



# **Vehicle Orientation: Know Your School Bus**

Reference Guide and Test

## Introduction

There are more than 427,000 school buses currently running throughout the United States. Every day, they transport more than 26 million students combined! School buses are the backbone for making education accessible to millions of students every year. School bus drivers should already know the importance of maintaining these vehicles daily. However, there are many additional things about a school bus that drivers should consider.

**By knowing the major components and items on the school bus, you can:**

- a) Have a better understanding of how to diagnose problems if they arise.
- b) Gain additional knowledge of your bus's capabilities and limitations.
- c) Accurately describe faulty equipment to your mechanics.

## **Types of School Buses**

1) School bus drivers have a pretty high chance of driving different styles of buses. Drivers may be filling in for another driver, they may have switched organizations, or are a go getter that wants to know as much as they can about the vehicles they are operating. In any event, knowing the different styles of buses is important.

2) School buses come in all kinds of weights, designs and sizes. School buses are designed so that they're highly visible and include safety features such as flashing red lights, cross-view mirrors and stop-sign arms. They include protective seating, high crush standards and rollover protection features. It is important to know that different types of buses have different types of classifications. These classifications are important to know so you understand their characteristics, as well as their limitations.

3) There are typically 4 classification types. Types A, B, C, and D. **All types are able to transport 10 or more passengers.** They all have a gross vehicle weight rating. **Gross vehicle weight** is the MAXIMUM allowable weight when the bus is loaded to full capacity and includes the weight of the vehicle, fuel, passengers, and all other items placed inside the bus including the spares.

4) A **Type A** school bus is capable of carrying 30 passengers. **Type A buses are sub-**

**divided into 2 groups.** A1 and A2.

- a) Type **A1** has a gross vehicle weight rating of LESS THAN 10,000 lbs.
- b) Type **A2** has a gross vehicle weight rating of 10,000 lbs or MORE.

5) **Type B** school buses are designed to carry 16 passengers or less including the operator. The type B bus is also sub divided. Type B1 and B2.

- a) Type B1 has a gross vehicle weight rating of 10,000 pounds or LESS.
- b) Type B2 has a gross vehicle weight rating of MORE than 10,000 lbs.

6) **Type C** school buses are considered to be the traditional school bus. Known as a 'conventional' bus with a conventional design. The engine is located under the hood at the front of the bus. **It is designed for carrying more than 70 passengers.** Most conventional buses are 33 to 45 feet in length. They are 9 to 11 feet in height and weigh about 12,000 lbs. When fully loaded, the weight of the bus can be around 20,000 lbs. The passenger door on a type C is placed behind the front wheels. **The Gross weight rating for a type C** is over 10,000 lbs and typically between 23,500 to 29,500 lbs. and its wheel base is 20-22 feet.

7) The **Type D** bus, also known as the 'Transit Style Bus' **is designed to carry more than 80 passengers.** Most transit buses are 35-45 feet in length and are approximately 9-11 feet high. They weigh about 14,000 lbs. A fully loaded transit style bus can be around 24,000 lbs. The engines on type D transit buses can be located at the front OR rear of the bus, depending on the buses manufacturer and design. One major difference between a conventional and transit bus, is that **the passenger door on a transit is placed AHEAD of the front tires.** The Vehicle Gross Weight rating is more than 10,000 lbs and typically between 25,000 to 36,000 lbs. and it's wheel base is 22 to 24 feet.

8) The wheelbase determines the bus's turning radius as well as the tail swing of the bus. This is why it is important to understand and practice driving techniques in different types of school buses.

9) There are several reasons to know about the different types of school buses and their classifications. By doing so, you will have an understanding of the bus's capabilities and limitations.

## General Characteristics of a School Bus

10) You should have a clear understanding of the general characteristics of the bus you are driving. Of course we don't have the time to cover every type of school bus and every design within those types. However, you will see that there are similarities in all types of buses that you should know about.

11) When looking at the exterior of a school bus, you will notice several items to be aware of. Not for the sake of simply knowing where they are, but also their general functionality and what you should mechanically watch for when doing your daily pre trip inspection. By knowing the items on your bus, it will be easier for you to recognize a problem when on the roadway, or even better yet, before you leave the bus yard.

12) Every school bus will be equipped with the bus driver's most helpful safety tool, the mirrors. **Mirrors** will come in all shapes and sizes, as well as designs. The configurations for mirrors will differ from bus to bus. However, their primary function is the same.

13) Also, at the front of the bus, there will be access to the **windshield wiper fluid**. It is important to check wiper fluid daily. You would not want to be out on the road with heavy dirt on the windshield and no way to clean it off.

14) Every school bus will have **fuse boxes**. Fuse boxes supply electricity to the bus. The location of fuse boxes on different types of buses will be different. Regardless, it will be important to know where the fuse boxes are for the bus you are driving.

15) **Storage compartments** are usually located on the exterior of the bus. They are used to store equipment for sporting events and/or items for field trips. Some districts will store their emergency triangles and snow chains amongst other bus related items in the storage compartments as well.

