

# **Safe Braking on the School Bus**

(Safe Braking Practices and Techniques)

Reference Guide and Test

by Video Communications

## **Introduction**

School bus drivers already know how important the brakes are to a school bus. But, consider this: if you don't understand and follow braking practices and techniques, it can lead to a dangerous situation. The video covers these practices and techniques. The video also covers the importance of speed and stopping distances. And it goes over how perception and reaction time play a major role when braking. The video also emphasizes the affect weather has on the braking systems on school bus's and additional issues. The guide throughout the video is Martin Ward, A C.E.O. and Safety Training Supervisor at Mid-Placer Public Schools Transportation Agency.

## ***Part 1: Safe Braking Practices and Techniques***

- 1) Bus drivers must keep in mind the importance of applying brakes accurately. The correct techniques for doing so can reduce the chance for a serious accident. Stopping a school bus smoothly and within the limits of safety is the sign of an experienced driver.
- 2) School bus drivers must have their vehicles under control at all times. An important concept that we refer to in the video, is the relationship between the speed the bus is traveling and the weight and size of the bus.

### **Differences Between Hydraulic and Air Brake Systems**

- 3) In the video, Martin explains the differences between hydraulic and air brakes. The primary difference is that hydraulic brakes are pressurized by liquids and air brakes are pressurized by air.
  - a) Hydraulic braking systems are smaller and simpler than air brakes. When braking with hydraulic brakes, the brakes work instantaneously. The reduced delay and shorter stopping distances provided by hydraulic brake systems, result in safe vehicle operation. Because of it's immediate stopping ability, you should always be looking ahead for potential stops and be sure to apply the brake gently.
  - b) Air brakes have an added delay when the brake pedal is applied. This is due to the time it takes for the air to flow through the lines to the brakes. And this can take up to a half second. When braking with air brake systems, the driver should push the brake pedal down and hold it in place until the vehicle comes to a smooth stop.

4) When braking, the driver should always keep the bus in a straight line; at the same time the driver must remain aware that it may become necessary to turn the bus, if that becomes a necessity.

### **Proper Seat Adjustment**

5) In the video, Martin explains to his trainee the importance of body position and comfortability while driving.

- a) Your hips, knees and ankles should all be at a 90° angle.
- b) You should be able to comfortably reach the acceleration and brake pedals.
- c) Hands should be at the 10 and 2... or.....the 9 and 3 positions.
- d) Thumbs should be positioned out.
- e) And arms should almost be horizontal with a slight bend in the elbow.

### **The Importance of Signs**

6) Be mindful of signs to warn you of upcoming stops or slow downs. This can include: curved roads, stop signs ahead, railroad crossings, steep downgrades and more. Make sure to always pay attention to warning signs and road markings to warn you accordingly when braking on the bus.

### **Service Brake Check**

7) In the video, Martin has the bus driver do a couple of service brake checks not only to check the brakes, but also so the driver gets used to the brakes in the bus she is driving.

### **The Basics of Braking**

8) When applying brakes in a school bus, whether it is hydraulic or air brakes, there is a general braking technique that should be followed. You should use your right foot when braking. Also, a school bus is much heavier than smaller vehicles and requires the driver to begin braking sooner in order to stop smoothly.

### **Smooth Stops**

9) In the video, martin gives a demonstration of how to bring the bus to a smooth stop. He does this by reducing pressure on the brake pedal ever so slightly, just before coming to a stop. After martin gives the demonstration, he has the driver bring the bus to a smooth stop. Try to avoid sudden stops, not only for the safety of your passengers, but for vehicles that are following your school bus

**10)** An experienced driver anticipates stops well ahead of time. This increases the margin of safety and in addition, by not needing to apply too much pressure, this means that less wear will occur on the brake shoes.

## ***Part 2: Speed, Perception, Reaction time and Following Distances***

**1)** One of the first things you must realize is that you are driving a vehicle that can be up to 40 feet long and can weigh as much as 10 tons. This is much different than stopping a typical automobile. Stopping a vehicle so large and heavy can pose challenges to drivers.

**2)** *Stopping distance is the distance required for a vehicle moving at a specified speed to come to a complete stop.*

### **The Affect of Speed**

**3)** Speed plays a major effect on stopping distances. For instance, when you double your speed, it will take about four times the distance to stop. The effect that the vehicles weight has on stopping distance is that the brakes have to work harder to stop a heavier vehicle. That is why it's crucial to drive a bus slower whenever the situation warrants it. The faster the bus goes, the harder it is to stop.

**4)** The weight of a school will never change, but the driver by controlling speed can reduce the chance of an accident when reduced speed allows safe braking to occur.

