill is typed, or generated by a computer.

The freight bill has all the information contained on the BIL and more. It shows:

- all charges
- the trailer number
- the origin and destination terminals
- any additional information the driver needs

such as special instructions for handling or delivering the load.

The freight bill may have as many as fifteen copies. Copies will go to Sales, Traffic, Customer Service, Operations, Accounting and many other departments at the carrier's main office.

If you must collect freight charges or a COD amount, you'll have the original freight bill and two more copies. These copies show that the consignee paid the COD. Write on the copies whether the charges were paid by cash or check. Once you're paid, date the copies and sign them. Then give the original freight bill to the consignee.

After unloading the shipment, the consignee signs the delivery receipt in a space that states the shipment was received in good order. You sign it too, noting the number of pieces delivered and the date. The consignee gets the consignee copy and you keep the delivery receipt. Both copies should have exactly the same information on them.

THE WAYBILL

A waybill is used to deliver split shipments or to deliver a shipment before the charges have been applied.

A shipper has 5000 cartons going to one customer. Each carton weighs 45 pounds. This is enough to make five loads, each 45,000 pounds. So, the shipper splits the shipment, but makes one bill of lading to earn a lower shipping rate. As a rule, the larger a shipment is, the lower the rate.

The carrier types five waybills and one freight bill. Each waybill shows the number of cartons, the weight and the trailer number or the trip

fig. 28-2
An example
Freight
Bill.

STIIAIGKT U . I OI U .ONG-OAIGINAL.IIOT NEGOTIAB1..E

PAGE 1 of 2

APPLY
PRO LABEL
HERE

M
0.11

***---

CONSIGNEE Or Enter in heavy 25 lines "CON" and apply to the consignor name in it
of same period in the CE file.

BILL TO GENERAL COMMENTS

RECEIPTS	HT	DESCRIPTION	ROUTING	WEIGHT (delivered only) (subject to correction)	RATE	CHARGES	CLASS

SHIPPER'S NAME AND ADDRESS

SHIPPER'S PHONE

SHIPPER'S CITY

SHIPPER'S STATE

SHIPPER'S ZIP

number. The freight bill shows all the information from the bill of lading and all the freight charges. Each load is delivered on a waybill. A waybill set consists of a delivery receipt, consignee copy and a memo or extra copy. No freight charges show on the waybill.

The delivery receipt and consignee copy are signed and dated the same way freight bills are. Bring the delivery receipt and any extra copies back to your dispatcher.

THE MANIFEST

A manifest is used when there is cargo from more than one shipper in your trailer. It lists all the cargo in the load. It shows the number of pieces and the weight for each shipment. If there is a pro number or a shipper's number, they are listed as well. (A pro number is a special number used to identify the load.) A brief description of the freight and packaging is included.

The manifest heading shows the carrier's name and the owner-operator or the driver's name. There is space for the date and the truck equipment numbers. Figure 28-3 shows a brief example.

Cargo Documentation

Just about every carrier uses a different format for the manifest. Some show the freight charges. Some show the origin city and the destination city. But, simply put, a manifest is a document that lists the cargo that is being carried.

fig. 28-3
An example manifest.

XYZ CARRIER MANIFEST						
Jan. 1, 1988			Eqipt. #s 38/44 D/OP DRIVER Joe Smith			
PRO#	SHIPPER	S/N	PCS	PKG	DESC	WEIGHT
0445321	Cont. Foods	4455	100	ctns	canned food	4500
Dn8662	American Supply	n8	50	pails	peanutoil	3000
S9997n	Texas Miis	none	350	bags	ftour	350'.)()

PRO NUMBERS

Pro numbers are the numbers assigned to freight bills and waybills. The name is taken from Progressive Freight Bill Numbering System. This means an advancing set of numbers given to freight or waybills. Just like the pages in a book, the numbers go from 1 to 2 to 3, and so forth. A carrier's Atlanta, Georgia, terminal might start the new year, 1988, by numbering the first freight bill cut like this: ATLS-0000001 .

- ATL is for Atlanta
- 8 is the last digit of the year, 1988
- 0000001 is the first bill cut in 1988

The next freight bill is numbered ATLS-0000002. In a few months, the numbers might be ATLS-3357749. The next year they would start with ATL9-0000001. This makes it easy to keep track of shipments and paperwork. Delivery receipts can be filed in numerical order, keeping each year separate.

Carriers refer to their freight bills often. Shippers and consignees send in freight claims for loss and damage months after a delivery. Disputes about freight charges can result in overcharge claims a year or two later. Pro numbers allow the freight bills to be filed in order, day after day. They can easily be pulled from the file to settle claims and disputes .

OBSERVATION SKILLS TEST

What did you notice about the illustration that began this chapter? Did you read it carefully? Can you recall the three items of cargo described on the form? Was anything damaged? Turn to the Observation Skills Test Grid at the back of the book and see how your skills are improving.

THE DELIVERY RECEIPT

The delivery receipt copy of the freight or waybill set has a lot of value to the carrier. It is so valuable that it's usually filed in a room that can be entered only by employees. This document can be used to prove that a shipment was delivered to the correct consignee. It shows:

- the name of the person who received the shipment
- the name of the truck driver who delivered it
- if the charges were paid at the time of delivery
- if there were any exceptions at time of delivery
- the date and the time of the delivery
- the truck or trailer number
- the shipper's number

Sales people use delivery receipts to prove good service in their efforts to secure more business from shippers. The delivery receipts document on time delivery and good service.

Both the Traffic and Cargo Claims and the Maintenance and Safety departments also use the delivery receipt. They may have to find out what happened to a trailer or a tractor on a certain day. For instance, they may need to find out how it was damaged. The delivery receipt will give them this information and tell who the driver was, too.

If there is any damage or shortage, it must be noted and signed by the driver and the consignee on the delivery receipt and the consignee copy. Be very careful that you describe the damage or shortage exactly. Do not simply write that 10 cartons are damaged. State exactly how they are damaged.

Shortages must show what is short. "Five cartons short" is not enough to protect the carrier. Suppose the load consists of large color TV sets and wood stands or carts for the sets. What is short, the TV sets or the wood stands?

Carriers also do not want drivers to deliver overages . An overage is when there are more pieces to deliver than what the freight bill or BIL ca& for. Usually an overage is part of someone else's shipment that got loaded in error.

Most carriers have a rule stating the driver must call the dispatcher before accepting an exception to a clear delivery (without loss or damage).

Once a delivery receipt is signed by both parties, you should treat it like gold. It might have more value than gold someday .

THE TRIP REPORT

Although "trip report" is the most common name for this document, it's also sometimes called a trip record, trip register or mileage report. The document may have different names, but the data that is noted is pretty much the same.

The trip report shows all the important facts about a trip, including:

- date and place the trip began
- the driver's name
- truck equipment numbers
- beginning and ending odometer reading
- each state entered or crossed
- odometer readings each time a state is entered
- amount of money advanced to the driver for expenses
- fuel purchases, where the fuel was purchased, the amount and the cost

Figure 28-4 shows a sample trip report . Trip reports can also be generated automatically by on-board computers. This is covered in greater detail in Chapter 12.

Cost control is a big factor in the trucking industry . Your carrier strives to keep track of the number of miles its trucks travel, both loaded and empty miles. By using trip reports, carriers can figure the cost per mile and the cost per shipment. They can also figure which tractors cost less to operate and which break down more often. A trip report shows all the money paid out for a trip. It also shows money advanced to the driver. This is money given to you before you leave on a trip or sent to you while you're on the road. Advances are routinely wired to truck stops where

Documentation

fig. 284
Example of a trip report.

TRIP REPORT				TRIP HO. _____
FROM _____	DATE _____	TIME-- _____	CARRIER _____	
TO _____				
TRAILER NO. _____				
CASH CONTROL		EXPENSES		
BEGINNING CASH ON HAND		PAID TO	FOR WHAT	AMT
ADVANCE CHECKS				COST
TOTAL				
TOTAL EXPENSES				
CASH LEFT				
BEGINNING ODOMETER READING <u>C=J.</u>				
ENDING ODOMETER READING <u>C-1</u>				
TOTAL MILES <u>L=J</u>				
STATE	ODOMETER	STATE	ODOMETER	TOTAL EXPENSES

they can be received by drivers who run out of cash. By listing all money received and all money paid out, the expense report helps the carrier keep track of the costs for each trip.

To figure their costs accurately, carriers need a complete expense report. They must know if they are making a profit or taking a loss. By reading expense reports for many trips, they can see where the money is going. Is the tractor using too much fuel? Are there too many repair bills, with resulting down time? Are meal and motel expenses higher than necessary? Expense reports show repairs, long distance phone calls, protective clothing purchases and more.

The carrier also wants to know how many miles were driven in each state. That is why you enter the odometer reading each time you enter a state. Each state has a fuel tax that must be paid. All states demand that a fuel tax be paid even if fuel is not purchased in their state. The number of

Cargo Documentation

miles driven in a state determines the amount of fuel tax that state must be paid.

You may hear the term "IITA," which means International Fuel Tax Agreement, or the term "RITA," which stands for Regional Fuel Tax Agreement. Your carrier's trucks may be registered in one of the states that participate in those agreements. These agreements were established to simplify the way carriers pay taxes.

Carriers can figure pay from the trip report, too. You should keep a copy of every trip report. By doing this, you can be sure you're getting paid the correct amount.

QUIZ _____

1. A _____ is a legal and binding contract.
 - A. freight bill
 - B. waybill
 - C. bill of lading
 - D. trip report

2. If a shipment is prepaid, you must collect the money before the shipment is unloaded.
 - A. True
 - B. False

3. If there is a fine for an overload of freight, the _____ must pay it.
 - A. shipper
 - B. consignee
 - C. dock foreman who weighed the freight
 - D. driver

4. The freight bill includes all the charges which are figured from the _____.
 - A. bill of lading
 - B. pro numbers
 - C. expense report
 - D. waybill

responsible for the condition of the cargo. Not only must you make inspections to ensure your truck is safe and road ready, you must also periodically check the cargo to be sure it is secure, within legal weight limits and properly balanced. The only exception to this is when the trailer is sealed.

Here is what the Department of Transportation says about those responsibilities in the Federal Motor Carrier Safety Regulations Part 392.9: No person shall drive a motor vehicle and a motor carrier shall not require or permit a person to drive a motor vehicle unless:

- the vehicle's cargo is properly distributed and adequately secured.
- the vehicle's tailgate, tailboard, doors, tarps, spare tire and other equipment used in its operation and the means of fastening the vehicle's cargo are secured; and
- the vehicle's cargo or any other object doesn't obscure the driver's view ahead or to the right or left sides, interfere with the free movement of his arms or legs, prevent his free and ready access to accessories required for emergencies or prevent the free and ready exit of any person from the vehicle's cab or driver's compartment.

Avoiding accidents that result from improper loading and securing is a big responsibility placed upon the driver. It will affect you daily so study these FMCSR parts until you know all the details about your responsibilities:

- 392.9 Safe Loading
- 393.100 Protection Against Shifting or Falling Cargo
- 393.102 Securement Systems
- 393.104 Blocking and Bracing
- 393.106 Front End Structure

You'll have to answer questions about cargo safety to get your CDL.

The other major reason for proper load securement is the prevention of damage claims against the carrier. Every item the driver allows to be damaged by improper handling or tying down will be noted as it's unloaded, inspected and received at the destination point. A claim for the damage is then made against the carrier. Thought and effort on the part of the driver as loads are being secured can prevent such claims. In this chapter we'll look at the proper ways to load, secure and unload cargo so as to prevent damage.

LOADING PLATFORM TRAILERS

The term "platform trailer" may refer to either a flatbed trailer or a low boy. There is no end to the kinds or types of loads you may encounter if you are pulling either type of platform trailer. Some loads may be light, bulky loads. Others may be very compact heavy loads. Normally the loads that are destined to be hauled on platform trailers are loads that simply cannot be loaded into a box van through its back doors, due to size or weight.

Loads going onto platform trailers are those that are lifted and placed on the trailers by forklifts or cranes. Some loads may be driven onto the beds of the platform trailers.

HEIGHT LIMITS

Loads can only be stacked so high on flatbeds. First, there are height limits for travel on the interstate. This limit is usually 13½ feet measured from the surface the vehicle stands on. Some states will allow taller loads, and may or may not require you get a permit, usually in advance, for such loads. A good trucker's map book would have details on specific state height limits. Second, for stability, you must keep the center of gravity low or you are more likely to tip over. Load the heaviest pieces on the bottom.

Low boy trailers are perfect for high loads. Since the trailer itself is built so low, more of the height can be taken up by cargo. Also, the low slung construction keeps the trailer and load stable.

The regulations can get pretty specific about how certain loads, such as coils, pipes and lengths of metal, are tied down. FMCSR Part 393.100 has the details and sketches of the requirements. The fact that metal loads are covered in such detail is not to say that all other type loads are not important. They are, and we'll discuss some of the more common ones in this chapter. Your carrier may also give you specific tiedown instructions for flatbed loads.

SECURING PLATFORM LOADS

The most common methods used to secure loads on platform trailers are:

- cables and winches
- webbing straps and winches
- chains and load binders

All are easy to use. However, as you tighten them, they can crush, bend or cut the load. So you must take steps to protect the cargo from being

any damage to the cargo and for any damage to roads, property or persons caused by the cargo. Don't take chances with cargo securement.

PROTECTING PLATFORM WADS

Ta

A tarpaulin, commonly known as a tarp, is a protective cover. In the trucking industry, tarps are used to cover cargo on platform trailers. You may need to tarp a load not only to protect the load, but also because state or local ordinances require it to protect people from spilled cargo.

Tarps are tied down with rope, fabric webbing or elastic cords with hooks. To tarp a trailer, you'll lift the rolled up tarp to the top of the front racks and unroll it across the bars to the back of the trailer. Then you pull it tight and tie it to cross bars on the racks. If the tarp is even and tight, it will not flap at normal highway speed.

It's a lot tougher to tarp an uneven load of machinery or equipment. Place the tarp directly on the cargo after the tiedown assemblies are tight. Then tie down the tarp so wind and weather don't get inside. An overlap in the front will help. Fold the tarp so there are no open spaces to catch the wind. You may need extra lengths of rope when you tarp uneven cargo.

Some examples of cargo that must be tarped when hauled on a platform trailer are listed below.

- plywood and lumber for indoor use
- military hardware
- cement and plaster in paper sacks
- iron, steel and aluminum
- restaurant kitchen equipment
- nails in paper boxes
- laundry and dry cleaning equipment
- pipe used for drinking water

Water can damage any of these loads, so inspect the bed of your trailer for holes. If your trailer floor is not waterproof you should cover the floor with plastic. Shippers often cover the top and sides of loads with plastic, but this plastic usually does not go around the bottom of the load. Placing plastic on the trailer bed and tarping over the plastic used by the shipper will keep the load dry.

You may be required to "smoke tarp" a load. This means using a tarp to cover the front part of the load. The tarp prevents the cargo from being discolored by smoke coming from the exhaust stack. If you fail to protect a load from smoke discoloration, a claim will be made against your carrier for the damage.

