

**1. Introduction to longer combination vehicles, their emergence in trucking, and an overview of the course.**

All drivers of longer combination vehicles (LCVs) must be trained in their operation, including classroom and behind-the-wheel training. The training rules took effect on June 1, 2004, and can be found in sections 380.101 through 380.401 of the Federal Motor Carrier Safety Regulations.

The Federal Motor Carrier Safety Administration (FMCSA) has estimated that 35,000 LCV drivers were subject to the rules in 2004. Most of them were grandfathered and did not have to undergo additional training. Grandfathering was no longer allowed after June 1, 2005. About 1,200 new LCV drivers will need training each year.

An LCV is any combination of a truck-tractor and two or more trailers or semi-trailers which operate on the national highway system in interstate commerce, having a gross vehicle weight (GVW) greater than 80,000 pounds.

The particular highways included can be found at [www.fhwa.dot.gov/reports/routefinder/](http://www.fhwa.dot.gov/reports/routefinder/).

The 80,000-pound weight includes all vehicles, people, and cargo.

The most common types of LCVs are Rocky Mountain Doubles (RMD), Turnpike Doubles (TPD), and Triple Trailers (TT).

LCVs are not allowed in all states. In 1956, federal rules adopted the interstate highway system, placed size and weight limits on vehicles, and gave more than 20 states the option to allow LCVs. Not all states exercised that option. In 1991, the door was closed: Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) which prohibited states from increasing the size and weight of combination vehicles beyond that already allowed on June 1, 1991.

Today, LCVs are primarily allowed in western states and on some turnpikes, such as in Indiana, Ohio, Pennsylvania, and Florida. States that do allow LCVs do not all allow the same types of LCVs.

The LCV training requirements do not automatically apply to drivers operating in intrastate commerce, that is, those who never cross state lines or haul goods that cross state lines. To apply the rules within a state, to intrastate drivers, the state must adopt the federal Part 380 rules. As of 2007, the following states had adopted those rules: Colorado, Illinois, Indiana, Oregon, Utah, and Washington. Check with your state for additional information.

According to the federal rules, drivers must have an LCV training certificate or grandfathering certificate before they can drive an LCV.

**2. Qualifications needed to undergo the training, and the procedures for training.**

Not just anyone can undergo LCV training. You have to show proof that you are qualified. You must present evidence that in the previous 6 months you had a valid Class A CDL with double/triple endorsement and driving experience in a Class A vehicle. Driving experience can be verified by an employer's written statement.

If applying for triples training, driving experience must include a Class A truck-tractor/semi-trailer combination or a truck-tractor/semi-trailer/trailer combination with a gross vehicle weight of 80,000 pounds or less.

In the past 6 months you must have had:

only one driver's license;

- \* no CDL suspension, revocation, or cancellation;
- \* no 'major offense' convictions while operating CMV (including DUI, refusing an alcohol test, leaving an accident scene, etc.);
- \* no 'railroad-highway grade crossing' convictions while operating CMV;
- \* no convictions for violating out-of-service orders;
- \* no more than 1 'serious traffic violation' conviction while operating CMV (includes speeding (15 mph+), reckless driving, erratic lane changes, following too closely, etc.);
- \* no convictions for violating traffic control laws in connection with a crash involving a CMV.

### **3. Outline of the training**

The training will cover the following items, as required in the regulations:

- \* Orientation: LCVs in trucking, regulations, driver qualifications, vehicle configuration factors
- \* Basic Operation: Coupling/uncoupling, basic control & handling, basic maneuvers, turning, steering, tracking, proficiency development
- \* Safe Operating Practices: Interacting with traffic, speed and space management, night operations, extreme driving conditions, security issues, proficiency development
- \* Advanced Operations: Hazard perception, hazardous situations, maintenance and troubleshooting
- \* Non-Driving Activities: Routes and trip planning, cargo and weight considerations

### **4. The role of LCVs and LCV drivers**

What are the advantages and disadvantages of LCVs? The advantages of LCVs may include:

- \* Productivity: LCVs improve productivity due an increase of cargo-carrying capacity of 30% to 100% per driver. This results in fewer truck trips, lower cost, and fewer miles driven.
- \* Cost: Transport costs may be lower due to fewer drivers needed per cargo unit, and more efficient use of fuel.
- \* Traffic: Improved productivity may result in fewer trucks on the road.
- \* Air Emissions: LCVs may produce lower air emissions per unit of cargo transported.

