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# SERIES 3.1 Defensive Driving

## INTRODUCTION

This series is designed to give you the information you'll need to become a "Professional School Bus Operator". In order to do this you not only need the information but also a great deal of practice. By continuing to improve our driving skills, all road users will benefit. We will cover all elements of "Defensive Driving" and basic driving techniques.

The definition of Defensive driving according to the Canada Safety Council is:

"Defensive Driving is driving to prevent collisions in spite of the incorrect actions of others and adverse conditions."

Traffic collisions in Canada are a serious problem. Whether or not you have been involved in a collision it's the consequences that still affect you. The facts are staggering:

- Each year Canadians are involved in 650,000 motor vehicle collisions! (That is 1,781 collisions per day or 74 collisions every hour)
- Approximately every three hours someone dies in a traffic collision. That's almost eight people killed every day!
- Each year approximately 3,200 people are killed in traffic collisions!
- In the province of BC, during a one-year period, the insurance industry paid out \$1.9 billion in claims and adjustment costs under the provisions of private passenger car policies alone – more than \$5,200,000 per day!
- One out of every three people living today will be involved in a crippling or fatal traffic collision during their lifetime.

These figures are appalling, but there is hope. Many organizations and individuals are attacking the problem in various ways. By improving your knowledge and skills you can be part of the solution and hopefully avoid contributing to these statistics.

Studies have shown that the average driver is capable of driving at least twice as safely as they currently do. No one driving today can afford to drive at half of their potential.

- S** **SEE** what is going on around you...to the front, the rear, the left and right. Don't forget about overhead traffic signals or overhanging objects and the road surface beneath your vehicle.
- A** **ANALYZE** what you have seen. For example, don't just "see" children playing beside the road, analyze this information and recognize the potential hazard that exists should a child dart into your path. Remember, you are not an observer – you are an active participant.
- F** **FIND** the way to avoid any hazard should the situation actually happen. To do this requires you to know what is happening around you as you do not want a plan which creates a second danger as you escape from the original hazard.
- E** **ESCAPE** by putting your plan into action should the dangerous situation develop.

## THE PROFESSIONAL OPERATOR

While a properly maintained vehicle is a very valuable tool in the prevention of collisions, the most influential factor is the operator. It is the operator's knowledge, skills, habits, attitudes and physical and mental condition that determines the majority of collisions and similarly, most collision avoidance.

How can you become a "Professional Operator"? It really involves no magic, but it does require a conscious effort until you have trained yourself to respond in an automatic manner.

- **Identify** – You must be able to identify any potential hazards or dangerous situations.
- **Predict** – Predict what may happen next and all the possibilities.
- **Decide** – Which course of action you may need to take in order to avoid a collision.
- **Execute** – Put your plan into action.

It is important that you remain alert and consciously search for hazards as you drive. Both your survival and that of your passengers depends on your ability to identify the clues that indicate a potential or real hazard. Most people continually go through the mental process of practicing the “Basic Collision Prevention Formula” subconsciously while they’re driving. However, there is a tendency for minds to wander and daydream and the process stops. By practicing the formula, your mind will stay focused longer and you will have developed an important tool for maintaining mental alertness.

## SIX CONDITIONS AFFECTING DRIVING

There are six conditions in any driving situation and your ability to adjust to any of them may prevent or create a collision.

- |                       |                       |
|-----------------------|-----------------------|
| 1. Light Conditions   | 4. Traffic Conditions |
| 2. Weather Conditions | 5. Vehicle Conditions |
| 3. Road Conditions    | 6. Driver Conditions  |

### 1. Light Conditions

- Overdriving your headlights at night. The average headlights are only capable of illuminating the highway for approximately 100 metres. Consequently, if you drive more than 80 km/h at night, it is unlikely you will be able to stop in time should you suddenly have to.
- Headlight glare at night. The human eye takes about seven seconds to recover from headlight glare and at 80 km/h, you would travel 160 metres in those seven seconds.
- Sun glare in the morning or late afternoon, or glare from a bright winter day. Sunglasses and a clean windshield are essentials for a professional operator.

### 2. Weather Conditions

- Driving rain, snow, sleet and fog all contribute to loss of vehicle control. These conditions can be dangerous because they affect other road users as well. Reduce your speed, drive with your headlights on and, if conditions are too bad, don’t drive at all.



### 3. Road Conditions

- Curves, gravel, valleys and hills all limit the speed at which you can drive.

### 4. Traffic Conditions

- Many run-off-road collisions probably reflect the deliberate choices of some “escape artists” who took a chance once too often. The defensive operator looks far ahead, anticipates traffic situations, uses good judgment and avoids getting into tight spots in the first place.