Prepare the trailer bed to accept a large heavy load that will be set in place by forklift or crane by putting dunnage (usually lumber) in place for the

Loading, Securing and Unloading Cargo

load to rest on. This will enable a forklift or sling to get under the load at the receiving destination. Placing a solid heavy load directly on the surface of the trailer would cause major unloading problems.

INSPECTING PLATFORM LOADS

All cargo, including tarped loads, must be inspected for security by the driver in transit according to FMCSR, part 392.9. The only exception is sealed cargo. Once you're on the road, you must check the load often. Look closely at all wood bracing and supports. Make sure none of the nails are pulling away. Pull at each chain. If there is any slack, open the binder and adjust it. Make your first inspection within the first 25 miles. Often, if anything is going to move slightly and loosen the chains, it will happen early on, as soon as the truck vibrates and bounces down the road a short distance. Make your second inspection after three hours OR 150 miles and then inspect three hours or 150 miles after that. Some unusual loads should be checked more often. Check again at each break you take from driving.

You should carry a hammer, nails, chains, binders and a good supply of rope, especially when you pull a platform trailer. With these supplies, you can make repairs to bracing or place another chain on a piece of machinery that appears loose.

When you perform your three-hour checks, you'll walk around the truck to check tires and lights as well as the cargo. At night, you should have a flashlight in one hand and a tire hammer in the other. Lightly tapping the chains with the hammer will tell you if they are tight or loose. A tight chain will cause the hammer to bounce back.

Some types of cargo are more prone to shifting than others. If you pull a load that requires tiedown assemblies of any kind, you should adjust your driving techniques to reduce the chance of shifting. Make no sudden moves, no swerving and no fast stops. Do not pull off the roadway onto an uneven surface. Drive more slowly than usual when you enter and exit expressways. Avoid parking areas that have sharp inclines.

LOADING VAN TRAILERS

Most cargo for van trailers will either be stacked by hand on the floor (floor load) or come on pallets (palletized). Sometimes the shipper will usually do all the loading. You will only supervise it. Maybe we should not say "only." Remember you are responsible for everything that hap-

pens to the load after you sign the paperwork. Be sure the loading is done properly.

Examine each pallet as it comes into the trailer. Look for any boxes that are damaged. If you find any, don't accept them. Also be sure the forklift driver doesn't damage any boxes when in loading them. You should be careful to do this because when you get to the delivery point the receiving clerk will look at each box. If any are damaged you will pay. It doesn't matter that the box was damaged before it ever got on your truck. The receiver will assume it was your fault.

Make sure each pallet is stacked so it does not lean. Make sure each pallet is placed so it is tight against the one in front of it and that it is square with the trailer. If you don't do this the pallets will take up too much room and they may not all fit in the trailer. In most cases there will be two rows of pallets down the length of the trailer. Position each one so there is the same amount of space between the pallets and between the pallets and the walls.

OBSERVATION SKILLS TEST

Did you notice the loaded trailer in the illustration that began this chapter? Did the load look secure to you? Why or why not? Check your answer with the Observation Skills Test Grid at the back of the book.

Tiered Stacking

Not all freight is loaded on pallets. Now and then, you will hand-stack a load of cartons or sacks. To load boxes securely, use the tiered stacking method shown in Figure 30-3 on the next page. This will distribute the weight of a tier of freight equally. By overlapping rows so the freight in the tier ties together, there's less chance the cargo will shift.

Start on either side on the floor in the nose of the trailer. Load the first carton in the corner against the front wall. Load all the way across the floor, completing one row of cartons in the tier.

Start the next row of the tier on the side of the trailer opposite the start of the first row. If the cartons in the first row do not exactly fit across the unit, leave the space. As long as the carton being loaded to start the next row does not overhang more than half its width, do not worry. This overlap is good and it starts an overlap all the way across the row. Wedge this first carton tight against the trailer wall and each carton in the row against the loaded cartons.

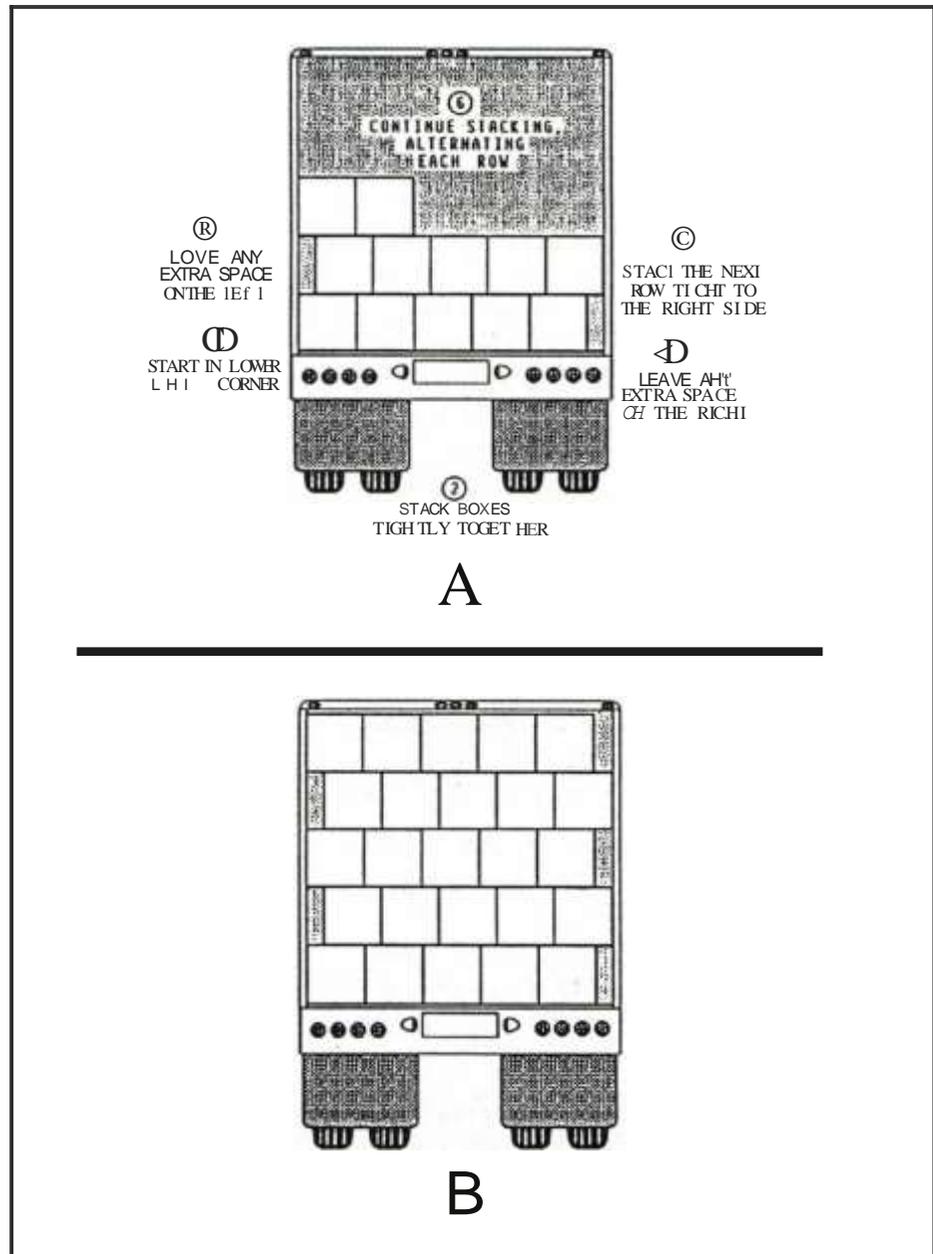
Loading, Securing and Unloading Cargo

Continue loading rows across the trailer as outlined above. Always start the next row on the side on which the previous row was finished, thus building a tier of freight from the floor to the roof.

The different sizes and shapes of the freight being loaded will dictate how closely you can follow the tier technique of loading. You will have to make some adjustments for different sizes of cartons. For instance, you could load the length of the freight the long way in the trailer, not across the trailer. This reduces the possibility of the tier shifting backward or forward in stop-and-go travel. The overlapping rows reduce shifting from side to side.

fig. 30-3

(A) Tiered stacking method. (B) A full trailer with tiered stacks. This method for securely loading dry freight cartons can be used for sacks as well.



Aim to build your tiers so the side facing the loader is as straight as possible and the top row is as level as possible. Put the heavier, stable freight in the bottom tiers, the lighter freight on top of the tiers. Always place cartons right-side up as indicated on the cartons.

Loading Reefers

It's particularly important that reefer cargo be loaded properly. Air must be permitted to circulate all around the load. This helps to maintain an even temperature and keeps sections of the cargo from drying out. With both floor and palletized loads, be especially careful to leave spaces around and between the rows. Keep the load away from the rear door, especially when extreme outdoor temperatures could affect the cargo.

SECURING VAN W ADS

Securing van loads doesn't present the same challenge that securing platforms loads does. The van body itself provides stability to the load. There is however one device, the load lock, that provides extra stability to the van load.

Load locks are long poles that stretch across the width of the trailer. Once in place they are pushed against the sides of the trailer with a jack-like mechanism. These should always be used in the rear of the load to prevent any boxes from falling. Place one near the top of the load and another about halfway down. Be sure they are firmly in place.

PROTECTING VAN W ADS

In a similar fashion, the van body itself protects the cargo, so you don't need tarps or plastic. Before you load, though, make sure the inside of the trailer is clean and dry. Check for nails, splinters or other protrusions that could damage the cargo.

INSPECTING VAN W ADS

Inspecting a van load is also a fairly simple procedure, consisting of just a simple check to make sure nothing has shifted out of place. If you have done a good job of loading and securing the cargo, nothing should.

LOADING LIQUID TANKERS

The person in charge of loading and unloading a cargo tank must be sure someone is always watching. The person watching the loading or unloading must:

- have a clear view of the cargo tank
- be within 25 feet of the tank
- be aware of the hazards
- know the procedures to follow in an emergency
- be authorized to move the cargo tank and able to do so

Turn off your engine before loading or unloading any flammable liquid. Only run the engine if needed to operate a pump. Ground a cargo tank correctly before filling it through an open filling hole. Ground the tank before opening the filling hole, and maintain the ground until after closing the filling hole.

Keep liquid discharge valves on a compressed gas tank closed except when loading and unloading. Unless your engine runs a pump for product transfer, turn it off when loading or unloading. If you use the engine, turn it off after product transfer, before unhooking the hose. Unhook all loading and unloading connections before coupling, uncoupling or moving a chlorine cargo tank. Always chock trailers and semitrailers to keep them from moving when uncoupled from the power unit.

Never load a liquid tanker completely full. Liquids need outage-room to expand when they warm. Your dispatcher will tell you the outage needed by the liquid you'll be loading.

Some liquids are very dense, and even a small amount is quite heavy. You will fill a liquid tanker only partially full of such heavy liquids. A liquid level sensing device and controller will help you load liquids to the proper level.

As you know, some tankers are compartmented. This means you must be careful not to overload any one compartment. You could put too much weight on the front or rear axle if you do.

SECURING AND PROTECTING LIQUID LOADS

As with van loads, the tanker body keeps the load secure. Tankers are often insulated, cooled or heated to keep the load at a specific temperature. They are also often pressurized to keep certain substances stable enough for transport. The dispatcher and the shipper will tell you at what temperature and pressure the load should be kept.

INSPECTING LIQUID LOADS

Inspect the tank trailer's hoses and valves often to make sure there are no leaks. Check temperature and pressure gauges to see that proper levels are being maintained.

PICKING UP A SHIPMENT

The procedure for picking up a shipment will vary somewhat from place to place, but they'll all be pretty much the same. It will likely go some thing like this:

When you arrive at the shipper's yard you stop at the front gate. The guard looks at your I.D., logs you in and calls the shipping office to report your arrival. You're told where to park your truck and where to go for the shipping papers. After you park the truck, you walk to the dock shipping office. A sign over a window says "Drivers Report Here."

An office clerk asks for your company name and your name. You are handed a copy of a bill of lading and a blank tally sheet. The clerk has written "Door 23" at the top left. You are told to back the trailer to that door and wait for the foreman.

After you back to the dock, use the stairs and go to the trailer. Inspect the roof and sides for any holes. Check the floor for dirt or nails. Return to the loading dock and stand at your door. Wait for the foreman. Do not walk into the warehouse or into any of the offices.

When the foreman arrives, your trailer will be checked again. The foreman will send a loader to your door. Make sure you check your loading papers against the loader's papers because there have been times when the wrong freight was loaded on the wrong trailer.

Many warehouses stage the loads in the shipping area at a place called the ready line. The 1056 cartons you're to take have been brought out earlier to the shipping floor. They have been checked for damage and counted.

You should check your load at the ready line before it is placed in the trailer. Count the pallets and cartons. As the pallets are placed in the trailer, use the tally sheet to check off the number of cartons. If the pallets all have the same number of cartons, in this case 48 each, you will check off each pallet as it is loaded. Then show that each pallet contained 48 cartons and $22 \times 48 = 1056$ total. Write down the trailer number, the bill of lading number, the date and your name.

The foreman will bring the bill of lading. Check that it has not been changed. If it is in order, print your company name, then sign it. Show the number of cartons you received and the date and trailer number. Circle the total number of pieces, then affix a pro number. Accept your copy of the bill of lading. Ask to use the phone. Call your dispatcher, state your name and number and report that the trailer has been loaded.

When you leave, pull the trailer out very slowly. Because you signed for a complete load in good order, any damage will be your responsibility. Continue to pull out slowly until you are clear of the dock and any other trucks. Then check the load again before you close the doors.

PROPER WEIGHT DISTRIBUTION

Your main concerns when your trailer is being loaded are:

- gross weight
- loading to bulk capacity
- axle weight
- weight rating

Gross vehicle weight (GVW) is the total weight of the tractor or trailer plus its load. Gross combination weight (GCW) is the total weight of the power unit and the trailer or trailers plus the cargo. The GVW or GCW of your vehicle cannot exceed the limit set by each state you drive through. If your truck is found overweight at a port of entry or inspection station, there may be a stiff fine which you, the driver, must pay. In addition, you may have to unload the extra weight at the weigh station before you can proceed. Then you'll have to come back for it, or pay someone else to take it for you.

The allowed GCW for an 18-wheeler is 80,000 pounds. However, the axle weights must not be exceeded. Axle weight is the weight any axle or combination of axles transmits to the ground. States have axle weight limits. Common examples are:

- steering axle - 12,000 pounds
- single axle - 20,000 pounds
- tandem axle - 34,000 pounds

If the weight on your rear tandem is 37,000 pounds, you can still be fined even if the GCW of your rig is less than 80,000 pounds.

Further, you must comply with bridge laws. These state laws set maximum axle weight for axles that are close together. This prevents overloading bridges and roadways. A bridge law may permit even less weight on an axle than would be allowed otherwise.

Some states even limit the amount of weight you can put on each wheel. You'll have to know about these laws in states you'll travel through so you can distribute your load properly.