The disadvantages may include:

- \* Safety: Triples tend to sway and can leave the lane they are traveling in, although sway can be lessened by advanced connector types. Triples also require more passing length, spray more rain and snow, and have a history of being underpowered while climbing steep grades.
- \* Pavement Damage: Heavier trucks deteriorate the pavement structure at an accelerated rate.

A Texas study found that one big rig pass causes the damage equivalent to 2,000 to 3,000 cars. However, the extra pavement damage from LCVs may be mitigated by the increased number of axles.

- \* Infrastructure Damage: LCVs, especially Turnpike Doubles and Rocky Mountain Doubles,

demonstrate wider off-tracking on curves than currently legal tractor-trailer combinations. Off-tracking can damage shoulders, curbs, and signs along ramps and intersections.

- \* Parking: The parking spaces at state rest areas and truck stops are not designed for trucks longer than 80 feet.

The role of the driver is critical in any LCV operation. The driver's role includes:

- \* Responsibility for inspecting LCVs for safe operation on public highways;
- \* Coordinating proper weight distribution to comply with requirements;
- \* Operating safely ensuring a safe and timely delivery of product; and
- \* Maintaining qualifications to operate LCVs.

## **5. Federal, state, and local regulations and rulemaking bodies that affect the trucking industry, especially LCV operations.**

Trucking and the operation of LCVs in particular is highly regulated at the federal, state, and local level.

At the federal level:

- \* The Federal Motor Carrier Safety Administration (FMCSA) issues the Federal Motor Carrier Safety Regulations (FMCSRs) found in Title 49 of the Code of Federal Regulations, Subtitle B, Chapter III, Subchapter B, Parts 350-399. Within the FMCSRs are the LCV training rules in Part 380.
- \* The Federal Highway Administration has regulations on the size, weight, and length of LCVs. Section 658.23 put a freeze on the operation of LCVs in 1991. Appendix C to Part 658 lists the states that allow LCVs and the restrictions in place in those states.
- \* The National Highway Traffic Safety Administration sets vehicle safety standards, primarily for manufacturers.
- \* The Pipeline and Hazardous Materials Safety Administration administers the Hazardous Materials Regulations.

Each state has passed laws and rules setting the legal vehicle sizes and weights for their particular jurisdiction. The limitations cover the legal limits allowed for width, height, length and weight for various vehicles and/or trailer configurations. They also address the limitations for vehicles traveling on interstate or designated highways within the state and/or other state or supplemental highways.

## **6. What are the general driver qualification and health and wellness issues?**

To operate an LCV safely, the driver must be fully qualified. To be qualified under the FMCSRs, drivers must pay particular attention to: 49 CFR Part 380, the training requirements for LCV drivers and entry-level drivers (those with less than 1 year of interstate CDL driving experience);

- \* Part 382, the drug & alcohol rules covering all CDL drivers;
- \* Part 383, the CDL (and LCV endorsement) rules; and
- \* Part 391, the basic driver qualification rules, including requirements for medical cards, employment applications, annual reviews, and road tests.

Under Part 391, drivers must undergo a medical exam at least every 2 years, and drivers must carry a current medical card at all times. Drivers should be familiar with the medical problems

that can lead to loss of medical qualification:

- \* Limb loss or impairment
- \* Insulin use
- \* Cardiovascular disease
- \* Respiratory dysfunction
- \* Blood pressure
- \* Muscular, joint, or vascular disease
- \* Epilepsy
- \* Psychiatric disorders
- \* Vision problems
- \* Hearing problems
- \* Drug use / alcohol abuse
- \* Other conditions that could impair safe driving

States may have their own medical requirements for intrastate drivers. Many states have adopted special exceptions or waivers for drivers with medical problems that would otherwise disqualify them under the federal rules. Contact the state for details.