### 5. Vehicle Conditions

- Bad tires blowing out at high speeds
- Bald tires unable to grip the road when needed
- Defective brakes, poor steering, etc.

### 6. Driver Conditions

- Physically you are very dependent on your vision directly ahead of you as well as around you. Using your peripheral vision, you can see the “big picture”. Keep your eyes moving to scan the road ahead, behind and to the sides. Every 3-5 seconds, check your rear view mirror for any vehicles that may be following or trying to pass.
- Focusing your attention on your driving, although sometimes difficult, is imperative to your ability to avoid collisions. Your attention needs to be on the task at hand and void of personal distractions. Make sure you are well rested before beginning your trip.

- Driving under the influence of any medication can affect your driving ability. When prescribed, ask your physician what effect, if any, your medication may have on your ability to drive.
- Alcohol in any amounts will impair your ability to drive. Many employers in Canada forbid employees from driving within 12 hours of consuming any alcohol.

Each of these conditions is critical on its own. However, you will seldom encounter a situation with one of these conditions on its own, they tend to be grouped together, compounding the effect. It is important that you learn to recognize when any or all of these conditions are adversely affecting your driving and adjust your driving behavior accordingly. This may mean not driving at all until after the condition has improved.

What can you do to make sure that these conditions don't surprise you? At a very minimum, you attempt to anticipate the conditions you are likely to encounter during your drive. "Take a Pre-Trip Mental Inventory". Before you start, sit behind the steering wheel for a minute or two and run through a mental checklist.

### **PRE-TRIP MENTAL INVENTORY CHECKLIST:**

Driver Conditions:

- Am I fully rested?
- Free from alcohol or other drugs?
- Feeling fine and not ill?
- Am I able to concentrate on driving?
- Is my attitude courteous, careful and considerate?

Vehicle Conditions:

- Under the hood?
- Exterior?
- Interior?

Conditions of the Environment:

- Light?
- Weather?
- Road?
- Traffic?

After you've answered these questions appropriately, you have mentally prepared yourself for the driving conditions you could encounter on the trip ahead.

How does one become a defensive operator? Once again - no magic, but it does require a conscious effort to follow and practice the basic collision prevention formula, which is to:

1. Recognize the hazard;
2. Understand the defense; and then
3. Act in time.

Virtually every driving situation has potential hazards and in order to protect yourself, it is not enough to know what you are doing. You must be aware of what is developing around you. The actions of others, the condition of the roadway, parked cars, visibility, etc., are all part of that development. Far too often we are lulled into a state of relaxed well-being when we drive and our attention wanders. In this state we can easily miss detection of a hazard. When this happens, an easily avoided problem can rapidly become a full-blown emergency.

It is important that you remain alert and consciously search for hazards as you drive. If you consciously practice hazard detection, you will soon develop the habit and become an "automatic hazard detector".

### **ELEMENTS OF DEFENSIVE DRIVING**

In order to successfully avoid collisions, the professional operator requires a high degree of knowledge, alertness and foresight and must exercise judgment and skill in executing the "action plan".

#### **Knowledge**

A great deal of knowledge about driving can be acquired through experience, but experience is not necessarily the best teacher as bad habits develop and are hard to break. Traffic safety experts are convinced that knowledge of driving should be acquired through a planned program, such as the one you are taking now.

**Alertness**

Alertness is the habit of keeping one's attention focused on driving and free of distractions. It includes the attitude of detecting hazards and the ability to avoid collisions. Being fully alert requires the use of vision, touch, smell and hearing to receive and interpret various messages. Mental alertness can be developed consciously and is improved with practice.

**Foresight**

This is the ability to anticipate and prepare for most eventualities. It consists of being able to assess traffic situations, as far ahead as possible, to anticipate how they are likely to develop and to decide whether or not what develops will present a hazard.

**Judgment**

Good judgment implies recognition of the alternatives present in any traffic situation and the ability to arrive at a wise choice in time to avoid a collision. It is dependent on knowledge and experience and also intangibles such as common sense and intuition.

**Skill**

Skill is the ability to manipulate the controls of the vehicle to successfully perform basic traffic maneuvers such as turns, passing, reversing, parking, etc. There is a correct way to do each of these. Skill is developed through learning how to do them the right way and doing them the right way every time.

**Good Habits**

This means that you have consciously practiced the correct procedure to the point where you subconsciously do it right every time. Correct performance has become instinctive. Good visual habits, for example, are one of the most important tools available to the defensive driver.

**THE PERFECT OPERATOR**

You may be safe in thinking that perfect driving is not possible, but let's consider what perfect driving means. The professional operator knows that perfect driving is achieved by having one perfect trip at a time.

A perfect trip is any trip characterized by the lack of one major trait: errors. Error avoidance is the key to perfect driving. There are several types of errors that may occur on any given trip.