Loading to bulk capacity is the attempt to fill all space in a trailer and still stay within weight limits. The real problem is to get all the freight inside a trailer without overloading a set of axles.

After you load you should always check your weight on a public scale. If there is no scale where you load, ask someone there where the nearest one is. Most larger truck stops will have one.

If your truck has sliders, this is where they can be a big help in weight distribution. Chapter 24 shows how to use sliders in order to be legal on all axles.

When you scale your truck be sure to weigh each axle or pair of axles separately. It is not enough to know only your GYW or GCW weight. You must know the weight on each axle and each group of axles to be sure you are legal.

One final consideration is the weight rating. Manufacturers assign a gross vehicle weight rating (GVWR) to a single vehicle plus the cargo, and a gross combination weight rating (GCWR) to a tractor with its trailer or trailers and the load. These ratings state how much weight the vehicle can support safely. Tires, suspensions and coupling devices also have weight rating. Exceeding the weight rating isn't illegal. It does abuse the vehicle and its parts, though. This leads to early breakdown. It can also be dangerous. An overloaded vehicle is harder to steer and stop. A badly overloaded truck could break down in traffic.

Loading for Proper Weight Distribution

Loading your truck within weight limits isn't your only concern. You also want the weight to be properly distributed. When cargo is piled too high, the vehicle becomes top-heavy. It's more likely to rollover in curves and on banked roads. Overloading the steering axle can make it hard to steer. You'll also have steering problems if the front axles don't have enough weight on them. Too little weight on the drive axles can reduce traction and lead to skidding. When cargo is unevenly distributed, it's more likely to shift and become damaged in transit.

Before the first box goes into your trailer, you should have planned out exactly how you are going to load the whole trailer. A little planning will make your life a lot easier. If you do this you won't have as many problems with too much weight on an axle. This might be a little difficult at first, but after a while you will get to know your trailers and the kinds of loads you usually haul.

If your whole load is one kind of product, let's say boxes of nails, then you have a fairly simple task. As a general rule, most vans can be loaded

evenly from front to back. So, first figure out how many boxes or pallets you can put in the trailer without going over your gross weight. Then be sure they are spaced evenly from the front to the back.

If you have a very bulky load that takes up a lot of room but doesn't weigh very much, you have a different problem. Your challenge is to get as many boxes as possible into your trailer. Be sure to use all the available space in the trailer. Even though you are loading something you think is light, you would be wise to watch the weight. It is not impossible to overload a trailer with little, light boxes.

The most difficult load to load is one that has several different kinds of cargo, some heavy, some light, some bulky and some dense. In this case you have to plan very carefully. Your weight is the most important consideration but you may want to plan for unloading too. If you have several stops, the last cargo loaded should be destined for your first stop. If you have any questions about how to load, ask your dispatcher or a fellow driver.

SEALING AND LOCKING THE TRAILER

Once a trailer is loaded, it must be locked and perhaps sealed. Any trailer with doors must have a padlock for each door. The better quality the padlock, the better the load is protected.

In addition, many shippers and trucking companies have their own seals. A seal is a band of metal or plastic with a company name and a serial number. Once the seal is applied, it must be cut to remove it. Seal numbers are recorded on bills of lading and other shipping documents. A sealed load means the driver should not remove the seal until the consignee looks at it or removes it just before unloading. A sealed trailer is the only exception to the rule which says the driver must periodically check the load for security.

DELIVERING A SHIPMENT

When you unload, use the same tally sheet or a new one. Keep track of the number of pallets and cartons as they are taken off the trailer. Watch the forklift driver carefully. Some operators are careless. If the forklift tines are not low enough, they will puncture the cartons and cause

damage. If you see this happen , stop the operator and call for the foreman . If they have caused damage, it should not be marked on your delivery receipt. It is their responsibility .

When unloading is complete, have your delivery receipt signed. Make sure the number of pieces is circled, show the date and trailer number. Do not allow them to sign with notations such as "Subject To Recount Or Damage."

Never leave the trailer when the doors are open. Do your own checking and counting . Never accept someone else's count. You are responsible.

QUIZ

1. No matter who loads a trailer, the _____ is responsible for its security .
 - A. shipper
 - B. driver
 - C. consignee
 - D. manufacturer

2. Cables or webbing straps with winches, or chains and load binders are commonly used to secure loads because although they are hard to use, they're easy on the cargo.
 - A. True
 - B. False

3. The whole purpose of chaining is to hold the load down and prevent its movement sideways or forward or backward.
 - A. True
 - B. False

4. Addep leverage can be had by slipping a piece of pipe over the handle of a load binder .
 - A. True
 - B. False

Loading, Securing and Unloading Cargo

5. When a brace, crate or support is built for cargo securement, the nails used should be at least _____ as the thickness of the board they are being driven through.
 - A. as long
 - B. twice as long
 - C. half as long
 - D. three-quarters as long

6. If your trailer floor is not waterproof you should _____
 - A. refuse the load
 - B. spread sawdust over the floor
 - C. cover the floor with plastic
 - D. borrow any other trailer sitting in the lot

7. You should make your first cargo inspection within the first of driving.
 - A. two hours
 - B. 25 miles
 - C. 30 minutes
 - D. two miles

8. Three main concerns you must pay attention to when your trailer is being loaded are gross weight, axle weight and
 - A. the air pressure in the trailer tires
 - B. the route you will use to your next destination
 - C. loading to bulk capacity
 - D. dunnage weight

9. The allowed gross weight for an 18-wheeler is 80,000 pounds per axle.
 - A. True
 - B. False

10. The only exception to the regulation that says you must inspect your cargo is the _____ trailer.
 - A. tarped
 - B. reefer
 - C. dry freight
 - D. sealed



HOURS OF SERVICE FOR DRIVERS

INTRODUCTION

As a tractor-trailer driver, you will be responsible for maneuvering up to 40 tons of loaded equipment in all kinds of weather and traffic conditions. You will be expected to safely deliver valuable cargo to its destination in the shortest time possible. Many shipments are part of the Just in Time, or JIT, delivery system. This system gets rid of the costly overhead of warehousing stock by getting it there just in time for its use.

In order to wisely use your time behind the wheel and yet stay within the federal laws, you will need to know how to manage and record various activities when you transport freight. There is far more to hauling a shipment than just driving.

The human body must have rest in order to function. We often push ourselves beyond our natural limits to do the job we have set out to do. If we push too hard, often we do not do the job as well as we should.

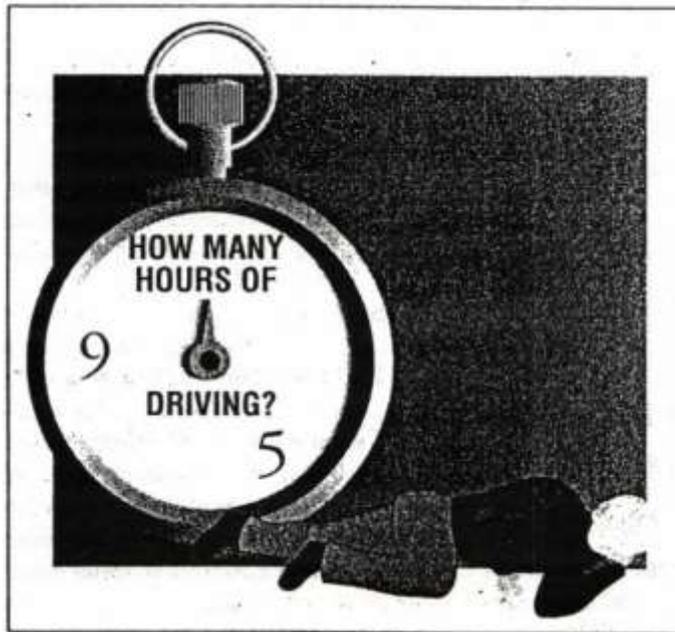


Figure 24-1

Airline pilots have strict limitations on their flying hours and the required rest between flights. Federal laws have been passed to protect passengers by guaranteeing their pilot should not be unfit to fly because of fatigue.

Your responsibility as a tractor-trailer driver is similar to that of a pilot. You should not be unfit to drive because you are too tired. Your skills are at their best when you are well rested and alert. There are federal regs that also apply to drivers of heavy vehicles to keep tired drivers from driving.

REGULATIONS

The laws that govern maximum time on duty are found in Part 395 of the Federal Motor Carrier Safety Regulations (FMCSR). You must know and comply with them. The regs regarding Hours of Service (time on duty) apply to you if you drive a CMV that:

- Has a GVWR of 10,001 lbs or more.
- Transports more than 15 persons including the driver.
- Transports cargo requiring hazmat placards.

DEFINITIONS

On-Duty Time: The time the driver begins work, or must be ready to go to work, until the time he or she is relieved from work of any kind. On-Duty Time includes all time spent:

- Working or waiting to be dispatched at your terminal or a shipper's facility.
- Inspecting, servicing, or getting your tractor or trailer ready.
- Driving or in the cab except for sleeper berth time.
- Loading or unloading cargo, or supervising the loading or unloading.
- Obtaining shipping documents.
- Performing required duties at an accident involving your rig.
- Repairing your rig or staying with it while repairs are being made.
- Doing any work for pay for a carrier.
- Performing any compensated work for any non-motor carrier.

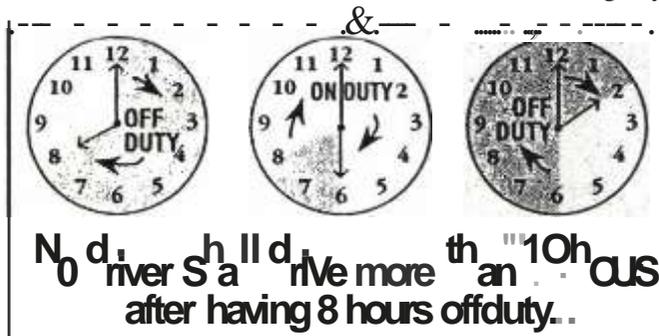


Figure 24-2

Sleeper Berth: A berth in the tractor cabin which the driver can sleep. Its size and other specs are determined by law.

Driver-Salesman: A driver who also sells products or provides services to the customer. An example is a beverage or baked goods delivery person. The driver works within 100 miles of his home terminal and spends at least half of his time selling or taking orders for restocking products.

Multiple Stops: Several stops in the same village, city, or town that can be entered as one stop.

Principal Place of Business: The main office of the carrier where all records are kept.

Off-Duty Time: Any time during which the driver is relieved of all on-duty time responsibilities.

Driving Time: All time spent at the controls of your tractor.

Seven (7) Consecutive Days: Seven days in a row, beginning on any day at a given time.

Eight (8) Consecutive Days: Eight days in a row, beginning on any day at a given time.

Twenty-Four (24) Hour Period: Twenty-four hours in a row beginning at a time set by the carrier.

Regularly Employed Driver: A driver who works for one motor carrier for any 7 consecutive days.

HOURS OF SERVICE

MAXIMUM DRIVING AND ON-DUTY TIME

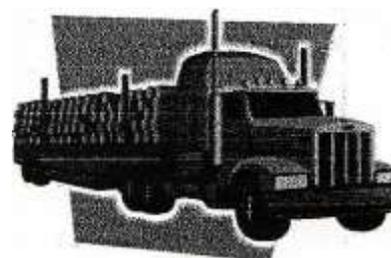
Federal laws provide that no carrier shall require or permit a driver to drive:

- » More than (11) hours after having (10) hours off duty.
- » After being on duty for (14) hours following (10) hours off duty.
- > After being on duty for (60) hours in any (7) consecutive days if the carrier does operate every day of the week.
- > After being on duty for (70) hours in any (8) consecutive days if the carrier does operate every day of the week.

These same regulations apply to an owner/operator. The laws say no commercial driver can drive more than the specified hours. Section 35.3 of the FMCSR provides for exceptions to the rules

TRAVEL TIME

If an employer requires a driver to travel, even though he is not driving, the time must be counted as on-duty time unless the driver is given (10) consecutive hours off-duty when he or she arrives at the destination. Then the travel time will be counted as off-duty time.



ADVERSE DRIVING CONDITIONS

Snow, sleet, fog, and icy pavement; and unusual road conditions may prevent the driver from completing his scheduled run in the (11) hours allowed by law. In such cases, the driver may be able to drive for (2) hours more to reach the original destination or a safe place to park the rig. Adverse driving conditions must be noted on the driver's log to show the reason for the extra driving time.

RECORD OF DUTY STATUS

There are only two records permitted by federal laws to record a driver's duty status. The status must be noted on the:

1. Driver's Log -or
2. Carrier's Time Record

The Carrier's Time Record may be used only when:

- » The driver operates his home terminal
- » The driver reports back to his home terminal and was not on duty more than (12)-hours.
- » The driver has at least (10) hours off duty after each (12) hours on duty.
- The driver does not drive more than (11) hours following (10) hours off.
- » For 6-months, the carrier prepares and maintains records showing the time drivers go on duty and off duty, the total hours per day, and the preceding 7-day record for new or part-time drivers.

HOURS OF SERVICE

17. When noting the city and state where the change of duty status took place, include such information as adverse weather or emergency conditions in the remarks section.
18. On some Driver's Daily Log forms, the starting point and final delivery, or turn around, point may be entered. If the run is a turn around back to the original terminal, enter the name of the most distant point, and then the words *and return*.
19. Although it is not required by law, it is a good idea, and often company policy, for a driver to complete the recap section of the Drivers Daily Log. List the number of hours remaining on duty and state whether you will be driving. Figure 24-6 on page 24.10 shows how one type of recap may be completed.

DRIVER'S DAILY LOG
One calendar day - 24 hours

The diagram shows a Driver's Daily Log form with the following sections and callouts:

- 6**: U.S. Highway Department of Transportation Federal Highway Administration REV. 5-7
- 7**: (Month) (Day) (Year) (Total miles driving today)
- 9**: (Name of Carrier or Carriers)
- 10**: (Main Office Address)
- 13**: (Name of co-driver)
- 16**: Remarks section with fields for 'FROM' (Pro or Shipping No., Commodity, Shipper) and 'TO' (Starting point or place, Destination or turn around point or place)
- 18**: Recap section on the right, showing 'Exempt Hrs Today' as 89MoH and 'Missed Hrs Today' as blank.

The grid for duty status includes categories: 1 OFF DUTY, 2 SLEEPER BERTH, 3 DRIVING, 4 ON DUTY (Not Driving). The grid is divided into MID-NIGHT and MID-NIGHT periods, each with 11 numbered columns.

Figure 24-5

Driver's Daily Log Entries

The Driver's Log is his or her personal record of duty status and the time worked for each employer. If the driver was paid for work for a non-carrier, he or she must also record this as On-duty time. -

All entries must:

- Be made only by the driver.
- Be legible.

- Be current to the last change of duty status.
- Be made using the time zone of the driver's home terminal. For example, a driver on a run to New York from his or her home terminal in California will make all entries using Pacific time. If the return run starts at 7:00 am out of New York, he or she will enter the time as 4:00 am. Carriers with multiple terminals assign a home terminal to each driver.
- Be certified as correct by the driver's signature.
- Be made on the correct section of the grid. A solid line will mark every 24-hour period.
- Be readable on the duplicate copy. Press hard to make sure.