16) The **battery compartment** is located on the outside of the bus as well. The battery compartment should be checked during your pre trip inspection. **You should be on the lookout for loose or frayed wires**. You should also check for any corrosion around the battery posts. If you see damaged wires or corrosion, you should let your mechanics know immediately.

17) **You should also know where the engine compartment on your bus is located.**

Most type A, B, and C buses are going to have the engine compartment at the front of the bus. Conventional style school buses will have the engine up front, under their nosed hood. Transit style buses will have the engine compartment in the front OR rear of the bus, depending on the vehicles design.

18) Not every bus is going to have the exact same design. This is also true of the buses **interior**. Although the items in the bus's interior may be similar, their placement will vary from bus to bus and different manufacturers design. **When it comes to the toggle switches, controls, steering wheel, transmission and other buttons and switches, you should take the time to study the ones for the bus you will be driving.**

19) The different types and designs of school buses are so much the same, yet, so individual at the same time. You should always take the time to familiarize yourself with the bus you will be driving. And as mentioned earlier, it never hurts to know as much as you can about the other types of buses you may eventually end up operating.

## **Undercarriage and Component Parts**

20) Knowing your school bus can make all the difference in the world when faced with mechanical issues. By knowing where the major items are on the bus, you will be able to diagnose mechanical problems better than if you knew nothing about it at all.

21) Although the placement of engine and/or component parts on a school bus may vary on design and bus type, they will primarily have the same engine components regardless of where they are located on the bus.

22) **There are several items in the engine compartment that you should familiarize yourself with.** Not only for their functionality, but also what you should be watching for during your daily pre trip inspection.

23) **Just like any automobile, the engine needs oil to mechanically function.** Wether your district wants you checking the oil or not, it is important to be able to identify where the oil is located. Knowing where the oil and oil pan is located can help you identify if a leak is present during your pre trip inspection. **If your district does want you to check the oil, MAKE SURE to do so with the engine turned off.** Something else to keep in

mind is that if there is an evident oil leak, you would need to report it to your mechanics as opposed to just adding more oil. The mechanic in the video brought up the point; ***If fluids are low, it means they went SOMEWHERE and there may be a bigger mechanical issue looming.***

24) **Belts** are one of the most crucial moving parts in your engine. They drive the alternator, water pump, and the power steering pump, among other things. By visually inspecting belts you can pass along critical information to mechanics about their condition.

25) **The engine should be turned off when inspecting the belts.** When inspecting belts you should check:

- a) their tension (the belt should twist about 90 degrees at the longer sections of the belt)
- b) their overall condition.

26) **Belts will need to be replaced** if cracked, frayed, glazed or showing signs of excessive wear. Noise coming from the belt system is a sign of wear and the smell of burnt rubber can indicate a slipping belt.

27) You will also find the **transmission fluid dipstick** in the engine compartment. Once again, whether you would check this or not, is up to your organization. If you do check the transmission fluid levels, **most vehicles would require you to do so while the vehicle is in the neutral position and is idling.**

28) Something else you should know about is the **power steering reservoir**. You should visually inspect the levels of the power steering fluid and make sure they are where they need to be.

29) In the engine you will also find the **coolant reservoir**. Many buses have a sight glass that you can check coolant levels in. It is important to know where the coolant reservoir is and to make sure the cap is on tight and levels are all good. **It is important to pay attention to your gauges when out on roadways.** If you smell a sweet, boiling scent, this may be an indication that the bus is overheating and you should pull over at a safe location to let it cool. You should then contact dispatch and ask how to proceed.

30) You should also check the **air filter**. Just like the coolant reservoir, many buses have a sight glass that you can observe and will give you an indication about when the air filter should be changed.

31) The engine components that we just mentioned are some of the most typical ones that you would look at to diagnose problems in the engine. We don't expect drivers to be mechanics, but by understanding and applying preventative maintenance and knowing where these items are, you will be able to help mechanics diagnose mechanical problems when they take place.

32) Anytime you see an oil leak, low fluid levels, damaged or worn belts or any other component engine part that you would think is a safety concern, it should be brought up immediately to your mechanics and supervisor. **DO NOT ATTEMPT to drive the bus if you even question a mechanical issue.**

33) Equally important as knowing the major items in the engine compartment, is to understand the undercarriage of your bus. The video does not cover every single item. However, it covers a few of the major items, by knowing their placement, can help you identify mechanical problems while driving and in general.

34) Underneath the engine compartment on the undercarriage of the bus you will find the **oil pan and plug** directly below it. As mentioned earlier, this is where you would be able to see an oil leak if the oil pan plug is loose or damaged. It's important to know where the oil pan and filter are located to identify leaks on or around it.

35) Other major items would include the bus's **transmission and retarder**. As you should already know, applying the retarder to minimize brake wear is an essential part of operating the school bus. Also, if you feel the bus slipping in and out of gear while on the roadway, there's a good chance that the transmission could be the culprit.