**Collisions**

Both in terms of human lives and dollars, this can be the most serious error.

**Traffic Violations**

To have a perfect trip you must obey the law and drive defensively. A safe and professional operator has thorough knowledge and understanding of all traffic laws and general rules of safe driving. The rules of the road may also change from time to time and it is expected that a professional operator will know and be aware of these changes. Operators' manuals are available from any motor vehicle licensing agency. Along with the basic laws of the road, which apply to all drivers, professional operators must obey all additional laws which specifically governs the operation of their vehicle.

**Vehicle Abuse**

Vehicle abuse can lead to excessive wear and tear of the vehicle to the point where it is unsafe to operate. An inexperienced, untrained or careless driver can shorten the life of a vehicle drastically by not performing pre-trip inspections, braking excessively etc. With the cost of new vehicles, it is only common sense to drive in such a manner as to prolong the life and condition of the vehicle.

**Schedule Delays**

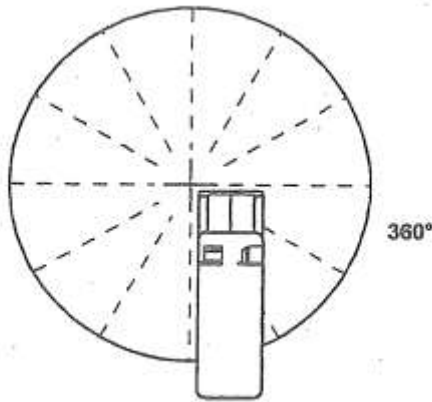
Being punctual involves planning to be punctual. You cannot make up for lack of planning by trying to make up time on the road after the fact. Failing to adhere to a schedule when driving school bus can cause a variety of problems for you and others.

**Discourtesy**

No perfect trip can contain a discourteous act. Most acts of discourtesy involve at least some degree of risk and can lead to other motorists becoming hotheaded. This, in turn, creates a potential hazard.

## ZONE OF AWARENESS

Many drivers are content to limit their awareness to the things they can observe by looking through the windshield, with an occasional glance in their rear view mirror for good luck. A defensive operator however, realizes a hazard can develop from any angle and that the zone of awareness must include a full 360 degree circle around the vehicle as well as above and below the vehicle.



While most hazards will appear from the front, rear or side of the vehicle, more than one driver has lost control by not being aware of the road condition under their vehicle. Similarly, drivers have lost the tops of their campers, buses or trailers in parkades or underpasses. Overhanging eaves, wires or tree limbs may also be a collision point if the driver is unaware.

Remember, the earlier a potential hazard is detected, the more time you have to avoid any problem that develops. Therefore, your zone of awareness should be as wide as possible for the circumstances.

In our zone of awareness there are clues to detect any potential hazards. We can detect these through the use of our senses.

### Hearing

The sound of car horns, train whistles, children playing and the sound of other vehicles braking are all examples of messages we receive through hearing and are possible indicators of hazards. Listening to the sound of our own vehicle can help you identify

maintenance problems that can lead to a collision if left unattended. To gain the greatest advantage of your hearing as a hazard identifier, you must have unimpaired hearing by not playing the stereo or radio excessively loud and the in-vehicle noise should be tolerable.

### Feel

As we drive, our bodies are in contact with various parts of the vehicle, our hands on the steering wheel, our bodies in the seat and our feet upon the pedals. The vibrations caused as the wheels roll over the road surface are transmitted through the vehicle to our bodies. These vibrations can tell us much about the road surface and how our vehicle is "holding" the road.

### Smell

Can your nose really warn you of a potential driving hazard? The answer is yes! The signals tend to be more subtle and you must learn to interpret with more imagination. The smell of burning grass, for example could indicate a vision problem further down the road if heavy smoke is blocking the view.

### Vision

Good vision and good visual habits are essential to safe and defensive driving. Vision can change so gradually that it is easy to be unaware of a vision problem until it is too late. Make it a practice to have an eye examination on a regular basis.

There are two interesting facts related to vision about which you should be aware.

- **Speed of travel**

As your speed of travel increases, there is a corresponding reduction in your peripheral vision. At a standstill, most people, while looking straight ahead, can still see objects appearing to the side without shifting their gaze. This gives us a range of vision covering approximately 180 degrees. At highway speeds, this range of vision is reduced so that the effect becomes somewhat like driving through a tunnel where you still see straight ahead but your peripheral vision is limited.

- **Steering**

We tend to turn toward whatever we look at. We use this tendency to help us drive around curves by focusing our gaze well ahead to the point we wish to reach. If, however, we were to focus our attention on an off-road object ahead, we would find ourselves gradually turning toward that object and if we did not react in time we would drive off the road. For this reason, it is important to keep our eyes moving, scanning the Big Picture.