Recap

RECORD OF TIME WORKED				
1	2	3	4	5
8 DAYS - 70 HOURS				
ORMR:				
IO (NUMBER):				
INSTRUCTIONS				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

RECORD OF TIME WORKED				
1	2	3	4	5
7 DAYS - 60 HOURS				
ORMR:				
IO (NUMBER):				
INSTRUCTIONS				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

Figure 24-6

- Two or more consecutive 24-hour periods off duty may be recorded on one daily log.
- Sleeper berth time is only the time spent resting in an approved type of sleeper berth. Time spent sleeping on the seat or while sitting in the cab cannot be counted as sleeper berth time.
- All time spent at the controls of the rig must be counted as driving time.
- Changes in duty status must be recorded to the nearest 1/4 hour.
- The driver must have daily logs for the previous seven days.

All daily logs must be:

- Kept by the driver for seven days.
- Turned in to the carrier within 13 days, either in person or by mail.
- Kept temporarily at the home terminal by the carrier. Then they should be kept at the carrier's main office for at least six months from the date on the log.

The Driver's Daily Log shown in Figure 24-7 shows entries made by a driver on a midnight-to-midnight run from Richmond, VA to Newark, NJ. Notice how the 24-hour period contains a solid line made by the entries.

U.S. HIGHWAY DEPARTMENT OF TRANSPORTATION ORIGINAL FILE NUMBER
 FEDERAL HIGHWAY ADMINISTRATION REV 57 DRIVER'S DAILY LOG ORIGINAL FILE NUMBER

.....
 111100111 f 9J J20 One calendar day • 24 hours 1 H (-/6)
 IOiY) (Y...-1 (Toulds!Od'YI Vehicle numbers - (Show each unit)

CAREER TRUCKING
 (Name of Carrier or Carriers) **ORANGE, CA 92667**
 (Main Office Address)

David J. Smith
 (Driver's signature in full)
 (Name of co-driver)

REMARKS	MID-NIGHT											Total Hours
	1	2	3	4	5	6	7	8	9	10	11	
1: OFF DUTY	[Solid line]											11
2: SLEEPER BERTH	[Solid line]											7 3/4
3: DRIVING	[Solid line]											7 3/4
4: ON DUTY (Not Driving)	[Solid line]											3 1/2

REMARKS
 MID-NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11
 Richmond, VA
 Fredericksburg, VA
 Baltimore, MD
 Philadelphia, PA
 Cherry Hill, NJ
 Newark, NJ

FROM: Swing point or place TO: Destination or turn around point or place

US DEPARTMENT OF TRANSPORTATION AT HOME

Figure 24-7

SCHEDULE

- 600 am - 7:15 am: Driver reported for work at his home terminal in Richmond and helped load his trailer.
- 7:15 am - 7:30 am: Picked up the shipping documents and did the pre-trip inspection.
- 7:30 am: Driver got behind the wheel and began driving.
- 9:30 am - 10:00 am: Driver was in minor accident near Fredricksburg, VA. Filed police report.
- 1200 noon: Driver arrived at the company's terminal in Baltimore, MD. Was relieved from duty to go to lunch while repairs were made to his tractor. The driver returned to the terminal at 100 pm and resumed his trip.
- 300 pm - 3:30 pm: Made deliveries to 2 locations in Philadelphia, -PA. 400 pm: Stopped at rest area in Cherry Hill, NJ.
- 4:00 p - 5:45 pm: Slept in sleeper berth
- 5:45 pm: Started driving again.
- 700 pm: Arrived at Newark, NJ terminal. Parked rig and went to driver's room to complete paperwork.

7:00 pm - 8:00 pm: Driver completed daily log, vehicle condition report, and insurance report on the accident.

8:00 pm: Driver went off duty.

DRIVER DECLARED OUT OF SERVICE

A driver may be declared out of service by any agent of the Federal Highway Administration (FHA) for either of the following reasons:

- The driver has been on duty too many hours.
- The driver does not have Daily Logs for the previous 7 days.

NOTE: A driver who has not completed the log for the current day and the day before, but has logs for the previous six days, will be given a chance to bring his logs up to date without being declared out of service.



If a driver is declared out of service because of too many hours on duty, he or she cannot drive until they have been off-duty long enough to be eligible to legally drive again.

Figure 24-8

If the driver is declared out of service for not having the daily logs, he or she may not drive until they have been off duty for 8 hours in a row and can legally drive again.

PENALTIES

Drivers who make false entries on their Daily Logs, do not prepare a Daily Log, or drive more than the allowable hours, are subject to:

- Heavy fines.
- Being declared out of service.

They may also face delays in delivering their cargo. If a driver has driven too long, he or she can have an accident. As a result of this accident, both the driver and the carrier may face civil and criminal liability.

Carriers who do not keep proper records on all their drivers are also subject to heavy fines and civil liability if there is an accident because the driver violated the regs.

A current log that is neat and readable means the driver has a professional attitude about knowing and obeying the trucking laws.

DRIVER'S DAILY LOG

RECAP

possession for one month

(Month) (Day) (Year) (Total miles driving today) One calendar day - 24 hours

Vehicle numbers (Show each un)

Verify these entries are true and correct

(Name of Carrier or Carriers)

(Driver's signature in ink)

(Main Office Address)

(Name of co-driver)

MID-NIGHT	1	2	3	4	5	6	7	8	9	10	11	NOON	1	2	3	4	5	6	7	8	9	10	11	Total Hours
1: OFF DUTY																								
2: SLEEPER BERTH																								
3: DRIVING																								
4: ON DUTY (Not Driving)																								

Minus Hrs To day

Subtotal

Add Hrs. in from Today

Excess Hrs. Tomorrow

REMARKS

MO:

NIGHT 1 2 3 4 5 6 7 8 9 10 11 NOON 1 2 3 4 5 6 7 8 9 10 11

Pro Shipping No.

Commodity

Shipper

Check the time and enter name of place you reported and where released from work and when and where each change of duty occurred. Explain excess hours.

FROM:

Starting point or place

TO:

Destination or turn around point or place

DRIVER'S DAILY LOG

RECAP

possession for one month

(Month) (Day) (Year) (Total miles driving today)

One calendar day - 24 hours

Vehicle numbers (Show each un)

Verify these entries are true and correct

(Name of Carrier or Carriers)

(Driver's signature in ink)

(Main Office Address)

(Name of co-driver)

REMARKS

MO: 1

MID-NIGHT	1	2	3	4	5	6	7	8	9	10	11	NOON	1	2	3	4	5	6	7	8	9	10	11	Total Hours
1: OFF DUTY																								
2: SLEEPER BERTH																								
3: DRIVING																								
4: ON DUTY (Not Driving)																								

Subtotal

144 Hrs. Gain from Fnl

Pro Shipping No.

Commodity

233

FROM:

Starting point or place

TO:

Destination or turn around point or place

HOURS OF SERVICE

True-False Questions

If the question is true, circle the T. If the question is false, circle the F.

- T F 1. On duty time may include many activities in addition to driving.
- T F 2. All time spent in the tractor is considered driving time.
- T F 3. In the event of unexpected bad weather, a driver may be permitted to drive two extra hours to reach the original destination or a safe place to park the rig.
- T F 4. The driver's log is the only method permitted by federal law to record a driver's duty status.
- T F 5. The carrier's time record may be used to record a driver's duty status when the driver operates within a 100-mile radius of the home terminal.
- T F 6. The driver's log is the most commonly used record of duty status for tractor-trailer drivers.
- T F 7. Federal rules require every carrier to make sure each driver records his or her duty status in duplicate.
- T F 8. Only the driver is permitted to make entries in the daily log.
- T F 9. Time spent sleeping on the seat or while sitting in the cab may be counted as sleeper berth time.
- T F 10. All time spent at the controls of the tractor-trailer must be considered driving time.
- T F 11. All of his or her daily logs for the previous 7-day period must be kept by the driver.
- T F 12. A driver may be declared out of service by any agent of the FHA if he or she has been on duty more than the maximum hours pennitted.
- T F 13. Drivers who make false entries on daily logs may be discipli ned by their companies but not by other authorities.

TRIP PLANNING

INTRODUCTION

As well as driving a rig safely, the driver must be able to plan trips. He or she must be able to read and understand maps, know the general size and weight laws, and registration and fuel tax requirements. The driver must also be aware there are special regulations to be followed when planning a trip.

The driver must understand how important it is to keep accurate records. The carrier may need the records to show they have complied with the regulations for hours of service, cargo, fuel tax payments, and registration fees.

A driver should be able to estimate:

- Mileage from point of origin to destination.
- Trip time.
- Fuel requirements.
- Personal financial needs.

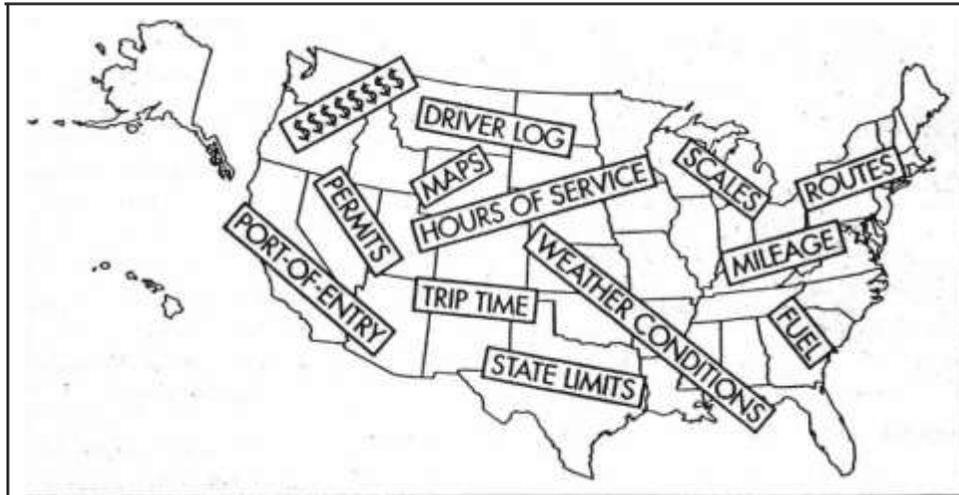


Figure 27-1

The driver may or may not be involved with these aspects of trip planning. Companies differ in what they require of the driver. It depends on the type of operation, the size and type of carrier, length of haul, territory covered, etc.

This chapter will help you understand what to do when you are planning a trip. Knowing how to plan well for a trip will help you be a more responsible driver.

TYPES OF TRUCK RUNS

This section is intended to give you an idea of the types of runs found in the trucking industry, and what they are like. Some carriers operate only a single type of run. Other carriers operate many types. The driver may or may not have a choice of the type of run assigned.

Many times, the driver will be given specific instructions about which routes are to be used. These instructions must be followed. In some cases, the company may have to operate over specified routes under its operating authority. In other cases, company management specifies the use of a particular route because other routes have been checked, and this one is the best. Going off an assigned route without a very good reason is a serious violation of company rules and may cause the driver to be disciplined.



A local operation may cover an area no larger than this.

Figure 27-2.

Local Operations

Local Pickup & Delivery: In typical local pickup and delivery operations, the driver operates in and around cities. He or she will usually be delivering freight to its final destination (the consignee), and picking up freight from shippers. A local operation may represent the final step in delivering freight to its destination after it has been brought into the area by a line-haul operation. It may also pick up freight that will be transported to a distant destination by another carrier. In other local operations, freight is moved between nearby points of origin and destinations.

The local driver must know the street system well so pickups and deliveries can be

made in the safest, quickest way. The driver must also know the local traffic patterns in order to determine the best route to take when picking up or delivering freight.

Peddle Run: This is a type of local pickup and delivery operation. Usually freight is hauled from a terminal to a few points in a nearby area. The driver is also picking up freight from the points to be served. Because of frequent changes in the points to be served, drivers of this type of service may be asked to select their routes. Drivers should know how to select the safest and quickest route for each trip.

Shuttle Operations: In some operations, some drivers move either empty or full trailers between terminals. The trailer is picked up at one terminal and moved to another terminal. This type of operation is often used for long-haul operations.

CHAPTER TWENTY-SEVEN

Meet and Turn: Meet and turn is a type of relay run in which two drivers start toward each other from different points and meet at a chosen mid-point. At the meeting place, the drivers exchange complete units or only trailers. Then each driver goes back to his or her starting point.

Turn-around: In a turn-around run, a driver travels for about 5 hours to a destination and then returns to his or her home terminal. At the turn-around point, the driver may switch units or trailers for the return trip.

Roll and Rest: A single driver takes the truck from origin to destination in a roll and rest operation. At the end of each period of 10 hours of driving, the driver stops in a suitable location for the required off-duty time. The driver must plan the trip so there are suitable rest facilities at the intervals required by the hours of service regs.

Sleeper Operations: The driver of a rig that has a sleeper berth can accumulate the required off-duty time in two periods as long as neither period is less than 2 hours. This is a special provision of the hours of service regulations. Sleeper operations may use a single driver or a two-driver team.

A single driver with a sleeper cab saves lodging costs on the road. If the driver arrives early at an origin or destination, having a sleeper berth can let the driver get the required rest while waiting to load or unload.

Sleeper teams are used when speedy service requires the unit to be on the road as much as possible or a second driver is needed for other reasons. In team operations, drivers usually exchange duties every 4-5 hours so one driver can rest while the other drives.

Figure 274

ROUTE SELECTION

There are many types of highways. Selecting the right type often depends on how well you can read a map. Each type of highway is coded on a map. If you understand this code, you will be able to know what is an Interstate highway, what is a state highway, or what is only a country road. The types of highways are described in the following section. They are listed in the order of preference of use.

- Interstate routes
- Toll roads
- U.S. Numbered Routes
- State Primary Routes
- Other Streets and Highways

Line-Haul Transport

This type of operation is also referred to as over-the-road transport. Cargo is transported from a point of origin to one or more distant destinations.

Several types of operations fall within the general classification of a line-haul operation.

In some cases, a line-haul driver may return to the home terminal at the end of about 10 hours of driving. In other cases, a driver may be on the road two days or more at a time. Brief descriptions of several types of line-haul operations follow.

Regular Run: The driver operates between the same points on each trip and may or may not have a regular starting and finishing time for each period of driving. Today, very few drivers have regular runs.

Open Dispatch: The driver goes from the point of origin to a distant point. Depending on the driving time and the need to comply with hours of service limits, the driver may take another unit to an additional destination. After driving for 10 hours, the driver must rest. When the driver can legally drive again, he or she may be given a run heading toward the home terminal or may be dispatched to another point. The cycle may be repeated for several days before the driver returns home. A large part of line-haul transport uses open dispatch.

Regular Route: A regular route refers to line-haul transport between given origins and destinations using assigned highways. The highways to be used may be set forth in the company's operating authority issued by the ICC or set by a state regulatory agency. In a regular-route operation, going off-route is not only a violation of company rules, but also against the law.