### **Stopping Distance**

**5)** Typically three things that add up to total stopping distance. These are: perception distance, reaction distance, and braking distance. Add these up and you have your total stopping distance. With air brake buses you would also need to add air brake lag distance for the 1/2 second that it could take for the air to reach the brakes.

**a) Perception distance** is the distance your vehicle travels from the time your eyes see a hazard until your brain acknowledges it. With an alert driver this is approximately 1 second.

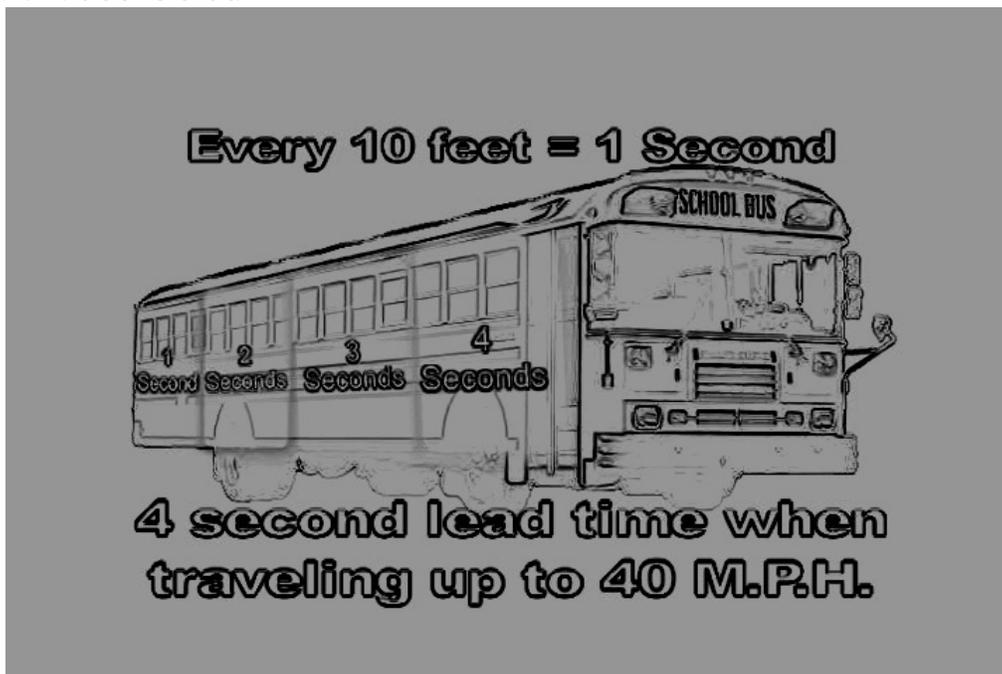
**b) Reaction distance** is the distance a vehicle travels after the hazard is recognized and until the brakes are applied. For an average driver this will take approximately 1 second.

**c) Braking distance** is the distance it takes to stop once the brakes are applied. Braking distances are set by the speed you may be traveling at, road conditions and the weight of the vehicle.

### **Tailgating and Following Distance**

1) A frequent cause for many traffic accidents is tailgating. Following too closely reduces your ability to properly look ahead and leaves little room to safely maneuver around hazards. However, there is a nice technique that you can use to establish safe following distances for your bus. The practice has been shown to dramatically reduce the risk of collision, and also the severity of an accident, should an accident occur.

2) **Following distances** are determined by the length of the vehicle you are driving. The standard that is often used to determine safe following distances is that for every 10 feet of length add 1 second when traveling up to 40 mph. You would add an additional second for every 10 M.P.H. above that.



3) In the video we give several examples of how to apply this formula. We use a 40 foot bus, traveling in ideal conditions at 55 M.P.H. This would be 4 seconds for the 40 feet of bus and an additional second and a half to two seconds for the speed being traveled. So, according to the formula, in a 40 foot bus and traveling at 55 MPH, your total following distance should be at about 6 seconds.

4) To utilize this technique effectively, you would first pick an object on the side of the road. This will be your reference point. When the vehicle you are following passes this object, you would begin to count. Mentally count, one one thousand, two one thousand and so on. If your vehicle reaches the fixed object before you finish counting, which in this example given in the video, is roughly six seconds, you are following too closely and must increase your following distance.

5) It is important to always scan the area and look ahead for curves and other obstacles. This will allow you to safely adjust your speed. If you take a curve too fast, you can lose traction and skid off the road or the tires will lose their traction and the vehicle could roll over. Anticipation and proper use of the brakes can eliminate this concern. And don't forget, always brake early when headed into a curve and look ahead and anticipate the conditions in front of you.