## Developing Good Visual Habits

Continuously scanning our surroundings on and off the roadway leads to good visual habits. Specifically:

- Focus farther as your speed increases
- In an urban area, view the road ahead one full block
- Focus farther down the road in rural areas than you would in urban areas
- Focus your gaze approximately 12 seconds ahead of your present position
- Scan 360 degrees and shift your gaze continuously including your dashboard instruments and mirrors
- At night when meeting oncoming vehicles with bright lights, shift your gaze well ahead and to the right hand edge of the road
- Use the glare reducing setting on your rear view mirror
- Keep your vehicle windows clean to reduce glare
- Maintain an unobstructed view
- Vegetation, buildings, trees, parked vehicles or any roadside obstruction that obscures vision should be treated as a traffic signal requiring you to stop if necessary, giving you the time to study the situation before proceeding
- Be aware that other vehicles in the adjacent lane may obscure your vision
- Failure to note traffic ahead possibly stopped for a left hand turn

- Urban driving demands a greater need for surveillance due to the greater concentration of traffic
- Traffic controls, congestion and pedestrian traffic on urban roads makes driving more difficult

## Detecting and Interpreting Clues

In our zone of awareness by using our senses, we can detect and interpret clues that may lead to collisions.

### Parked Vehicles

Driving beside parked vehicles is potentially hazardous because your vision is obstructed. Hazards often appear when there is little time or space for evasive action.

Three key sources of hazards are:

1. The space between parked vehicles through which pedestrians and animals may suddenly dart into the street.
2. The parked vehicle may suddenly pull out into your path.
3. Occupants of parked vehicles may open the doors without looking first. Positioning your vehicle at least 1 ½ metres out from the parked vehicle will place it beyond the arc of the door being opened.

Usually there are clues from parked vehicles of impending entry into the lane of traffic:

- Exhaust fumes will indicate the engine is running, ready to go
- Back up lights will indicate the vehicle is in reverse and is often followed by shifting to a forward gear and movement
- Brake lights indicate the driver may be shifting to a forward gear and movement
- Front wheels pointing toward traffic may indicate the vehicle is ready to leave the space or maneuvering to do so
- A person behind the steering wheel may indicate a vehicle ready to leave the space

## Roadway Hazard Clues

Roadway hazards are those that pertain to the condition of the road itself and fall into four categories:

1. Sight distance limitations
2. Maneuvering limitations
3. Traction limitations
4. Traffic conflict points Sight Distance Limitations

These are limitations to your vision caused by curves, valleys or hills and the following precautions should be taken:

- Watch the road ahead for signs indicating a curve ahead
- When approaching a curve, estimate a safe speed of travel, if not posted, from the degree of curvature and banking
- When approaching a downgrade, identify if the grade is steep enough to require downshifting. (Always downshift prior to the beginning of the hill).
- Identify the presence of dips and valleys possibly obscuring another vehicle

### Maneuvering Limitations

Driving a larger vehicle in certain situations can be more hazardous because of the larger maneuvering requirements. Compensate for these requirements whenever you detect:

- Narrow or narrowing lanes
- Roadway construction
- Gravel or dirt surfaces that have been rutted by travel of other vehicles

### Traction Limitations

The defensive operator learns through experience to “feel the road” with the vehicle. Be aware of road surfaces that have:

- Surface irregularities on asphalt and concrete such as potholes, frost heaves, cracked pavement etc.
- Wooden surfaces (such as small bridges) containing cracks, holes and protruding nails
- Washboard condition
- Oil or grease spills
- Snow or ice particularly in shaded areas such as underpasses
- “Black ice” caused by freezing temperatures

### Traffic Conflict Points

Traffic conflict points are those points on a roadway that require vehicles to merge, intersect, cross paths etc. The conflict occurs because two or more vehicles approaching from different directions are “competing” for the same space on the roadway. Examples of such conflict points include intersections, acceleration and deceleration ramps on freeways, parking lots, and merging lanes at bridges and hilltops. Some specific hazards in highway driving are:

- On an entrance ramp, be alert for vehicles stopped or slowing down.
- On a long entrance ramp with an acceleration lane that continues on as an off-ramp or deceleration lane, vehicles may leave the main roadway and cross over to merge onto the acceleration lane. Drivers unfamiliar with the exits may merge at the last moment. (See reference to Weave Zone in “Basic License Driver’s Handbook”).
- When nearing the end of the off-ramp, look for other vehicles that may be stopped or waiting in line at the end of the off-ramp.
- When approaching and passing interchanges on the freeway, note vehicles in the deceleration lane swinging back into the lane at the last moment, without warning.