Irregular Route: An irregular route describes line-haul transport between a combination of origin and destination points using any suitable route. It is in this type of operation that the driver is most likely to be involved in selecting a route. Even in irregular route operations, management may have set the routes to be used by drivers. This is most likely to happen between the origins and destinations that are served most often. A driver must comply with the set routes.

Relay Runs: A relay run refers to a trip in which a driver drives for 10 hours and then goes off-duty as prescribed by the hours of service laws. Another driver takes the unit on to the next point. This cycle may be repeated several times as the truck is driven from origin to final destination by several different drivers.



Line-haul operations are used for cross-country runs.

Figure 27-3

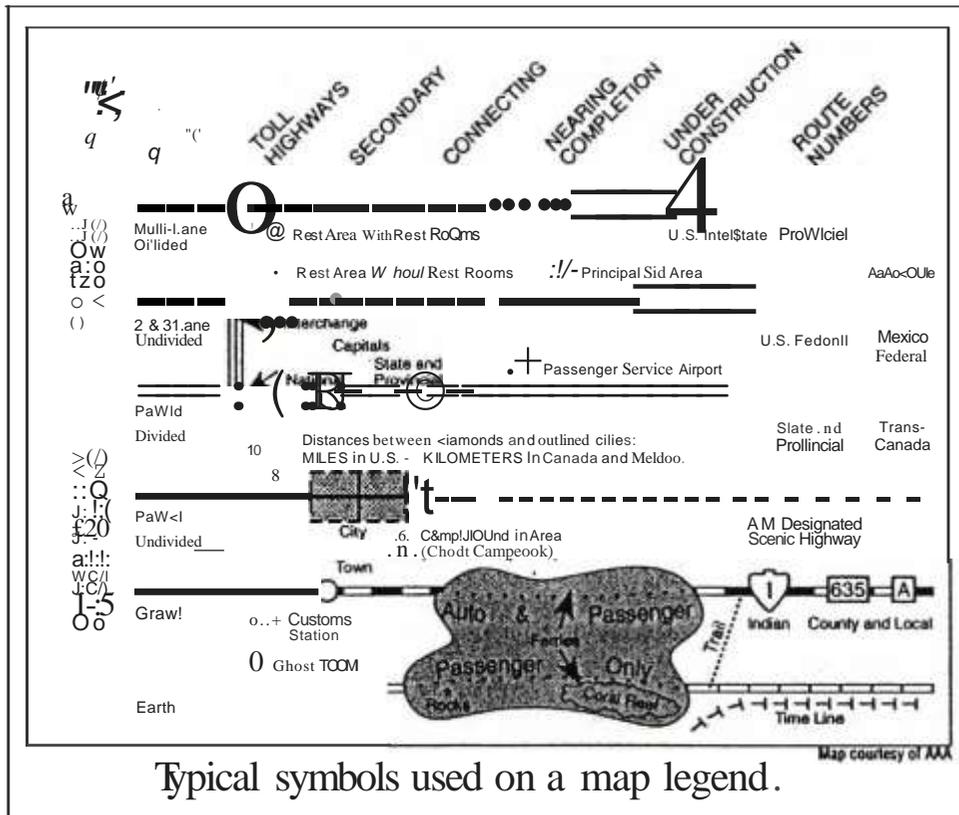


Figure 27-5

Interstate Routes: These routes are usually preferred because they separate opposing traffic, have limited access, and bypass many small communities. Although they are the safest type of highway, drivers must be aware that these highways can be snarled up by bad weather or traffic congestion, especially in urban areas. In selecting the Interstates, drivers should note other available routes in case of a major traffic problem on the Interstate.

Toll Roads: Except for having to pay a toll, these roads are similar to the Interstates. In many states, toll roads are part of the Interstate system. Whether to use a toll road must be based on many factors in addition to price. Drivers should take into consideration:

- Differences in time and distance over alternative routes.
- Terrain.
- Road conditions.
- The need to go through built-up areas.
- The amount of stop-and-go driving.
- Wear and tear on the equipment.
- Fuel usage.

U.S. Numbered Routes: These are the major alternatives to Interstates. Those that parallel the Interstates may be good alternatives in some instances.

State Primary Routes: Within each state, some instances, a state primary route may be as good as or even better than a nearby U.S. Numbered Highway.

Other Streets and Highways: Drivers will have to use other types of roads to reach a loading or unloading point. In general, choose county roads or other routes designated by number or letter. These are the through routes set by the local authorities and are generally better able than other local streets to safely handle truck traffic.

A driver must use extreme care when driving on local streets that often were not designed for truck traffic. Drivers should avoid using side streets because they may have hazards such as low clearances, unsafe railroad crossings, poor road surfaces, and sharp turns.

Special Situations

It is not possible to foresee every problem a driver may encounter. Drivers must learn to approach new situations carefully and use common sense. Some of the special situations you may find are:

- Local truck routes
- Posted bridges
- Prohibited routes

Local truck routes : Many cities and towns have designated routes for trucks. They are not always marked well. If you do not stay on the route, you may get a ticket.

Posted bridges: Many bridges have special weight restrictions . Do not cross a bridge if your rig's weight is more than the weight that is posted. Some fines are as much as \$10,000.



Figure 27-6

Prohibited routes: One reason for prohibiting trucks on some roads is a past history of accidents. Always heed posted prohibitions, even if it means driving on to a point where you can obtain information. If you do drive on the road, you may get a ticket, be faced with a hazardous condition, or be unable to avoid an accident.

There are many ways to get the information or help you need. Here are some suggestions:

- Use a CB. Talk to other truck drivers or local residents about the conditions.
- If you are near a destination, stop and call the shipper or consignee for directions.
- Stop and make inquiries about the local conditions at truck stops, service stations, firehouses, police stations, or other locations where there may be people who know the area.

MAP READING

Being able to read maps is important to the professional truck driver. Sooner or later, the driver will have to locate unfamiliar pickup and delivery points. Maps are a good investment because they offer the driver a chance to save time and miles. There are several types of maps.

- Local or area map
- State map
- U. S. map
- Atlas

You may obtain maps from several sources.

- Bookstores
- Drug stores
- Discount stores
- Auto Clubs
- Filling stations

Local or area map: A local or area map is very useful for the local driver because it will show local streets (see Figure 27-2 on page 27.1). You can get them in bookstores and in many drug stores and filling stations. Some show a single city, while other types may show one or two counties or a region. Because of the rapid growth in many urban areas, the driver should plan to obtain an updated map at least every year.



A portion of a state map.

Figure 27-7 -

State map: Often a free state map is available at information centers along the Interstates. They are also for sale at other locations. When considering the purchase of a map, a driver should remember maps covering several states or an entire region may not show the minor roads the driver will need to reach some points.

- Read the key, or legend, that explains the symbols and colors used to show the Interstates, federal, state, and local routes, rest areas, interchanges, distances, and other important features (see Figure 27- on page 27.7).
- Learn to figure the distance between points by adding the mileage figures shown along the route. Using the scale of the map is not accurate because measuring with a ruler will give only the airline distance. Airline distance is shorter than driving distance.

Many maps have mileage charts showing approximate distances between principal cities and towns. Many atlases have a special map showing distance and estimated driving times between principal cities. The driving times shown are usually for cars and light trucks. You should allow more time for driving a tractor-trailer.

- Learn to use the grid coordinates to locate points on the map. Numbers are printed across the top and bottom of maps, and letters are printed down each side. Most maps also have an index. On a state map, the index will list names of cities, towns, and villages. On the map of a city or region, the index will list street names. In each case, the location will show a letter and a number, for example C-6 or C6. To find the location look down from 6 and across from C. The point will be near where the imaginary lines from the number and letter cross on the map.

CALCULATING TRAVEL TIME AND FUEL USAGE

Knowing how to figure the distance, your average speed, and trip time will be helpful. The driver who wants to keep track of the average speed and fuel usage may want to buy a calculator. The following formulas are used often by truck drivers.

Distance = Speed multiplied by Time
 $50 \text{ mph} \times 9 \text{ hours} = 450 \text{ miles}$

Average Speed = Distance divided by Time
 $450 \text{ miles} / 9 \text{ hours} = 50 \text{ mph}$

Trip Time = Distance divided by Average Speed
 $450 \text{ miles} / 50 \text{ mph} = 9 \text{ hours}$

Travel Time

Drivers must comply with the DOT's regs for speed limits and hours of service. When a driver's record of duty status (driver's log) is checked, enforcement personnel will divide the miles driven by the number of hours of driving time to determine the average speed. This will tell them if the driver has been speeding.

Officials use these standards to decide if a driver has been speeding. Where the predominant speed limit is 55 mph:

- A trip of 450 to 500 miles in 10 hours is open to question. This means the driver had an average speed of 45-50 miles per hour.
- A trip of 500 to 550 miles in 10 hours, or any trip showing an average speed of 50 miles per hour or more will be considered not in compliance with the hours of service and the speed limit.

Where the predominant speed limit is 65 mph:

- A trip of 500 to 550 miles in 10 hours is open to question (average speed 50-55 miles per hour).
- A trip of more than 600 miles in 10 hours-(average speed of 60 miles per hour or more) is considered not in compliance with the hours of service and the speed limit.

Both drivers and motor carriers may be required to document runs to show they can be made without violating the hours of service rules or the speed limits.

The distance that can be covered in 10 hours of driving will depend on the speed limits and other factors such as heavy traffic, travel through urban areas, long upgrades, adverse weather, or anything that can reduce the safe operating speed. Generally, the average speed for a trip will be 5-15 mph below the cruising speed.

Fuel Consumption

To figure the fuel consumption:

1. Fill the fuel tank and record the mileage shown on the odometer.
2. After driving, refill the tank and record the odometer mileage.
3. Record the amount of fuel put in the tank.
4. Subtract the odometer mileage at the first fill-up from the odometer mileage at the second fill-up. This will tell you the distance covered.
5. To determine the miles per gallon; divide the distance covered by the gallons of fuel used.

Example:

Odometer reading - 1st fill-up	65456
Odometer reading - 2nd fill-up	65956
Gallons of fuel added	90

Distance covered = odometer reading at 2nd fill-up (65956)
odometer reading at 1st fill-up (65456)
500 miles

Miles per gallon = $\frac{500 \text{ miles (distance covered)}}{90 \text{ gallons (fuel added)}}$ = 5.5 mpg

If a driver knows the capacity of the truck's fuel tank(s) and the average fuel mileage, he or she can figure the cruising range by multiplying the tank capacity by the miles per gallon.

...- Example:

Cruising range = Tank capacity x mpg

Tank capacity = 100 gallons

Miles per gallon = 5.5

Cruising range = 100(gallons) x 5.5 (mpg) = 550 miles

TRIP PLANNING

The driver must be aware that under actual operating conditions, many factors can easily increase fuel usage. Some of the more important factors include:

- Prolonged idling
- Driving too fast
- Extended operation in low gears
- Stop-and-go driving
- Mountainous terrain
- Headwinds
- Low tires
- Defects in the engine or fuel system

KEEPING RECORDS

A driver must always have on hand all the papers he or she needs when they are on duty. Each carrier has its own way of keeping records. It meets the information needs of that carrier to help them remain within the law. You must learn the method your carrier uses.

If the driver does not carry the papers and keep the records the carrier requires, both the driver and the carrier can be penalized. Not carrying the right papers or keeping records may also cause delays in being paid.

The driver must have the following papers.

- Driver's license
- Medical certificate
- Driver's log
- Driver's inspection report

Law enforcement officers have the right to examine these documents.

Driver's license: Your COL must be the type required for the equipment you are driving. You must also have the proper endorsements. Federal law prohibits a truck driver from having more than one license. ,

Medical certificate: It must be current and valid.

Driver's Log (Record of duty status): The record must be correctly completed and kept up to date to the driver's last change of duty status. The driver who has to keep a log must have the log for the current day and the 7 preceding days with him or her while on duty.

Driver's inspection report : The driver must keep a copy of the inspection report prepared by the previous driver and must have a blank driver's inspection report available to prepare at the end of the trip or tour of duty.

The driver may also have other documents. These include:

- Shipping papers
- Trip reports

Shipping Papers: There are many different forms that are used for this purpose. (See the chapter on *Cargo Documentation*.)

Trip Reports: Carriers usually develop the type of report that meets their needs. As a result, there are many types, and they provide different information. The following data is usually found on these reports.

- Name of driver
- Terminal
- Vehicle identification
- Departure time from terminal
- Routing instructions
- Address of each stop to deliver or pick-up freight
- Times of arrival and departure for each stop
- Quantity of freight handled
- Time of return to terminal
- Space for remarks

Some trip reports have a space for entering the odometer reading when the driver crosses a state line or when going from origin to destination. Drivers must be very careful and accurate when noting these details. A driver must be sure to comply with the carrier's rules when preparing a trip report.

On-Board Recorder

More and more carriers are now using on-board recording equipment. Some carriers use this equipment to show compliance with hours of service limits. If the carrier for which you work uses such devices, they will teach you how to use them properly.

Some trucks have recorders installed so the carrier can control how the truck is operated. Basic information recorded by these devices includes:

- Time the engine is running
- Whether the truck is stopped or moving
- Speed
- Miles driven

Personal Needs

The driver needs to be able to meet personal needs during trips. The driver should find out what expenses he or she must meet while on the trip that will be reimbursed by the motor carrier, how the payment is to be made; what paperwork must be kept to prove the expense; and if there are forms to be filled out. These expenses and who is usually responsible are listed below.

Meals	Usually driver expense
Lodging	Usually carrier expense
Fuel	Carrier expense
Enroute repairs	Carrier expense
Tolls	Carrier expense if authorized
Permits	Carrier expense
Special fees	Carrier expense

Carriers handle their expense accounts in different ways. Some companies have accounts with fuel stops, motels, repair shops, toll facilities, and for pennits. Others use com-checks. Some will give you cash advances for these expenses. Always find out how your company handles expenses before you start on a trip. It is a good idea to keep copies of all receipts for your records.



Some of the personal concerns of truck drivers on the road ..

Figure 27-9

Drivers should know the kind of weather they may find during the trip. They should know where there may be extreme weather conditions. They should carry the right kinds of clothes with them for anything they may find. Clothes for working outside the truck during bad weather should be included. Many drivers also carry blankets, a sleeping bag, and an emergency supply of food in case they are stranded out in the middle of nowhere.

VEHICLE LICENSING AND PERMITS

Every vehicle must have a registration (license) plate (tag) in order to operate. Fees are paid each year, and registration plates are issued. The majority of trucks or truck tractor combinations that weigh more than 26,000 pounds will be registered under the International Registration Plan (IRP).

The IRP is a registration agreement among the states and Canadian provinces that is based on the percentage of miles driven in each state or province. License fees are paid to each state or province in which the vehicle operates. A cab card is issued to the vehicle. This card states the IRP areas in which the vehicle can operate.

