

**BRAKE TESTING PROCEDURES
FOR SCHOOL BUS DRIVERS**

Reference Guide and Test

Introduction

The need to maintain, test and rely on brakes is a critical component when pre tripping the school bus. With that being said, every bus driver will need to accurately and meticulously ensure that the brakes on their school bus are safe.

During the course of this training program we will demonstrate many important brake tests, the maintenance of brakes and the difference between hydraulic and air brakes. Also, we will introduce several other aspects of brake safety that will help drivers make sure that the brakes on their school bus are safe and well maintained.

Part 1: The Differences Between Hydraulic and Air Brakes

1) There's nothing more important on any school bus than the braking system. Even if you are spending most of your driving time with a particular type of brake system on your bus, it is a good idea to familiarize yourself with both hydraulic and air brake systems.

2) The **hydraulic brake system** is an arrangement of braking mechanisms that uses brake fluids or other types of fluids to transfer pressure. As the brake pedal is pressed, a pushrod that is attached to the brake pedal exerts force on the piston(s) in the master cylinder. This causes fluid from the brake fluid reservoir to flow into a pressure chamber which results in an increase in the pressure of the entire hydraulic system. This then forces fluid through the hydraulic lines towards the calipers. Then the brake caliper piston(s) apply force to the brake pads. This causes them to be pushed against the spinning rotor, and the friction between the pads and the rotor causes a braking torque to be generated, in turn, this slows the vehicle down.

3) **Air Brakes** are standard equipment on many school buses. Generally, air brakes are used on heavy duty vehicles. Air brakes work by the compression of air. Compressed air activates the brakes and causes the bus to stop.

a) Brakes are applied by pushing gently on the brake pedal. The heart of the air brake system is the compressor, which is often directly coupled to the engine. Once brakes are applied, the air compressor draws filtered air from the atmosphere and forces it into high pressure reservoirs at around 120 PSI. Most heavy duty vehicles have a gauge within the driver's view, indicating the availability of air pressure for safe vehicle operation. Air reservoirs are mounted in various locations and are generally plumbed together with one

way check valves. These reservoirs store the air that is pressurized by the air compressor and stand ready when called upon to supply air to various brake chambers.

b) Air Brake systems are not all built the same, however the principles of how they function are pretty much the same.

Part 2: Brake Testing Procedures

HYDRAULIC BRAKE TEST

1) In the video, we show the hydraulic brake test consists of the following procedure. With the engine running, apply firm pressure to the service or foot brake pedal and hold it for five seconds. The brake pedal should not move during this 5 second interval. And if it does, this may indicate that there may be a problem.

a) During the video we show a driver applying the brakes with 3 pumps, then holding the brake pedal down for 5 seconds. The warning light did not come on during that 5 second time period. This means that this part of the test was concluded successful.

b) We show the second part of the hydraulic test by moving the vehicle slowly forward and applying the brakes firmly. *You should be moving approximately 5 MPH.* During this test, make sure the bus doesn't pull from side to side or display any unusual characteristics such as a delayed stopping action.

2) Always take the time to do a proper brake test with the hydraulic brake system of the bus. And, if you have any additional questions, bring them up to your supervisor.

AIR BRAKE TESTS

1) Unlike the hydraulic brake system, air brake systems require a more in depth system check. Air brake safety devices may vary. However, the following procedures are designed to make sure that all safety devices operate correctly. Keep in mind that brake tests on buses with air brake systems are a complicated issue.

2) Safety procedures usually require the bus driver to use wheel chocks during the air brake check.

3) Here are the types of tests that must be conducted on a typical air brake system:

a) The **Governor Cut in/Cut out test** is to make sure that the governor is applying or cutting off air pressure to the air reservoir tanks as needed. The test takes place with the drivers monitoring the gauges to show air tank levels. The P.S.I. (*pounds per square Inch*) should not fall below 85 P.S.I. or rise above 135 P.S.I. The driver gives applications by holding the brake for 5 seconds at a time until air pressure has dropped. A successful test will show that the P.S.I did not drop below 85 or rise above 135 P.S.I.

b) The **Static Air Loss test** is designed to detect leaks and make sure that there is no air in the spring brake chambers. When testing the air tanks, the P.S.I can't increase by more than 2 P.S.I. If it does, this means the bus has failed the static air test. The test begins by applying the spring brake, then monitoring the air tank gauges for one minute. We demonstrate that the needle on the gauge stays static with no movement. This means there is no air loss from the air tanks.

c) The **Applied Air Loss test** is designed to make sure the pressure in the spring brake chamber is present. To do this test, the driver should monitor the brake chambers to see if there is any air loss. *First*, release the spring brake. Then look for the initial loss in air pressure. Next, apply a full application to the service brake and monitor the gauges for a full minute. If there is no loss in air pressure the test is concluded successful.