## Detecting Other Driving Hazards

It is important that you learn to spot a potential hazard and estimate its seriousness, giving yourself enough space and time to take evasive action if the need arises.

### Single Vehicle Hazards

As the name implies, these hazards have been classified as single vehicle because they involve the motion of an individual vehicle. There are many reasons why another driver may present a hazard to you, such as inattentiveness, loss of control or their failure to communicate their intentions to you. The following clues demand that you give the other driver an extra wide berth:

- Frequent lane changes suggests inattentiveness, indecisiveness, fatigue or alcohol impairment
- Frequent speed changes when not required by conditions
- Failure to signal intentions
- Quick, jerky stops as opposed to gradual deceleration when not necessary
- Out-of-province license plates suggest they may be unfamiliar with road conditions and directions
- Failure to adjust to dangerous driving conditions such as icy, slippery roads
- Failure to respond appropriately to your signals of intention (i.e. – overtaking you too quickly when you decelerate for a stop)
- False signals (i.e. – a driver who has been displaying a turn signal with no intention of turning)
- Special vehicles such as tractors, emergency vehicles or vehicles required to make frequent stops

## Multiple Vehicle Hazards

These hazards are typically formed at “traffic conflict points” where traffic converges or intersects and on highways characterized by high volume traffic. Due to the high volume of traffic, hazards are frequently compounded as other vehicles present can restrict visibility. Be alert and adjust your speed accordingly.

### Other Road User Hazards

Driving is made more hazardous by the presence of other vehicles and road users, including pedestrians, cyclists, joggers and animals. In most cases, these other road users won't be out in the main flow of traffic, but their proximity to the road seldom guarantees this. Clues to hazardous situations include:

- Location of the road user relative to the roadway
  - Pedestrians or joggers on the shoulder
  - Cyclists travelling on the road edge or shoulder
- Motion of the road user
  - Pedestrians running toward the roadway
  - Children playing
  - Cyclist approaching from a side road
- Ability to see the road user
  - Pedestrian's vision obscured by umbrellas, trees etc.
  - Driver stepping out from a parked vehicle while your vehicle is in the “blind” spot
- Attentiveness of road user
  - Child chasing a ball
  - Pedestrians engaged in a heated discussion
- Lack of control
  - A motorcyclist turning on a slippery surface

It is important to realize that the various types of hazards discussed above have been categorized for purpose of presentation only. In an actual driving situation, they frequently occur in combination, requiring split-second thinking and action on your part.

## Collision Avoidance

### Commentary Driving

One of the best methods of hazard detection you can practice is “commentary driving”. Commentary driving is a technique where the driver says out loud their main observations and interpretations of the events developing around the vehicle. With regular practice, “real observation” will become habit and you will find it is not necessary to speak out loud but silent observation is just as effective for collision avoidance.

For example:

- “signal light is stale green; oncoming car signaling left; walk light flashed off; pedestrian crossing...”

Commentary driving is extremely useful when practiced because:

- It creates an awareness of the vast number of things a driver should be watching for and thinking about
- It assists in the development of good visual skills and helps the driver resist common distractions
- If done aloud with an instructor, it helps the instructor evaluate progress **and** instructor effectiveness.

You can use commentary driving with the Basic Collision Prevention Formula as mentioned earlier: identify the hazard, predict what may happen, decide on a course of action and execute your action plan. Let’s follow one example all the way through the process of commentary driving:

### Identify:

“Speed is 50 km/h, cars are parked on both sides of the street, no other vehicle traffic is in sight front or rear, there are no side intersections, children are playing ball one half block ahead on the right and road conditions are good.”

### Predict:

“Child could run out onto roadway from behind parked cars.”

### Decide:

“If the child runs out from the right, sound horn, apply brake. Brake suddenly or, worst case scenario, hit the parked car rather than the child.”

### Execute:

“Reduce speed now, preparing to brake.”

This example is fairly simple. Imagine how this situation would have been complicated if there was oncoming traffic, or if a car behind you was signaling its intent to pass. Practicing this approach will better prepare you if a real emergency arises.

## Two-vehicle Collisions:

To this point we have covered detecting hazards and given a few methods to avoiding them. The main emphasis of this section will be avoiding the two-vehicle collision as it is usually the most serious of all collisions.

### Positioning of the vehicles before the collision occurred.

There are only six positions that another vehicle can take in relation to yours, prior to a collision. The positions are:

1. Vehicle ahead
2. Vehicle behind
3. Oncoming vehicle
4. Intersection or angle
5. Another vehicle passing you
6. You passing another vehicle

By studying these six positions, learning the hazards associated with each and the defences against them, you can avoid being in most two-vehicle collisions.