Usually, the carrier obtains the registration plate. It is up to the driver to be sure mileage records are kept. The percentage of fees paid to each state depends upon the number of miles driven in that state compared to the number of miles driven in all states and provinces.



Figure 27-10

If a truck that has IRP plates plans to operate in a state that is not shown on the IRP cab card, a trip permit must be obtained. The carrier is responsible for telling the driver how to obtain these permits. Permits are usually issued for a given period of time, ranging most often from 24-72 hours.

There are currently 45 states and one Canadian province (Alberta) in the IRP. The following states are not members of IRP: Maine, Delaware, Massachusetts, New Jersey, and Hawaii.

If a truck operates in a state that is not in the IRP, the vehicle is subject to that state's laws and regulations. The carrier should be aware of these limits. The Department of Motor Vehicles or Motor Vehicle Agency of each state can advise you of the laws in effect in that state.

Fuel Use Tax

In order to operate legally in a state, a truck must be registered for fuel use tax purposes. When it is registered, a fuel tax decal will be issued. This decal is then placed on the door of the tractor. The decal is evidence the vehicle is registered for fuel use tax purposes. The price of the decal varies considerably from state to state. The fuel use tax itself is paid by the carrier quarterly. The fuel tax registration law is usually enforced by the state revenue or taxation department.

The carrier pays the fuel tax in each state based on the number of miles driven in that state. If the carrier buys more fuel in a state than is needed to cover its fuel tax obligation, the carrier gets a tax credit. On the other hand, if not enough fuel is bought in a state, the carrier must pay more tax.

A driver must be sure he or she gets receipts for all fuel purchases and submits them to the carrier along with required record of miles operated. The information submitted by the driver forms the basis of the carrier's fuel tax report to each state.

Weight Distance Taxes

Most states have eight distance taxes. They are also called mileage taxes, ton-mile taxes or axle taxes. These taxes are paid by the carrier and are based on the annual ton mileage. The carrier must also file a quarterly report. States often require trucks to be registered for the weight distance tax. The carrier usually obtains a decal or lumber for the tractor. These taxes are enforced by the state's highway department or transportation department. California and Colorado currently do not impose these taxes.

Mileage Control Sheet
(Speedometer Mileage Readings)

Destination - - - - - ' - - - - -

Date - - - - - Unit Nos. _____

Driver - - - - -

New Jersey

Beginning _____

State line OUT _____

State line IN _____

Ending _____

New York

State line IN _____

State line OUT _____

Connecticut

State line IN _____

State line OUT _____

Pennsylvania

State line IN _____

State line OUT _____

Figure 27-11

Regulatory Fees -

Carriers regulated by the ICC are issued Interstate Operating Authority. This means their trucks may cross state lines. Many states require carriers to register that authority with the state. In most states, it is registered through the Department of Public Service or Public Utility Commission. When registering the authority, the carrier must identify the vehicles that operate under that authority.

To identify the vehicle, the carrier buys a Form D cab card (bingo card) from the National Association of Regulatory Utility Commissioners in Washington, DC. The card price is currently 50 cents. The carrier must then get a stamp for each vehicle from each state in which it operates. The stamp is then placed on the card. The stamp price ranges from 25 cents in some states to over \$10 in others. There is no central clearinghouse for buying these stamps. The carrier must contact each state separately. The carrier usually is responsible for complying with this law.

Some carriers also hold intrastate (within a state) authority. The carrier is responsible for complying with the intrastate operating authority requirements in the same way it is responsible for complying with interstate (between states) operating authority. Private carriers are usually not affected by this type of regulatory requirement.

FEDERAL LENGTH AND WEIGHT LIMITS

All states must allow truck combinations of certain weights and lengths to operate on roadways that are part of the National System of Interstate Highways. This system is also known as the Designated System or National Network. Most of these highways are identified by the letter I and the number of the highway such as I 80 or I 5. Many additional multi-lane, divided highways, such as the U.S. routes, are also part of this system.

In addition, states must allow federally authorized STAA truck combinations to have access to terminals and facilities for food, fuel, repairs, and rest. States are allowed to determine the distance off the designated system these vehicles may travel for such purposes. The distances currently range from a limit of 1500 feet off the New York State Thruway, for example, to unlimited access on state and local roads in Ohio.

Many state highways have requirements similar to the following federal weight and size limits, but it is always wise to check the applicable maps and charts for actual dimension limits.

Vehicle Weight

A maximum of 20,000 lbs. may be carried on any one axle and 34,000 lbs. on a tandem axle. 80,000 lbs. overall gross weight is allowed on a typical five axle tractor-semitrailer. The way the axles are spaced and the number of axles may lower the single and tandem axle limits. Rigs must also stay within weight-to-length limits based on the weight of groups of two or more adjacent (following) axles.

The outer bridge measurement is the distance from the center of the steering axle to the center of the last axle in the combination. The inner bridge measurement is the distance between any two following axles. Weight limits are determined by these distances. The total weight of the inner bridges should always equal the weight the outer bridge measurement.

The following are limits that some states have imposed for the length of semitrailers. Note the difference in requirements.

Vehicle Length

There is no limit on the overall length of a tractor-semitrailer on the Interstates and designated highways. Some states do limit the length of semitrailers to 48 feet.

States cannot limit the length of trailers to less than 28' for doubles (semi trailer and trailer). States must also continue to allow 28' ~~in~~ double trailers if they were in operation before 1983.

TRIP PLANNING

No state can prohibit doubles on the Interstate and Designated Highway System. Longer doubles (more than 28' per trailer) and triple trailer combinations usually operate under special permits.

State Limits

Unless they are controlled by federal interstate law, weight and size limits vary from state to state. If a driver is not sure of a state's limits, he or she should find out about the limits before entering the state. Dispatchers usually have this information. The State Police, Highway Patrol, Department of Transportation, and state trucking associations can also usually provide accurate information.

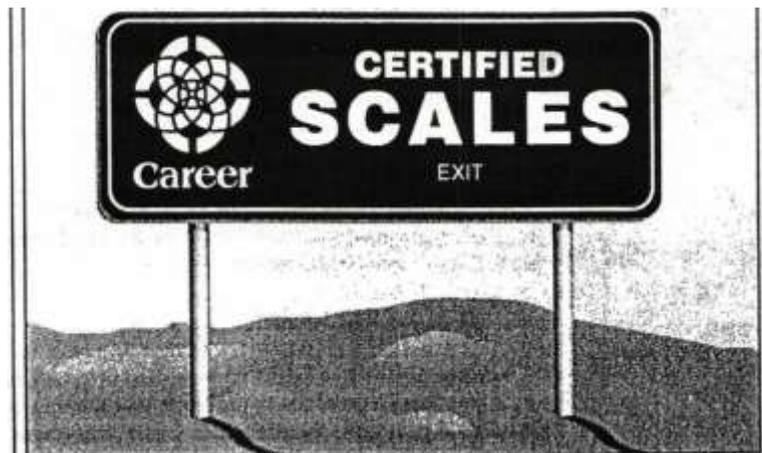
When deciding whether a tractor-trailer is within limits, there are three key factors to be considered.

- Vehicle Weight
- Number of Axles
- Vehicle Length, Height, and Width

Vehicle weight:
 Many state agencies provide color coded maps (red, green, purple) that identify load maximums that can be carried on various roads. These maximums are generally based on the condition of the road and the weight that can be supported by the bridges.

Vehicle Lengths -Maximum Limits

	<i>Interstates</i>	<i>State Highways</i>
Alaska	48'	45'
Alabama	51'	51'
Arizona		
California		
Delaware	53'	Not Specified
Georgia	48'	48'
Idaho	48'	48'
Kansas	53'	53'
Michigan	50'	50'
New Jersey	48'	48'
Ohio	53'	53'
Oklahoma		52'
Texas	57'	57'
Wyoming	60'	60'



TRUCKS WEIGH ON CERTIFIED SCALES TO BE SURE THEY ARE WITHIN LEGAL LIMITS.

Figure 27-13

Number of axles: States have bridge laws that limit the maximum weight that may be carried. The laws are determined by the number of axles and the distance between them. While most states have adopted Federal Bridge Formula B to determine axle weight limits and gross weight limits, some states have other means of figuring these limits.

Vehicle length: Vehicle length is regulated by both state and local governments. They also set the maximum load, length, and overhang (the distance beyond support of the load bed) that is permitted. The legal length may be set either in terms of overall length (from bumper to bumper) or trailer length.

Vehicle height and load: While some states permit vehicle heights of 14', most restrict heights to 13'6". This limit includes the load. Overpasses on most Interstates have clearances of 16'6", but some are only 13'6". Always check to make sure.

Loads that are larger than either the state or local laws allow need special **Special Permit Hauling**

permits. You can get these permits from state agencies and police departments. Typical loads that need these permits include machinery, buildings, and bridge construction girders.



Figure 27-14

Some permits limit hours of operation (before sundown, after sunup, rush hours, etc.) and the routes to be used. Permits may:

- Be limited to specific vehicles.
- Require the use of special signs (oversize load, etc.;
- Require the use of escort vehicles both in front of and behind the load.
- Require using special amber lights.
- Specify the route to be followed.

Drivers may have to submit their planned route before they can get a permit. If a detour or delay occurs, the driver may have to call the state or local agency that issued the permit to request a change in time or route.

Hazardous Material

If you haul hazardous material, trip planning will be affected. You must first know the cargo is hazardous. Second, you must follow federal regs for trip planning. Finally, you will need to know in advance which highways and facilities you may use and which ones restrict or prohibit hazardous materials. You may not use certain bridges or tunnels.

TRIP PLANNING

Federal Regulations: You must obey Part.397 of the Federal Motor Carrier Safety Regulations (FMCSR). These regulations deal with driving and parking vehicles that contain hazardous materials. You must understand and follow sections 397.3, 397.5, and 397.7.

FMCSR 397.3 requires all vehicles carrying hazardous materials to comply with state and local restrictions on routes and parking.

The safe haven regulation is FMCSR 397.5. It requires all vehicles carrying Class A or Class B explosives (Explosives 1.1 through 1.3) to be attended at all times. They may be parked in a safe haven. A safe haven is an area approved in writing by local, state, or federal officials in which unattended vehicles carrying Class A or Class B explosives may be parked.

FMCSR 397.9 controls the routes. Trips must be planned in the best interest of public safety and not for the operator's convenience.

Vehicles carrying hazardous materials must, when possible, operate over routes that do not go through or near heavily populated areas and should avoid tunnels, narrow streets, alleys, or places where crowds are assembled.

Restrictions on Hazardous Material Transportation: State: Hawaii										
Facility Name and Location	Are Cargos With the Following Allowed to Pass Through the Tunnel or Highway facility.									
	Explosives 1.1-1.3	Class A	Class B	Class C	Class D	Class E	Class F	Class G	Class H	Class I
Oahu	N	N	Yes	Yes	Y	Y	Y	Yes	Yes	Yes
Pali Tunnel -SR-61 Between Honolulu and Kailua	o	a	s	s	es	es	es	s	s	s
Wilson Tunnel -SR-63 Between Honolulu and Kaneahe	N	N	Y	Yes	Y	Y	Y	Yes	Y	Yes
Remarks:	o	a	es	s	es	es	es	s	es	s

Red Hill Tunnel on Proposed H-3 Route Will Have Similar Restrictions . .
 . No Bridge or Highway restrictions on Kauai, Maui, or Hawaii.

Figure 27-5

Loads of Class A or Class B explosives require a written trip plan. The carrier must submit the plan in advance. The driver must then follow the plan. In some cases, the driver prepares the plan for the owner.

There are also specific regulations dealing with routing decisions in the Hazardous Materials Regulations. HMR 177.8D requires drivers of vehicles containing hazardous materials to obey state and local laws for the use of tunnels.

Planning for trips and hauling radioactive material is controlled by HMR 177.825. There are detailed instructions for routing loads of radioactive materials. A written route plan must be submitted in advance for highway route controlled quantities of radioactive materials.

ROADSIDE ENFORCEMENT

As well as the normal enforcement of traffic laws, there are three other types of controlling activities routinely carried on by states. Drivers need to be aware of:

- Scales.
- Ports-of-entry ..
- Roadside safety inspections.

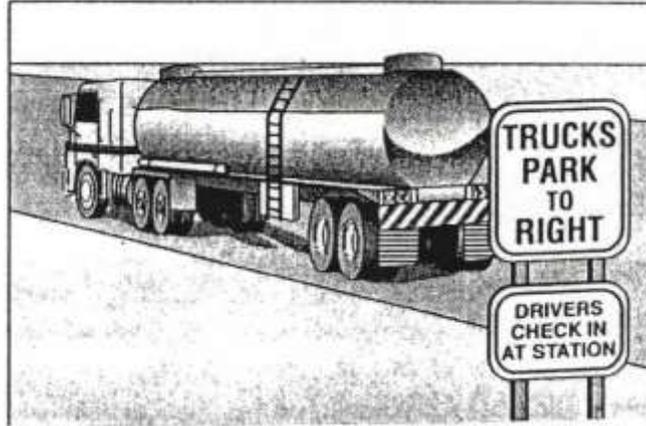


Figure 27-16

In many cases, these functions are carried out at a single location .

Scales

States usually enforce size and weight laws through a combination of permanent scales and the use of roving crnws that have portable scales, or loadmeters . Permanent scales are often on the main highways at the state line. In some states, there are also scales at other key points. Not stopping at the scales is a serious offense and may lead the driver into an unsafe situation.

Ports-of-Entry

These are locations where the driver must stop and prove the carrier has authority to operate in the state. In some cases, the driver may have to buy permits or pay fees. Weighing may also be done at the port-of-entry . Do not pull onto the scales. Park near the scales and walk up and get your permit. Some states will fine you if you pull onto the scales without a permit. In some states, the driver's log will be checked for hours of service violations and be time stamped by the person on duty.

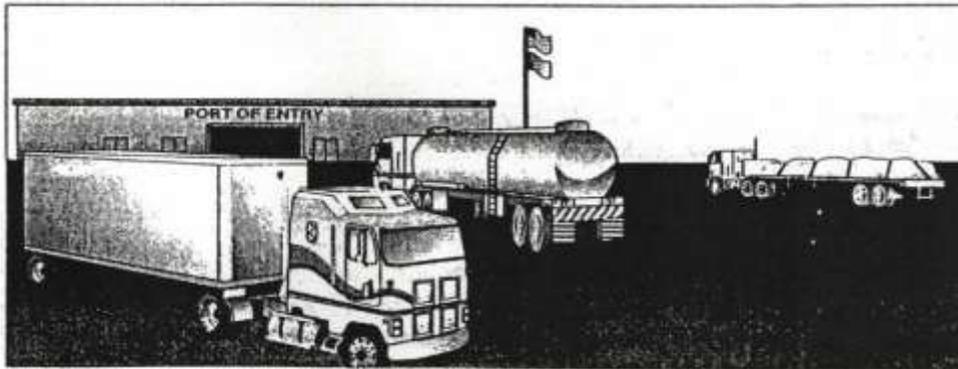


Figure 27-17

Roadside Safety Inspections

These inspections are done at scales, ports-of-entry, special safety inspection facilities, or in a suitable safe area. The driver must show his or her license, medical certificate, driver's logs, and the shipping papers for the load. Inspectors have the authority to inspect the cargo, even if it is sealed. If a sealed load is inspected, a new seal will be put on by the inspector. The driver should record in the log the identification number of the seal that is removed and the number of the new seal that is put on.