d) The **Low Pressure Warning Alarm test** is designed to warn bus drivers that there may be an issue with the air brake system. The purpose is to slowly exhaust the air from the service tanks until the **low air buzzer and warning light comes on**. The test begins by turning the key to the on position. Then, pump the service brake to lower the air pressure in the front and rear service tanks. The low air light and buzzer will activate at no lower than 60 P.S.I. (*In the video, we show the low air light and buzzer come on at approximately 70 P.S.I.*)

The last step in the test is for the driver to apply the spring brake and restart the bus. The driver should let the air build back up to about 100 P.S.I. The driver should then make

sure the air brake system and anything that is operated by it has enough air pressure to operate the bus.

e) The **Service Brake test** is designed to show you problems that you otherwise wouldn't know about until you would be required to engage the brakes on the road. With this test do the following. Wait for normal air pressure and release the parking brake, then move the vehicle slowly forward and apply the brakes firmly using the brake pedal. If the vehicle pulls to one side, has an unusual feel, or there is a delayed stopping action, get in touch with your bus mechanic so he can fix the problem.

f) For the **Spring Brake test**, release the spring brake and have the bus roll forward very slowly. Then apply the spring brake to make sure it will stop the bus and hold itself in place

4) It is important that you understand the basic functions of both hydraulic and air brake systems as well as the correct procedures for brake tests. And remember to ask questions or bring up potential brake test issues with your supervisor.

Part 3: Early Warning Signs, Inspection and Maintenance

1) As previously mentioned, if you feel the bus pull to one side or the other, it is a clear indication that there is something wrong with the brakes. This could be caused by a number of factors within the brake caliper system; for example rotors, and or the brake shoes on the bus may not be working properly and need maintenance. Also, if there is an unusual feel, or a delayed stopping action, when applying the brakes, it is also an indication that there is a problem with the brakes.

2) Another way to recognize potential brake problems is by listening. We give an example of this in the video by showing a bus in which the brakes are squeaking very loud when coming to a stop. It may be that the brake pads are worn out on the bus and the brakes are literally rubbing metal to metal, making it extremely unsafe to drive. Or the noise you hear can simply be dust that has gotten between the brake pads and rotor. Nevertheless, your motto as a bus driver should always be 'better safe than sorry'. If you hear any suspicious noise while braking, be sure to have it looked at.

3) It is helpful if you have a basic knowledge about how to inspect and maintain brakes. Knowing what to look for will help the bus driver identify potential brake issues. It also may help the mechanic get a heads up on the immediate problem.

4) Make sure that all the warning lights on the bus work. If there is a problem with the bus and the warning lights or buzzer do not come on, their can be potential for an accident. So take the time to make sure all of the bus's warning lights and warning buzzer are working properly.

5) Throughout the video, we covered several issues concerning the braking systems on the school bus. We have given the differences and a basic breakdown of both the hydraulic and air brake system. We have also given procedures for testing these systems. In addition, we have shown ways to identify issues with the brakes and the importance of inspecting and maintaing them. However, it is up to you, the individual bus driver to remain pro active. Take nothing for granted. A bus in which the brakes have been closely inspected, tested and maintained can be the difference between a safe ride home or a potential problem with serious consequences. Stay alert to any identifiable problems with the brakes and always err on the side of caution. Stay Safe.

Test Questions

1) Brake tests are only necessary if you think there may be a problem with the brakes.

TRUE or FALSE

2) Air brakes work by:

- a) The transfer of fluids
- b) The compression of air
- c) Pressing the service brake
- d) None of the above

3) With the Hydraulic brake test you should hold the foot pedal for _____seconds and make sure the pedal does not depress or the lights do not come on.

- a) 1 second
- b) 3 seconds
- c) 5 seconds
- d) None of the above

4) Hydraulic brakes are not as complicated to test as air brakes are.

TRUE or FALSE

5) Hydraulic brakes work by the transfer of fluids

TRUE or FALSE

6) You should use wheel chocks during the air brake test.

TRUE or FALSE

7) The air governor is the brains of the air tank system.

TRUE or FALSE

8) With the static air test, the P.S.I can't increase by more than _____P.S.I.

- a) 1
- b) 2

c) 3

9) The low air light and buzzer will activate at no lower than 60 P.S.I.

TRUE or FALSE

10) Knowing additional information about the bus's braking systems are not relevant because the mechanics will always be there to catch the problem.

TRUE or FALSE

ANSWER KEY

1) FALSE

2) b

3) c

4) TRUE

5) TRUE

6) TRUE

7) TRUE

8) b

9) TRUE

10) FALSE