This section will study those types of collisions as well as the mystery crash, the non-collision and run-off-the-road collisions.

### 1. Collisions with the Vehicle Ahead

Why do collisions with the vehicle ahead occur?

There could be a variety of reasons however, they all boil down to following too close. When required to stop you must be able to. And if you drive a larger vehicle, such as a school bus, it will take you longer to bring your vehicle to a full stop than it will the motorist in front of you. Being a good “follower” is one of those key attributes that separate the professional operator from an average driver.

In order to defend against this type of collision you must:

- Stay alert and
- Allow a safe following distance.

For cars and smaller vehicles, the 2-second rule can apply. However, larger vehicles such as school buses should not be closer than 4 seconds to the vehicle ahead.

The 4-second rule works as follows:

- Watch the vehicle ahead of you pass an inanimate object such as a power pole
- Count to yourself:
  - One thousand and one
  - One thousand and two
  - One thousand and three
  - One thousand and four
- If you pass the same object before you finish counting, you are following too close.

There are times though when your following distance should be increased such as:

- When you are following:
  - Oversize vehicles that obscure your vision
  - Dangerous goods carriers
  - Vehicles that stop frequently such as delivery vans, other school buses etc.
  - Vehicles being driven erratically
  - Emergency vehicles
  - Poor road conditions
  - Under conditions that reduce visibility such as fog, snow, smoke etc.
  - Where traffic intersects, merges or diverges

Few drivers are fully aware of the total stopping distance or time it takes to bring a vehicle to a full stop.

Consequently, they make errors in their decisions which, in turn, may result in a collision. There are three factors that determine how long it takes for a vehicle to stop.

They are:

- Perception time
- Reaction time
- Braking time

Perception time is the time it takes for a driver to see a situation and understand that there is a reason to stop the vehicle. The average perception time is approximately  $\frac{3}{4}$  of a second. Perception time and the distance travelled in this time will vary from driver to driver. Less experienced drivers are often slower to realize a danger exists. Also, the distance will vary greatly depending upon the driver’s visual search, level of attention, decision-making capability, degree of fatigue, use of alcohol or other drugs and many other vehicle and/or environmental variables. Reaction time is the time it takes the driver to physically react to a need to stop by releasing the gas pedal and by moving the right foot to the brake pedal. The average reaction time is  $\frac{3}{4}$  of a second. The reaction distance is how far a vehicle travels during the reaction time.

Braking time is how long it takes a vehicle to stop from the time the brake is pressed until the vehicle actually stops. How far a vehicle travels during this time is called the braking distance.

The total stopping distance is the sum of the perception distance, the reaction distance and the braking distance.

## 2. Collision with Vehicles Behind

Tailgaters can create hazardous situations for you. Be aware of any vehicle following too close and allow them to pass if possible. Other ways of dealing with tailgaters can be to speed up to the correct speed limit. If you are already going the correct speed, tap your brakes, slow down to see if they will pass or at the very least, allow yourself more following distance to the vehicle in front of you in case you are hit from behind.

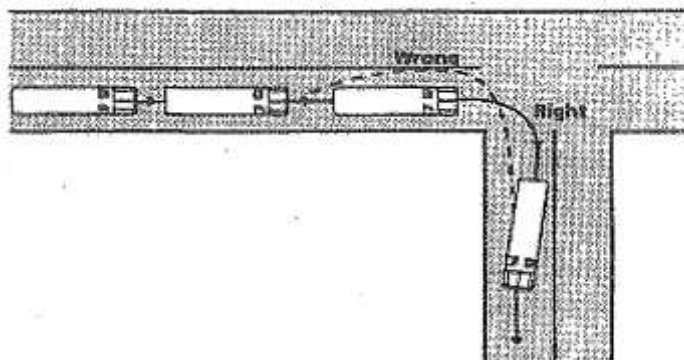
## 3. Collisions with Oncoming Vehicles

One of the first rules of the road we learn is that you are expected to drive on the right hand side of the road. There are times, such as when passing, when it is permissible to venture to the left-hand side, but these are specific instances only. If everyone carefully abided by this rule, there would not be head-on collisions.