36) Many buses also have **automatic snow chains**. If equipped with them, they need to be inspected for securement and you should know when to use them and when not to use them during operation of the school bus.

37) On the undercarriage, you will also find the differential. A **differential** transmits an engine's torque to the wheels. If there is leaking fluid, strange smells, vibrations or other

noises coming from the differential, have a mechanic look at it immediately.

38) Those are some of the MAJOR items you should consider under the bus. Tie rods, braking systems and even where the tie rods meet the axle, are all important parts of the bus which can either affect it's handling or can be the potential for an accident if left unchecked or ignored. **Take the time to study and understand the different types of buses you will be driving. Having a good understanding of these component parts will help to diagnose mechanical issues.**

## **Additional Information and Practices**

39) For you to get a full idea of school bus orientation, is to understand the importance of the mirrors on them. **Mirror adjustment is critical for operation of the school bus.** They are used to back the bus up, observe people and vehicles around the bus and even help aid when making turns. However, they cannot aid a driver in ANY of those aspects if they are not correctly adjusted.

40) **BEFORE attempting to adjust any mirrors, you should adjust your seat first.** Think about it. If you adjust the mirrors and then adjust your seat, you would be changing your point of view to the mirrors. Then they would need to be readjusted again.

41) The most widely used mirrors on the exterior of the bus are the **flat mirrors**. The right and left flat mirrors should be adjusted to see:

- a) Approximately one inch of the side of the bus. All along the side of the bus. (*You can even take a marker and measure the one inch space. This can give you a visual idea of what you should be seeing in your flat mirrors.*)
- b) 200 feet to the rear of the bus.
- c) The rear tires touching the ground.

42) **There are generally blind spots below and in front of each mirror, as well as a blind spot directly behind the back bumper.**

43) The **convex mirrors** are located near the flat mirrors and are used to view the left and right sides of the bus at wide angle. **Convex mirrors DO NOT accurately reflect the size and distance from the bus.** When adjusting the convex mirrors, you should be able to see:

- a) The entire side of the bus up to the mirror mounts.



- b) The front of the rear tires touching the ground.
- c) At least one traffic lane on either side of the bus.

44) The **outside cross-view mirrors** are mounted on one or both front corners of the bus. They are used to see the "danger zone" directly in front of the bus that is not visible by direct vision, and also view the "danger zone" to the sides including the service door and the front wheel area. **These mirrors present an image that does not accurately reflect the size and distance from the bus.** When adjusting cross view mirrors make sure that you can see:

- a) The entire area in front of the bus (*approximately 10-12 feet*).
- b) The front tires touching the ground
- c) The area from the front of the bus to the service door.

45) The **overhead interior rearview mirror**. This mirror is mounted above the windshield in the drivers side area and is used to monitor passenger activity in the bus. You should NEVER use this mirror for backing the bus. However, to adjust it properly, you should be able to see the top of the rear window in the top of the mirror. You should be able to see all of the seating positions as well.

46) Mirrors play a big part when orienting yourself with the school bus. Adjusting them to get the best overall view around the bus is critical.

47) Throughout the video, we have covered a plethora of information pertaining to vehicle orientation of the school bus. Understanding different classes and styles of school buses is important. Knowing the gross vehicle weight rating of different types of buses is equally as important. Understanding what to look for during your pre trip inspection, or while the bus is being operated, can be essential for passing along critical information to mechanics and supervisors. Now, take the time to study up on the vehicle you will be driving. Do your part to try and understand as much as you can about the engine and component parts on the bus. Make sure you properly adjust your mirrors. And of course, stay safe.

## TEST QUESTIONS

1) There are typically 4 classification types of school buses.

**TRUE or FALSE**

2) Gross vehicle weight is the MINIMUM allowable weight when the bus is loaded to full capacity. **TRUE or FALSE**

3) TYPE C School buses are traditionally called a \_\_\_\_\_ bus.

A) Transit

B) Conventional

C) Van Style

D) None of the above

4) The battery compartment is located inside of the bus.

**TRUE or FALSE**

5) Belts are one of the most crucial moving parts in your engine.

**TRUE or FALSE**

6) If your district wants you checking the oil level, you should do so with the engine off.

**TRUE or FALSE**

7) If you smell a sweet, boiling scent, this may be an indication that the bus is overheating.

**TRUE or FALSE**

8) You should adjust your mirrors before adjusting your seat.

**TRUE or FALSE**

9) The flat mirrors should be adjusted to see 2 inches of the side of the bus.

**TRUE or FALSE**

10) The cross-view mirrors should be able to see 10-12 feet in front of the bus.

**TRUE or FALSE**

## **ANSWER KEY**

- 1) TRUE**
- 2) FALSE**
- 3) B**
- 4) FALSE**
- 5) TRUE**
- 6) TRUE**
- 7) TRUE**
- 8) FALSE**
- 9) FALSE**
- 10) TRUE**