The driver may be put out of service for certain violations. These include:

- Hours of service violations.
- A vehicle so unsafe it is likely to be involved in an accident or breakdown.
- Leaking hazardous material.

At the end of a roadside inspection, the driver will be given a copy of the form filled out by the inspector. This form must be turned in to the carrier. If the driver will reach a company facility within 24 hours, the form may be turned in at that time. If not, the driver must mail the form to the carrier.

KEY WORDS

Ad valorem Tax: A tax based on the number of miles driven in that state that is paid by the carrier to each state.

Inner bridge: The distance between any two following axles. Determines weight limits.

International Registration Plan (IRP): An agreement among the states and Canadian provinces for paying registration fees that are based on the percentage of miles operated in each state or province.

Interstate Operating Authority: Issued by the ICC and permits trucks to cross state lines.

Line-Haul Transport: Also referred to as over-the-road transport. Cargo is transported from a point of origin to one or more distant destinations.

National System of Interstate Highways: Also known as the Designated System or National Network. Consists of the Interstates and many additional multi-lane, divided highways, such as the U.S. routes.

Outer bridge: The distance from the center of the steering axle to the center of the last axle in the combination. Determines weight limits.

Safe haven: An area approved in writing by local, state, or federal officials in which unattended vehicles carrying Class A or Class B explosives may be parked.

Weight Distance Tax: Also called a mileage tax, ton-mile tax or axle tax. A tax paid by the carrier that is based on the annual ton mileage.

LEARNING ACTIVITIES

'frip.Planning

Break into small groups. Using what you learned in this chapter, plan the following trips.

Trip #1

must you plan for before beginning your deliveries. What actions must you take to be sure the consignee receives

You are a delivery driver. You have goods to be delivered to ten different locations in the same city. What the right items on time?

Trip #2

You will be making an Open Dispatch Run. Your point of origin is New Orleans, LA. Your destination is Houston, TX. At Houston, you are assigned a run to Dallas, TX. In Dallas, you pick up a load for Oklahoma City, OK. In Oklahoma City, your load is headed for Wichita, KS. In Wichita, you are given a load for Kansas City, MO. In Kansas City, the load is going to Tulsa, OK. In Tulsa, you are dispatched to St. Louis, MO. From St. Louis, you are sent to Batesville, MS. At Batesville, you pick up a load for New Orleans. The run is during the month of March.

1. For how many days should you plan? _ _____ _
2. What paperwork should you be able to produce at any given time?
3. What special permits might you need?
4. How much money should you bring along? What other alternatives do you have to carrying cash?
5. What type of weather may you encounter? At what points?
6. Where can you find information about weather conditions?
7. What type of clothing should you bring along?
8. What type of supplies should you bring?
9. Will you need any special maps?
10. Fill out a Driver's Log for the trip.
11. What information will you need to supply to your carrier about your trip?

Trip #3

You are carrying a load of radioactive material from White Sands, NM to Huntsville, AL. The cargo is sealed. At an inspection point, the cargo's seal is broken so the load can be inspected. Plan your trip. List all permits needed. List all prohibited routes. What special care must you take? Fill out a Driver's Log for the trip. Will you need special maps?

Trip #4

You and another driver are assigned a run from Anacortes, WA to Houma, LA. You will be hauling drilling equipment. Your load is classed as overweight. Your cab has a sleeper berth. The run is being made in November. Plan your trip. List all permits needed. List all clothing, supplies, etc. you should take. Will you need special maps? Fill out a Driver's Log for the trip. What information should your carrier give you before you begin the trip? What information should you supply to your carrier when you return?

Map Reading

For the following trips, find the best route. Tell what type of roads you will have to use. Note if there are any s or bridges you cannot use. Will you need any special permits to make the run? What type of maps did you o plan your route? How far did you travel? Your instructor may use different routes because there are more s available for that run.

Trip #1

You pick up a load in Carbondale, PA. Your final destination is Youngstown, OH with stops in Liberty PA, Ridgway, PA .

Trip #2

Your point of origin is Detroit, MI . Your destination is Traverse City, MI with stops in Midland, MI , Big Rapids, MI , and Grayling, MI.

Trip #3

Your point of origin is Leadville, CO. Your final destination is Roswell, NM. You have stops in Aspen, CO, Breckenridge, CO, Durango, CO, Shiprock, NM, Grants, NM, and Alamogordo, NM.

Trip #4

Your point of origin is Mountain Home, ID. Your final destination is Spirit River, Alberta, Canada. You have stops in Grangeville, ID, Missoula MT, Coeur d'Alene, ID, Bonners Ferry, ID, Lethbridge, Alberta, Calgary, Alberta, Edmonton, Alberta, and Slave Lake, Alberta.

True-False Questions

Write T if the statement is true. Circle the F if the statement is false.

- F 1. In addition to being able to drive safely, a driver must be able to plan trips and read maps.
- F 2. Commercial truck drivers do not have to know the size and weight laws, how to register a CMV, how to get permits, or fuel tax requirements.
- F 3. Drivers should be able to find the approximate mileage from origin to destination.
- F 4. Drivers should know how to estimate trip time, fuel requirements, and personal financial needs.
- F 5. In many cases, motor carriers must operate over specified routes. Going off-route without a very good reason is a serious violation of company rules.
- F 6. Drivers do not need to know which types of cargos usually have routing restrictions. This is the job of the dispatcher.
- F 7. In all cases, the best routes for drivers to take are those using the U.S. numbered routes. These routes are always given priority in maintenance and repair.
- F 8. Only trucking company management is responsible for informing drivers of special weight restrictions on bridges.
- F 9. In areas where the speed limit is 55 mph, drivers should be able to travel 575 miles in 10 hours without breaking the speed limit and hours of service regulations.
- F 10. Drivers or motor carriers may have to document runs to show they can be made without violations of the hours of service laws or speed limits.

not do. Legally, "must" does not mean "may"; it does not mean "should." If an accident happens, there are things you must do and things you must

do. "Must" means you have no choice. If you do not do what the law says you must do, the penalty can be a fine, jail or the loss of your license - perhaps all three.

THE REGULATIONS

The Department of Transportation regulations tell you what you must and must not do. You'll find those regulations in the Federal Motor Carrier Safety Regulations (FMCSR) hand book. You must know these regulations. There's no maybes about that.

STOPPED VEHICLES

Sections 392.10 and 392.11 of the FMCSR tell you what you must do if you stop and have to leave your truck. Make sure the parking brake has been set. Use chocks if you must to be certain the truck won't move while you're gone. Park to the side of the road, not in traffic. Make sure other traffic can get around your truck, and that oncoming and following vehicles can clearly see your parked truck.

When you're involved in an accident that results in either or both injury or death to anyone or property damage of any kind, no matter how small, FMCSR 392.40 says you must stop immediately. This does not mean at the next rest area or at the next port of entry, but immediately, and in a safe place at the scene of the accident.

You must do everything you can to prevent the accident that's just happened from causing another accident. Another way to say this is that you must secure the accident scene. You'll learn how to do that later in this chapter.

You must give assistance to injured persons. The regulation warns you not to move anyone if moving them is likely to cause further injury. There are **many** cases where the trained truck driver is the only one who knows what to do at the scene of an accident. Many professional drivers have taken a course in first aid or life-saving techniques. It is a good idea to get yourself Red Cross certified.

If your truck is equipped with a CB radio, call the local police or highway patrol promptly. The sooner an ambulance or other emergency vehicle arrives, the better are the chances to minimize any injuries. Keep any accident victim warm until help arrives. Stop heavy bleeding by applying direct pressure to the wound.

You must show your driver's license and give anyone who asks:

- your name and address
- the name and address of your carrier
- your vehicle's state tag registration number

Finally, you must report all the details of the accident to your carrier as soon as you can. You'll learn more about that later in this chapter, too.

SECURING THE SCENE OF AN ACCIDENT

When you secure the scene of an accident, you must follow the same rules you follow when you stop your vehicle on the road. The rules covered here about emergency devices and those about how to set out warning signals apply any time you stop your vehicle on the road, whether there is an accident or not.

There are two parts to securing the scene of an accident.

- Put on your four-way emergency flashers.
- Set out warning devices.

Section 392.22 of the FMCSR requires you to put on your emergency flashers whenever you stop on the traveled portion of a highway or on the shoulder of a highway. You must put them on and leave them on until you set out warning devices and while you pick up warning devices. You may leave them on while the warning devices are out. You must not use the emergency flashers instead of warning devices.

The emergency flasher switch will most probably be found on your dashboard. Turn the flashers on immediately. Until you set out your warning devices, they may be the only warning to other drivers that an emergency has occurred.

Section 393.95 of the FMCSR tells you what emergency equipment you must carry and Section 393.22 tells you how you must set warning devices around your rig.

You must carry a fire extinguisher. You'll learn about that later in the chapter.

If your truck was made on or after January 1, 1974, you must carry three emergency triangles that reflect from both sides. The regulations give exact specifications for these reflectors. See Section 393. (i)(1-7) of the FMCSR to make sure your triangles conform to those regulations. There

are other devices you may carry to supplement the triangles, but you must carry the triangles.

If you're driving a truck that was built in 1974 or earlier, there are other warning devices you may use instead of the triangles. See Section 393.95(f)(1)(i-v) of the FMCSR for a full description of those devices.

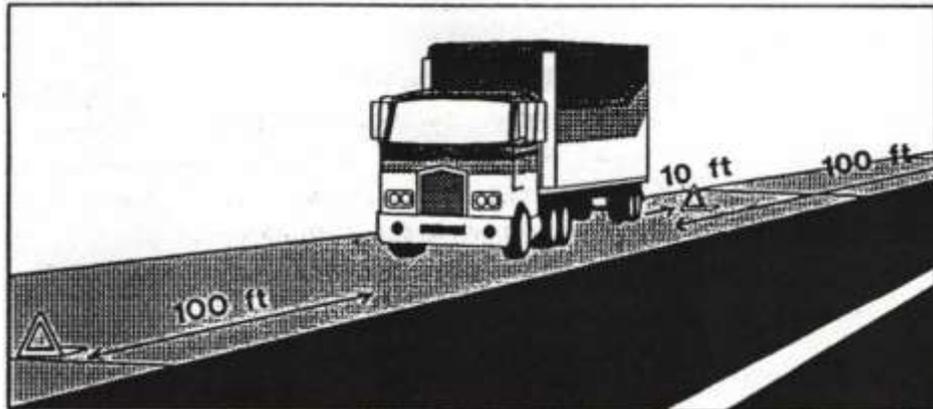
The general rule in Section 392.22 says you must set out warning devices as soon as possible, but for sure within 10 minutes of stopping. It says you must set out the three triangles as follows:

- Place one triangle at the traffic side and within 10 feet of the front or the rear of your rig.
- Place one triangle about 100 feet from your rig in the center of the traffic lane or the shoulder on which you've stopped facing the traffic that's approaching in that lane.
- Place one triangle about 100 feet from your rig in the center of the traffic lane or the shoulder on which you've stopped, in the direction opposite the second triangle just described.

Since this is the general rule, you should suspect there are some specific rules for specific circumstances.

fig. 31-1

The general rule for how to place emergency warning devices in case you must stop, or if you have an accident, on the road or on the road's shoulder.



If the accident occurs (or you stop for any reason) within 500 feet of a curve, crest of a hill or other object that would keep drivers from seeing you, you must place one triangle at a distance of 100 to 500 feet from your rig in the direction of approaching traffic. This is to make sure that approaching traffic has ample time to slow down.

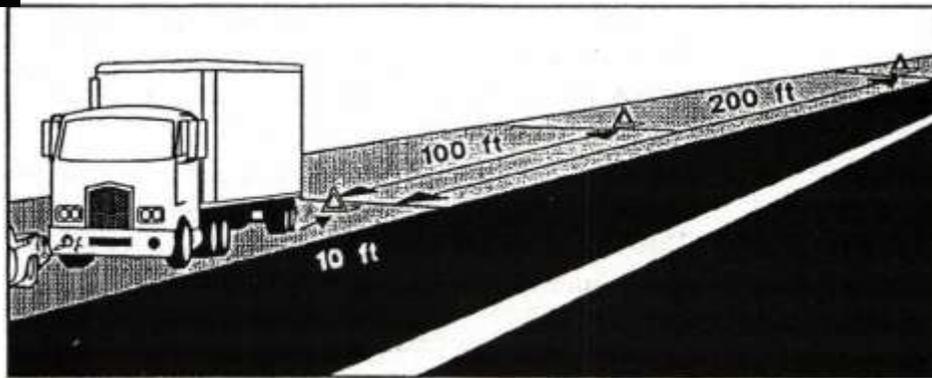
If the accident occurs on a divided or one-way road, you must:

- Place one triangle at a distance of 200 feet from your rig in the direction of approaching traffic.
- Place one triangle at a distance of 100 feet from your rig in the direction of approaching traffic.

- Place one triangle at the traffic side and within 10 feet of the rear of your vehicle.

Once you have placed your emergency triangle properly, you can turn your emergency flashers off.

Now that you've secured the scene to prevent further accidents from occurring, it's time to take care of any accident victims as we discussed earlier. Once you call the authorities, you'll need to begin gathering information for your accident report.



NOTIFICATION

Notification has two parts. You must notify certain agencies and your carrier must notify certain agencies. Part 394 of the FMCSR tells your carrier what accidents it must report, what information it must include in the report and to what agencies it must send the report. Your part is that you must notify your carrier.

Most motor carriers have company rules that drivers must follow. These are in addition to the DOT rules. Motor carriers that have driver's rules issue a printed Drivers Manual. It can also go by the name of Driver Information Handbook or Company Rules for Employees. Whatever the name, make sure you read this manual until you fully understand it.

Your Drivers Manual will include a section on what to do in case of an accident. After instructing you to stop and secure the scene, the manual will tell you to notify the proper authorities and your dispatcher. When you called the police, highway patrol, fire fighters or other local authorities, you began the notification process. Now you must call your company dispatcher and begin the process of the accident report.

There are a number of forms you must fill out if you have an accident. The highway patrol or local police will give you a local or state accident report, or perhaps just an information card, to fill out. You should be sure

to get the officer's name and the address of the police agency. The dispatcher or company accident investigator will ask you for this.

That is just the beginning of the information your carrier will need to make the reports it must make. First of all, your carrier must fill out Form MCS 50-T. This is the form required by the FMCSR. Then your carrier must fill out an accident report for its insurance company. The forms used by the insurance companies are very similar. They all need pretty much the same information to process a claim.

Of course, if you decide to become an owner/operator you'll be the carrier, too, in the sense that you'll be responsible for filling out form MCS 50-T and filing it with the proper federal agency. You'll also be responsible for reporting to your insurance company.