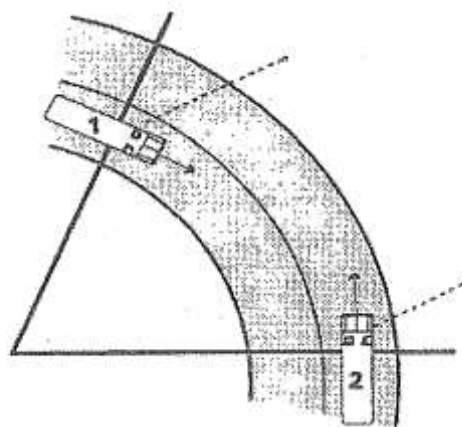
Circumstances do arise in which you or an oncoming vehicle will cross the centre line and find yourselves on the path of disaster. Some of these circumstances are driver caused, but some are not. Being consciously aware of the reasons why a driver would venture into the wrong lane makes it more likely that you will be able to anticipate and avoid the potential collision. There are four reasons a driver would be in the wrong lane:

1. **A problem in their own lane.** Trouble in a driver's own lane such as a construction barrier, animal, pedestrian, bicycle etc. will cause a driver to automatically swing left in order to avoid the problem.
2. **Faulty driving maneuvers.** Through an error in judgement a driver may cut into your lane. For example: making a wide right turn (which may be necessary for larger vehicles), swinging wide to make a left turn at an intersection or

misjudging the distance required to pass a vehicle. If you drive a vehicle with an extended wheelbase, take any additional space needed out of the street being entered.



3. **Centrifugal force on curves.** Centrifugal force is the force that acts on your vehicle to keep it going in a straight line when negotiating a curve. The outward arrows in the following diagram illustrate the centrifugal force acting on the two vehicles.



If driver #1 allows centrifugal force to push him across the centre line, and the oncoming driver overcompensates, a sideswipe or head-on collision could result.

What is the best way to negotiate a curve? Slow down before entering the curve. On right curves, keep the front of the vehicle close to the right of the lane and closely watch the right hand mirror for the position of the rear of the vehicle. On left curves, keep the front of the vehicle to the right of the lane, watching the left mirror. Apply power to the wheels when reaching the middle of the curve as it cuts down the effect of the centrifugal force.

When you apply power to the wheels, you introduce a force in a different direction than the pull of the centrifugal force. The result is greater control.

4. **Loss of Control.** Drivers can lose control of their vehicles for many reasons, including:
- right wheel dropping off pavement and the driver overcompensates in making the recovery
  - loss of visibility, centre line obscured or worn away
  - falling asleep at the wheel, drug or alcohol intoxication
  - tire blow-out, skidding on a slippery surface
  - poor road conditions, potholes

In these instances what can you do to avoid a head-on collision? The next points have been developed for this purpose.

#### **Read the Road Ahead**

Be aware of oncoming traffic and try to anticipate what problems that driver may encounter causing them to enter your lane.

#### **Ride to the Right**

Don't crowd the centre line. Leave plenty of room. If there are two lanes available to you going in the same direction, use the right lane as a matter of preference. To your advantage in this lane, traffic generally moves quicker because vehicles turning right cause less delay than those turning left.

#### **Reduce Speed**

When you see a threat developing, reduce your speed. This means slow down right away and if necessary, sound your horn and flash your lights to let the oncoming vehicle know you are there. By quickly slowing down you allow them the extra time they may need to get back into the proper lane and avoid a collision. Continue slowing down and preparing to stop until the situation clears.

#### **Ride Right Off the Road**

If you have followed the first three steps and the vehicle still keeps moving in your direction, you have only one out left – to ride off the road. This option will probably be better than a head-on collision. If a collision is unavoidable, try to hit the object or vehicle at an angle rather than head-on to lessen the impact. Never try to out-guess the other driver by pulling to the left.

#### **4. The Intersection Collision**

About one-half of all two vehicle collisions occur at intersections. This is largely due to the traffic conflict that exists at intersections both vehicular and pedestrian. Be prepared for the unexpected.

Intersection hazard clues:

- Stale green lights that have been visible for a block or two may change quickly to yellow. Also watch for stale pedestrian walk signals
- Vehicles in the left lane waiting behind vehicles that are turning may become impatient and without warning or signal, swing over into the right lane to get by
- Vehicles that are sitting at a green light rather than continuing on may be waiting for the intersection to clear of oncoming vehicles or pedestrians
- Drivers making turns may signal and move into the intersection and then, without warning, stop.

Negotiating intersections:

#### **Know**

Expect the unexpected. Decide in advance what you need to know at intersections. Your indecision can confuse other drivers and cause a collision. Be prepared to yield at all times.

#### **Show**

Signal your intentions well in advance and be in the correct lane.

#### **Slow**

Slow down gradually, an intersection is not a place for speed. Remember at 25 km/h you cover over 7 metres per second and may use up 5 metres just moving your foot from the accelerator to the brake.

## Go

Get through the intersection without hesitation or by being overly cautious, so as not to confuse other drivers.

It's important to keep in mind that the other uncontrolled locations are considered intersections as well, such as roads that enter onto highways, driveways and alleyways. The distraction from pedestrians, cyclists and animals add additional hazards.