6) It is also important to keep in mind that weather and road conditions can also play a factor. When road or weather conditions deteriorate or when speed increases, then your following distance must increase. You can use this formula to maintain safe following distances. If you are following vehicles properly, it allows you to safely maintain adequate stopping distances. Take the time to practice these formulas with the bus you are driving.

### **Part 3: Weather, Road Conditions and Additional Issues**

1) Each time a school bus driver applies their brakes they should keep in mind the condition of roadway surfaces. Poor road and weather conditions affect the bus's total stopping distance. When attempting to brake in these types of conditions, the driver must match their speed to the quality of the road surface in order to safely brake the bus efficiently.

#### **Road Conditions**

2) You can't steer or brake a vehicle unless you have proper traction. Traction is friction between the tires and the road. It will take longer to stop and it will be harder to turn without skidding when the road is slippery. You must drive slower to be able to stop in the same distance as on a dry road. Wet roads can double the stopping distance. It is recommended when driving in these types of conditions to reduce speed by about one third. So if you are driving at 55 MPH and a heavy rain starts to come down on the roadway, you should slow from 55 mph to approximately 35 mph on the wet road. On packed snow or in icy conditions, reduce speed by half, or more.

3) Sometimes it is difficult to know if the road is slippery. Be especially careful when the temperature is close to 32° F since that is the temperature when water freezes and ice can form on roadways making them extremely dangerous to brake on. And another issue to keep in mind when driving in these types of conditions; shady parts of the road will remain icy and slippery long after open areas have melted.

### **Driving at night or in Low Visibility**

4) When driving a school bus in low light or at night, you should always be able to stop within the distance you can see ahead of you. At night, low beams let you see about 250 feet ahead. During the day, fog, rain, or other conditions may require that you slow down to be able to stop in the distance you can see. You must increase your following distances in these types of situations so you will be able to have time to stop the bus smoothly and safely.

### **ABS on School Buses**

5) ABS stands for Anti-Lock Braking System. When you brake hard on slippery surfaces without ABS, your wheels may lock up. This may cause you to skid or even spin the vehicle. ABS helps to avoid wheel lock up and maintain control of the bus. Were not saying that you will be able to stop any faster with ABS, but it should allow you to steer around an obstacle while braking, and avoid skids caused by over braking. When you drive a vehicle with ABS, you should brake normally. Use only the braking force necessary to stop safely and stay in control.

### **CLOSING**

This video covers several issues pertaining to the use of brakes on the school bus. The video demonstrates the differences between different types of braking systems. In addition, the video thoroughly demonstrates basic braking techniques. It also gives examples of the importance of speed, reaction time, perception and stopping distances. Don't forget to practice this formula in order to maintain safe distances from vehicles you are following and, allow yourself plenty of stopping distance. And remember stay safe!

## **Test Questions**

1) *The size and weight of the bus causes the bus to take more time to brake when coming to a stop.*

**TRUE or FALSE**

2) *Hydraulic brakes are pressurized by:*

- a) **air**
- b) **liquid**
- c) **gas**
- d) **None of the above**

3) *Seat adjustments are strictly for mirror use and have nothing to do with brakes.*

**TRUE or FALSE**

4) *Stopping distance is determined by:*

- a) **Perception Distance**
- b) **Reaction Distance**
- c) **Braking Distance**
- d) **All of the above**

5) *Each ten feet of school bus is equivalent to \_\_\_\_\_*

- a) **1 Second**
- b) **2 seconds**
- c) **3 seconds**
- d) **4 seconds**
- e) **None of the above**

6) *You can use a counting technique to maintain adequate following distances.*

**TRUE or FALSE**

7) *If you are traveling at 55 M.P.H. and it starts to rain on the roadway, you should adjust your speed from 55 M.P.H. to approximately \_\_\_\_\_*

- a) **50 MPH**
- b) **45 MPH**
- c) **40 MPH**
- d) **35 MPH**

**8)** *You can bring the bus to a smooth stop by reducing pressure on the brake pedal ever so slightly, just before coming to a stop.*

**TRUE or FALSE**

**9)** *At night, low beams let you see about 250 feet ahead.*

**TRUE or FALSE**

**10)** *When you brake hard on slippery surfaces you may skid or even spin the vehicle.*

**TRUE or FALSE**

## **ANSWER KEY**

- 1) TRUE
- 2) b
- 3) FALSE
- 4) d
- 5) a
- 6) TRUE
- 7) d
- 8) TRUE
- 9) TRUE
- 10) TRUE