Under Part 382, drivers who operate vehicles requiring a CDL are subject to drug and alcohol testing. The required tests include pre-employment, random (50% of all drivers must be tested annually for drugs, 10% for alcohol), post-accident, and reasonable suspicion tests. If you violate the drug/alcohol rules, you will also be subject to return-to-duty and follow-up testing.

Drivers who fail a test, refuse to take a test (including failure to report for a test or cooperate with any part of the testing process), or who adulterate or substitute a test specimen, will be removed from service and will have to undergo treatment followed by additional testing.

A healthy driver is a safe driver. Let's examine how diet, exercise, alcohol & drug use/abuse, prescription drug use, and fatigue affect driver health: A balanced diet and no tobacco use will help you stay strong and healthy.

- \* Exercise will help you reduce stress, sleep better, reduce injuries, improve immunity, lower heart attack risk, and lower body fat, cholesterol, and blood pressure.

- \* Alcohol & drug use and/or abuse can have far-reaching effects. That's why companies must test drivers for drug use and alcohol abuse. Drug addiction and alcoholism can devastate a driver's health, family, employer, and other drivers.

- \* Drivers must use caution when taking prescription and non-prescription drugs. Such drugs may be allowed if your doctor has advised you that it will not affect your ability to drive a CMV safely. Consult with a doctor before taking any new prescription or over-the-counter drugs.

- \* Drivers must be proactive in fighting fatigue. Stimulants are no substitute for a good night's sleep. If you go night after night without adequate sleep, you go into a sleep debt, which means you'll have to get extra sleep to make up for it. Get 7-9 hours of sleep every night whenever possible. To help fight fatigue, be sure to get enough sleep and stay healthy. If you are constantly fatigued despite getting adequate sleep, you may have a sleep disorder seek treatment!

## **7. Discuss the key vehicle components used in the configuration of LCVs.**

Being equipped with two drawbars, a C-train eliminates the rear trailer's ability to rotate at the hitch point.

While a standard tractor/trailer unit has one point of articulation or joint, doubles have three:

1. First trailer kingpin and fifth wheel
2. Pintle hook and eye
3. Converter gear fifth wheel and kingpin of the second trailer

Following are some defining characteristics and handling requirements of several types of doubles.

**Western Doubles:** A western double is a standard A-train with two equal-length trailers, typically 24-31 feet long, and an overall length of 60-75 feet. The trailers may be dry vans, tankers, flatbeds, or dumps. There are several special handling concerns when pulling western doubles:

- \* Avoid backing. This typically difficult maneuver is made even more difficult with a double trailer unit not designed to be backed.
- \* Smooth steering is required. Jerking or whipping of the steering wheel is greatly magnified in the second trailer.
- \* The heaviest trailer must always be ahead of the lighter one.
- \* Don't apply brakes in a curve, because this will cause the second trailer to dip.
- \* The greater length of the rig requires the driver to take greater caution in passing, changing lanes, and crossing intersections.
- \* It's impossible to make tight turns with close-coupled rigs.
- \* Bumps and potholes may cause the tops of the trailers to strike each other.
- \* On curves, be aware of the vehicle's tracking so that stay within your lane while going around the curve.

Doubles add steps to the normal coupling and inspection procedures. The drawbar and pintle hook must be properly in place and hooked. Safety chains need to be in place, light cords need to be attached, all air-lines must be hooked up properly, and valves must be opened or shut as required. These items must be checked during en route inspections as well.

**Turnpike Doubles:** A Turnpike Double has longer trailers than a western double, generally 35-48 feet, with an overall vehicle length of around 100 feet or more. They typically are equipped with nine axles. Such rigs are often found on the turnpikes of the Eastern United States. Typically, a high-output engine and multiple gear range transmission are required for turnpike doubles.

Other major characteristics, handling, and special requirements are essentially the same as for western doubles, if magnified somewhat by the additional length. However, a driver who pulls turnpike doubles does need to be aware of areas where their use is restricted, as well as special permits that are required.