To gather the information they need after an accident, many carriers give their drivers an accident kit. Owner/operators buy their own accident kits. This kit has basic instructions printed on the outer cover. Follow these instructions, examples of which are listed below:

- Immediately set out warning devices.
- Help anyone who is injured.
- Call for medical help.
- Call the local authorities.
- Call your dispatcher.
- Pass out witness cards.
- Answer the questions of officials with the facts; don't offer opinions.
- Draw a rough diagram of the accident to help your memory later.
- Don't assume blame and don't offer to pay for anything.

Inside the envelope you'll find a driver accident report form, an accident description form and witness cards.

The driver accident report form helps you collect the information you or your carrier will need to fill out the forms required by the DOT and by the insurance company. Figure 31-3 shows you an example of this form. Make sure you fill it out neatly. Accidents, even minor ones, are at the very least upsetting. Your handwriting might not be legible at such a time. If you use printing, that will slow you down and give you more time to think about the questions and answers you'll need to deal with. Plus it will be easier to read later.

The accident description form is very helpful. It's a card with lines at the top and a blank space at the bottom. At the top, it asks you to explain in your own words what happened. Make sure you print this description clearly. At the bottom, it asks you to draw a diagram of the accident.

Now don't worry about drawing a truck that looks like a truck. The important thing is to show how the vehicles involved in the accident approached the scene and where they were following the accident.

Next, hand out witness cards to anyone at the scene who may have witnessed the accident. These cards ask witnesses to answer the questions listed below :

- Did you see the accident?
- Were you or anyone else hurt?
- Were you a passenger in our vehicle?
- Was our driver at fault?

fig. 31

Fill this form out carefully. It asks for some of the information your carrier will need to report the accident to the DOT and to the insurance company.

ACCIDENT REPORT FORM	
DRIVER ---	YOUR VEHICLE
ACCIDENT DATA	
DATE _____	TIME _____
PLACE ---	WERE ANY MECHANICAL DEFECTS APPARENT AT THE TIME OF THE ACCIDENT? EXPLAIN --
ROAD -----	_____
LANDMARK -----	WERE YOU WEARING SAFETY BELTS? _____
DEATH AND INJURY!	
PERSONS KILLED -	VEHICLE NO. 2
PERSONS INJURED -	TYPE MAH -
NOSPITAL PEOPLE WERE TAKEN TO	MODEL DRIVER YEAR -
_____	ADDRESS -
_____	CITY AND STATE -
INVESTIGATOR	OWNER ---
WAS ACCIDENT INVESTIGATED BY POLICE?	ADDRESS -----
OFFICER --- 8"0611	PHONE ---
LIST PERSONS CITED OR	INSURANCE CO- ---
ARRESTED CHARGES -	-----

The card then asks for a short explanation and for the witness's name, address and telephone number. Be sure to collect these cards. Be very polite when you hand them out and when you collect them. Always remember that you are representing your carrier. People will remember if you are efficient, competent and polite at an accident scene. It will reflect well on you and on your carrier.

Make sure your accident kit is complete and accurate. It is crucial to your carrier.

HAZARDOUS MATERIALS

If you're hauling hazardous materials and have an accident, you must notify your carrier immediately. The carrier must notify the DOT immediately. This is so crucial that the DOT has provided a toll-free number for carriers to use in cases of hazardous materials accidents. A call to this number will bring out members of the First Response Team, who are specially trained to respond to this type of accident. Chapter 32 covers this in more detail. Within 15 days, the carrier must follow up the call with a written report on DOT Form F 5800.1.

With hazardous materials, a leak can constitute an accident. Depending on the cargo, a leak could mean disaster to anyone in the area. That's one reason drivers hauling hazardous materials are specially trained and have a special endorsement on their CDL.

Some of the rules regarding accidents with hazardous materials are printed in the back of the FMCSR. Make sure you know these rules if you haul hazardous materials.

VEHICLE FIRES

Vehicle fires are accidents. Sometimes vehicle fires cause accidents and sometimes accidents cause vehicle fires. As a professional driver, you must know what causes vehicle fires. You must know how to prevent them. And, you must know what to do when a fire starts.

To start and burn, a fire needs fuel, air and heat. Fuel is anything that will burn. Most things will burn, given enough air and heat. Air, or oxygen, is essential. A fire cannot burn without air. (That's why one way to put out a fire is to "smother" it.) Heat is needed until the fuel reaches its ignition point. That's the point at which it will burn. Then it creates its own heat. As you'll see, friction is a main source of heat in vehicle fires.

As a professional driver, you have major responsibilities in the case of a vehicle fire. First of all, you must seek to protect your life and the lives of others. Then you must try to save your vehicle and its cargo.

TYPES OF VEHICLE FIRES

One way to group vehicle fires is to look at where they can start:

- the tires
- the trailer
- at a fuel island
- the electrical system
- the cab
- as the result of an accident

Tire Fires

Tires catch on fire because they become overheated. The major cause of overheating in tires is under-inflation. An under-inflated tire overheats because the tire flexes too much. As it flexes, its parts rub against each other and create friction. Friction creates heat. It can get hot enough to produce a flame, and rubber bums very well.

You can see that the best way to prevent tire fires is to make sure your tires are properly inflated. Chapter 10 tells you how to do that. Section 393.75(f)(4-5) of the FMCSR requires it. Your canier may require you to check your tires every 100 miles.

An overheated tire should be removed and placed at a safe distance from the vehicle. But first, you'll have to cool it off. The best way to do that is with a lot of water. If you don't have a lot of water available, a lot of dirt will do. If you have neither, you may just have to sit and wait for the tire to cool enough to remove it. If a tire is actually burning, you can use water or your fire extinguisher. We'll discuss how to do that later in this section.

fig. 31-4
Under-inflation causes tire fires. This chart lists some other causes as well, and some preventive measures.

TIRE FIRES	
CAUSES	PREVENTION
A. Under-inflated tires	A. Inflate tires properly
B. Running on a flat tire	B. Change or repair flat tire
C. Accumulated grease or oil around brake drum	C. Clean, find leak and repair
D. Overloaded rig	D. Reduce load or change tires
E. High-speed driving	E. Slow down

Electrical Fires

Problems with wiring and with the battery can cause fires. Electrical fires can also be used by faulty wiring, worn wiring, loose connections and overloaded circuits. Sections 393.28 through 393.33 of the FMCSR contain regulations regarding your electrical system. These regulations seek to promote safety by preventing electrical fires.

The way to prevent electrical fires is to make sure your truck conforms to the FMCSR. That will require some preventive maintenance on your part. Check the wiring under the hood every time you raise the hood. Make sure there are no loose or bare wires. It also means keep the engine clean. That way if the battery should go bad and sparc, there won't be any oil or fuel to bum. Also be sure to replace worn or frayed battery cables.

If you do have an electrical fire, follow the steps listed on the next page.

- Shut the engine down.
- Don't open the hood if you can avoid it.
- Break the circuit by pulling one of the battery cables loose.
- Use your fire extinguisher, shooting through louvers, the radiator or from beneath the vehicle.

When you turn off the truck, you stop the flow of electric current in the truck. When you jerk the battery cable loose, you stop the flow of electricity from the battery. Never use water to fight an electrical fire. Use the fire extinguisher. We'll tell you how in a later section.

Cargo Fires

Cargo fires are often caused by poor loading. A load that is not properly secured can create more than normal friction, which creates heat and can cause fire, especially if the cargo is flammable.

If you smell smoke or see smoke or fire coming from the doors of your trailer, you may have a cargo fire. Immediately pull off the roadway to an area away from people and other vehicles. Make sure nothing is overhead, such as telephone or electrical wires, a building or an overpass. Make sure the area is clear in case the fire cannot be contained.

In some cases, the best thing to do is call for help on your CB. Give your exact location. Mileposts or intersections are good points of reference. If possible, uncouple the tractor and drive it away from the trailer.

If you open the trailer doors, you'll introduce a large amount of oxygen into the fire. That will only make the fire burn faster and hotter. Drivers have lost their lives by opening the doors of a trailer that contains burning cargo. Do not open the trailer doors. There can be a fireball type of explosion. Wait for the fire fighters. Have your shipping papers ready to show the fire fighters. How they will fight the fire depends on the cargo.

A hazardous material fire can be very dangerous. If you haul a hazardous material, you'll be trained in exactly what to do if a fire should start.

Cab Fires

Cab fires are almost always the result of cab litter and carelessness. They could be called "trash fires" because the main cause of these fires is cab trash. Cab trash includes snack wrappers and sacks, fast food bags and cups and oily rags used for maintenance. If you're a smoker, the danger of a cab fire is increased.

It's obvious how to prevent these fires. Keep your cab clean and be careful what you do with cigarettes, cigars, pipes and matches.

Fuel Island Fires

This type of fire is also caused almost exclusively by carelessness. There have been serious fuel fires at truck stops, even though the rules covering fueling are common sense rules. Some of them are listed in Section 397 of the FMCSR. To prevent a fuel island fire, follow these rules:

- Turn off the engine.
- Put the fuel nozzle all the way into the fuel tank and leave it there until you have finished fueling.
- Do not smoke or allow any lighted smoking material within 25 feet of the fuel island.

Another important rule is: Do not leave the truck until you have finished the fueling process. Don't prop open the fuel nozzle with a screwdriver or pliers and leave it unattended while it's filling. Fuel can overflow and run onto the pavement. A fire could easily start. Even if it doesn't, the spill must be cleaned up. That can be expensive, and your carrier may be charged for your carelessness. That will not earn you a raise.

If a fuel fire does start, never use water on it. Water will only spread the fuel - and the fire. Use a fire extinguisher.

OBSERVATION SKILLS TEST

Recall the illustration that began this chapter. A dangerous situation is about to happen. How are the driver and her co-driver contributing to an accident in the making? Turn to the Observation Skills Test Grid at the back of the book to check the accuracy of your observation skills.

THE FIRE EXTINGUISHER

Section 393.95(a) of the FMCSR tells you that your truck must carry a fire extinguisher. This regulation also specifies exactly what types of fire extinguishers are acceptable. Make sure the extinguisher in your truck conforms to the regulations.

Fires have been grouped according to class. When the fuel for the fire is wood, paper, cloth, trash and other ordinary material, the fire is a Class A fire. When the fuel is gasoline, grease, oil, paint and other flammable liquid, the fire is a Class B fire. Electrical fires are Class C fires.

Most trucks use a 10 lb. size fire extinguisher with a rating of "A," "B" and "C." This type of extinguisher can be used for all classes of fires. It's filled with a dry chemical. When you squeeze the handle, an air pressure cartridge inside the tank is punctured. The released air pressure forces the powder out of the tank, through the hose, through the nozzle and onto the

fire. The dry chemical puts the fire out by smothering it. In other words, the chemical coats the burning material and prevents air from fueling the fire.

Your fire extinguisher will come with a manual that shows in detail how to use it. Read this manual. Become familiar with the fire extinguisher before you need to use it. What follows here are the instructions which are printed on a fire extinguisher:

- Keep the wind to your back.
- Hold the extinguisher upright.
- Pull out the ring pin.
- Stand back six feet.
- Aim the nozzle at the base of the fire.
- Squeeze the handles.

Continue until the fire is completely cooled. Simply the absence of smoke

- Use a side to side motion.

or flame does not mean the fire is out.

The extinguisher should be inspected monthly. Check the nozzle to make sure it's clear. Check the ring pin to make sure the tip is intact. Check the pressure gauge. The needle should be in the green area.

fig. 31-5
The fire extinguisher in your truck should be able to put out all three classes of fires.

LETTER SYMBOL		PICTURE SYMBOL
A	FOR 11000, PAPER, CLOTH, TRASH, AND OTHER ORDINARY MATERIALS	E11
m	FOR GASOLINE, GREASE, OIL, FAT, AND OTHER FLAMMABLE LIQUIDS	rn
e	FOR LIVE ELECTRICAL EQUIPMENT	

Take good care of your fire extinguisher. It's your fire fighting tool. Of course, the best fire fighting tool is prevention.

QUIZ

1. There are DOT regulations in the FMCSR that tell you what you must and must not do in case of an accident. You _____ know these regulations.
 - A. should
 - B. may
 - C. must
 - D. ought to

2. The DOT rules covering emergency devices and how to set out warning signals apply any time you stop your vehicle on the road whether there is an accident or not.
 - A. True
 - B. False

3. In case of an accident, you'll find reminder instructions such as "immediately set out warning devices, help anyone who is injured, call for medical help, call the local authorities and call your dispatcher" on the _____.
 - A. front page of Form MCS 50-T
 - B. back cover of your Driver Manual
 - C. back of the witness card
 - D. outer cover of your accident kit

4. The _____ helps you collect the information you or your carrier will need to fill out the forms required by the DOT and by the insurance company.
 - A. Form MCS 50-T
 - B. driver accident report form
 - C. state or local accident report form
 - D. police information card

5. To start and burn, a fire needs fuel, heat and _____.
 - A. water
 - B. dry chemicals
 - C. air
 - D. oxygen

6. Many cargo fires are caused by _____.
 - A. poor loading
 - B. hazardous cargo
 - C. opening the trailer doors
 - D. driving too fast

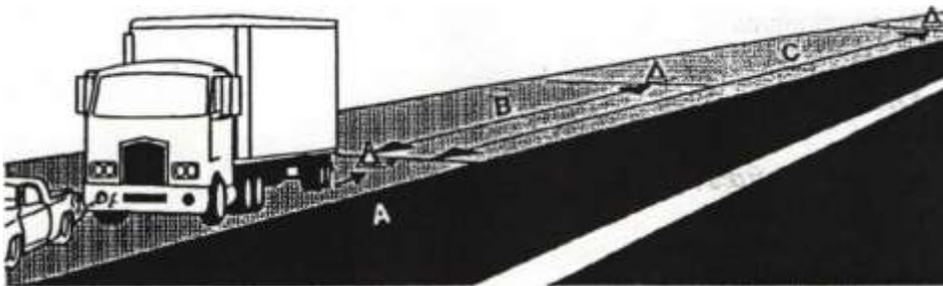
7. Most trucks use a 10 lb. size fire extinguisher that will put out fires with a class rating of _____.
 - A. "A"
 - B. "B"
 - C. "A" and "B"
 - D. "A," "B" and "C"

8. Refer to the illustration below, which shows the placement of emergency triangles according to the general rule for stopping on the shoulder of a road. How far should the triangles be placed from the vehicle? Write the correct number of feet in the blank next to the letter that corresponds with the triangle.



A. _ _ _ _
B. _ _ _ _
C. _ _ _ _

9. Refer to the illustration below, which shows the placement of emergency triangles according to the general rule for securing the scene of an accident that takes place on a divided or one way road. How far should the triangles be placed from the vehicle? Write the correct number of feet in the blank next to the letter that corresponds with the triangle.



A. _ _ _ _
B. _ _ _ _
C. _ _ _ _

10. The best way to prevent tire fires is to make sure your tires are properly _____
- A. demounted
 - B. inflated
 - C. sized
 - D. retreaded