**Rocky Mountain Doubles:** A Rocky Mountain double, as the name suggests, is generally used in the Western U.S. and is composed of a longer trailer in the front and a shorter trailer in the rear. Generally the front (semi) trailer is 40-53 feet long, and the rear (full) trailer is 26-29 feet long. Overall length is generally 80-100 feet.

Other major characteristics, handling, and special requirements are essentially the same as for western doubles, though the long front trailer does require extra room for maneuvering.

**B-Trains:** A B-train is composed of two semitrailers. On the first trailer, tandem rear axles are to the rear of the trailer body so the second axle is under the nose of the second semitrailer. A fifth wheel mounted above the second axle eliminates the need for a converter dolly. This also eliminates one articulation point normally found on a double rig; B-trains have two articulation points rather than three.

Trailer and overall length will vary depending on the geographical locations of B-train operations. Generally there will be two 40-foot trailers or one 40-foot and one 27-foot trailer. B-trains are more common in Canada than in the United States.

Again, other major characteristics, handling, and special requirements are essentially the same as for western doubles, with adjustments for trailer length. Backing is easier with B-trains, though it should still be avoided.

**Triples:** (also known as triple trailers or triple headers) are composed of three semitrailers, with the second and third converted to full trailers using converter gear and connected, as with doubles, by drawbar and pintle hook.

There are three kingpin/fifth wheel connections and two eye/pintle hook connections. Trailers are typically 27-28 feet long, with overall lengths of up to 100 feet.

Triples require highly skilled drivers. Their length requires additional time and space for making turns, stopping, and performing other maneuvers. Some maneuvers, such as backing, should never be attempted. Areas and highways where triples are allowed are limited.

Demonstrate basic LCV operations through on-the-road training.

This portion of the training course must cover the following elements:

- \* Coupling and uncoupling. Provide instruction addressing the procedures for coupling and uncoupling LCVs. While vehicle coupling and uncoupling procedures are common to all truck-tractor/semi-trailer operations, some factors are peculiar to LCVs. Emphasize preplanning and safe operating procedures.
- \* Basic control and handling. Provide an introduction to basic vehicular control and handling as it applies to LCVs. This must include instruction addressing brake performance, handling characteristics and factors affecting LCV stability while braking, turning, and cornering. Emphasize safe operating procedures.
- \* Basic maneuvers. Provide instruction addressing the basic vehicular maneuvers that will be encountered by LCV drivers. This must include instruction relative to backing, lane positioning and path selection, merging situations, and parking LCVs. Emphasize safe operating procedures as they apply to brake performance and directional stability while accelerating, braking, merging, cornering, turning, and parking.
- \* Turning, steering, and tracking. Provide instruction addressing turning situations, steering maneuvers, and the tracking of LCV trailers. This must include instruction related to trailer sway and off-tracking. Emphasize maintaining directional stability.
- \* Proficiency development: basic operations. Enable driver-students to gain the proficiency in basic operation needed to safely undertake on-street instruction in the next phase of this training program.

**8. You will be asked to demonstrate safe operating practices through on-the-road training.**

This portion of the training course will cover the following elements:

- \* Interacting with traffic. Provide instruction addressing the principles of visual search, communication, and sharing the road with other traffic. Emphasize visual search, mirror usage, signaling and/or positioning the vehicle to communicate, and understanding the special situations encountered by LCV drivers in various traffic situations.
- \* Speed and space management. Provide instruction addressing the principles of speed and space management. Emphasize maintaining safe vehicular speed and appropriate space surrounding the vehicle under various traffic and road conditions. Particular attention must be placed upon understanding the special situations encountered by LCVs in various traffic situations.
- \* Night operations. Provide instruction addressing the principles of night operations. Emphasize the factors affecting operation of LCVs at night. Night driving presents specific factors that require special attention on the part of the driver. Changes in vehicle safety inspection, vision, communications, speed management, and space management are needed to deal with the special problems night driving presents.
- \* Extreme driving conditions. Provide instruction addressing the driving of LCVs under extreme driving conditions. Emphasize the factors affecting the operation of LCVs in cold, hot, and inclement weather and in the mountains and desert. Changes in basic driving habits are needed to deal with the specific problems presented by these extreme driving conditions.
- \* Security issues. Discuss security requirements imposed by the Department of Homeland Security, Transportation Security Administration; the U.S. Department of Transportation, Research and Special Programs Administration; and any other state or federal agency with responsibility for highway or motor carrier security.
- \* Proficiency development. Provide driver-students an opportunity to refine, within the on-street traffic environment, their vehicle handling skills learned in the first three sections. Driver-student performance progress must be closely monitored to determine when the level of proficiency required for carrying out the basic traffic maneuvers of stopping, turning, merging, straight driving, curves, lane changing, passing, driving on hills, driving through traffic restrictions, and parking has been attained. The driver-student must also be assessed for regulatory compliance with all traffic laws.

**9. You will be asked to demonstrate advanced LCV operations, introducing higher-level skills once the more fundamental skills and knowledge addressed earlier have been mastered.**

This portion of the training course must cover the following elements:

- \* Hazard perception. Provide instruction addressing the principles of recognizing hazards in sufficient time to reduce the severity of the hazard and neutralize a possible emergency situation. While hazards are present in all motor vehicle traffic operations, some are peculiar to LCV operations. Emphasize hazard recognition, visual search, and response to possible emergency-producing situations encountered by LCV drivers in various traffic situations.
- \* Hazardous situations. Provide instruction dealing with specific procedures appropriate for LCV emergencies. These must include evasive steering, emergency braking, off-road recovery, brake failures, tire blowouts, rearward amplification, hydroplaning, skidding, jackknifing and the rollover phenomenon. The discussion must include a review of unsafe acts and the role they

play in producing hazardous situations.

- \* Maintenance and trouble-shooting. Introduce driver-students to the basic servicing and checking procedures for the various vehicle components and provide knowledge of conducting preventive maintenance functions, making simple emergency repairs, and diagnosing and reporting vehicle malfunctions. Provide instruction that addresses how to keep the vehicle in safe and efficient operating condition.

#### 10. **LCV route and trip planning.**

Trip planning is the art of getting from point A to point B safely, legally, and on time before you get behind the wheel. Such advance planning is critical for LCV operations.

Before leaving on a trip, an LCV driver must know where he or she is going, which highways are involved, and which permits are required for the trip. Knowing this in advance will save time and money down the road.

To ensure the LCV can be operated legally within the intended states of travel, the size and weight limitations must be investigated using:

- \* Appendix C to Part 658,
- \* The federal bridge formula, and
- \* State formulas.

Some other factors that must be considered when planning a trip include:

- \* Hours needed
- \* Total miles
- \* Time of day
- \* City vs. highway driving
- \* Hours-of-service regulations
- \* LCV restrictions
- \* Weather conditions

Certain permits may be needed for the trip. Permits are issued at the state level. The carrier and the driver may work together to obtain the necessary permits. Drivers must be familiar with all permit conditions and comply with any limitations and requirements listed in the permit. The following list includes the types of permits that may be required to operate an LCV:

- \* Vehicle registration (IRP)
- \* Operating authority
- \* Fuel/mileage tax (IFTA)
- \* Oversize/overweight permits

Drivers must also be aware of the 'reasonable access' limitations along the route. These limitations allow the LCV driver to leave the designated highways, up to a certain number of miles, for food, fuel, repairs, or access to a facility. The access limitations can be found in Appendix C to Part 658, if applicable.

#### 11. **Discuss LCV cargo and weight considerations.**



This portion of the training course must cover the following elements:

- \* Proper cargo documentation,
- \* Loading,
- \* Securing cargo,
- \* Unloading cargo,
- \* Weight distribution,
- \* Load sequencing,
- \* Trailer placement,
- \* The importance of axle weight distribution, and
- \* Trailer placement and its effect on vehicle handling.