### At **ALL** intersections:

- Never assume that the other driver will yield. Approach each intersection with your foot off the gas and covering the brake.
- As you approach the intersection, look left, then right. Prior to going through the intersection check again left then right.
- Proceed only when safe to do so, even if you have the right of way. You can't count on the other driver always obeying the rules
- Do not change lanes in an intersection
- Never pass a vehicle that is stopped at an intersection until you are sure it is not stopped waiting for a pedestrian to cross. Do not assume a vehicle stopped at the intersection and signaling left is only waiting for oncoming traffic to clear. There may be a pedestrian crossing as well.

### Crossing intersections:

In an urban area the following procedure will help you travel safely through each intersection and will get you into the habit of looking 360 degrees around your vehicle.

- Depending on visibility, take your foot off the accelerator and cover the brake if needed. Prior to entering the intersection, check left then right for traffic indicators and controls, pedestrians and other vehicles. If clear, check again left then right and proceed through safely.

- Once past the intersection check mirrors again for any change in traffic patterns behind you. If you plan to turn at the next intersection, position yourself so you are ready to turn. Look for pedestrians that may be crossing ahead.
- Between intersections, watch for traffic entering your lane from alleys or laneways
- When approaching the next intersection, repeat the procedure

With any intersection, if your visibility is obstructed for any reason, you may be required to stop prior to proceeding.

### 5. Collisions Caused By Another Vehicle Passing You

As an operator, you are aware that many motorists would rather drive in front of you than behind you and some of these drivers will take unnecessary risks such as:

- Tailgating – staying too close behind your vehicle and darting out to make a pass with limited visibility
- Following the leader – a series of cars passing you at the same time, even though the second and subsequent cars have extremely limited visibility

There is potential here for three types of collisions:

- The sideswipe
- The cut off
- Being run off the road

As a defensive driver, you can do much to alleviate the potential hazard and make it easy for them to pass.

If the pass appears to be safe, without creating a hazard:

- Maintain your lane position, either in the centre of the lane or slightly to the right to allow them extra clearance
- Maintain or reduce your speed, avoid the tendency to accelerate

If the passing vehicle cuts in too quickly after the pass, prepare to decelerate, braking if necessary. If the passing vehicle attempts to abort the pass, accelerate quickly to allow them to pull back into the lane safely.

Section 87(c) of the Highway Traffic Act: A driver shall not overtake and pass or attempt to overtake and pass another vehicle by driving in a parking lane (on the shoulder of the road).

## 6. Collisions Caused by you Passing Another Vehicle

Think about passing every time you find yourself in a position to pass and ask yourself, "What will I gain by passing? Is it worth the risk? Is the pass necessary? Will I have to exceed the speed limit to pass?" By consciously asking yourself these questions before you pass, you may find, in most cases, you don't have to pass after all. Passing tends to increase fuel consumption significantly. There is nothing wrong with passing another vehicle so long as it is done where it is safe and legal to do so. The Canada Safety Council advocates a method known as the "11 Points to Perfect Passing".

### 1. Is this pass necessary?

You may not need to pass at all and, rather than take a chance and break the tempo of traffic, it might be better to continue along as you are. Before attempting any pass always ask, "Is this pass necessary?". If the answer is no, then don't pass.

### 2. Do not pass if the lead vehicle is:

- Signaling or otherwise indicating a left turn
- Changing lanes
- Decelerating suddenly
- Passing children, cyclists or animals
- Being passed by another vehicle. Wait until the lead vehicle is finished passing, your visibility is restored and an adequate gap is present
- When the lead vehicle's vision to the rear is obscured by a trailer, open trunk, ice or snow or objects in the rear window
- When the driver of the lead vehicle appears inattentive

### 3. Stay back and maintain a safe following distance

The closer you get to the vehicle ahead, the less you can see. Tailgating in order to pass cuts down on visibility and the lead vehicle may suddenly stop leaving you in a hazardous position.

### 4. Check ahead

If there is another vehicle coming from the opposite direction, you need to decide if you have the time and passing distance you need to get into the left lane, pass the vehicle ahead, and get back into the right lane before this vehicle reaches you.

### 5. Check traffic behind

Use your mirror check and shoulder checking to determine whether or not someone is attempting to pass you before you attempt to pass the lead vehicle.

### 6. Accelerate

Build up to an adequate speed to ensure a safe pass is possible. You can still change your mind at this point.

### 7. Signal left

Use your signal lights to warn traffic behind of your intent. An attentive driver ahead will also see your signal. Shoulder check.

### 8. Move left

Now you are really committed; you are in the passing lane and it is your responsibility to make a safe pass. Ensure you have centered your vehicle in the lane and that you have provided sufficient clearance for the vehicle being passed.

### 9. Check traffic behind

Signal your intention to move back into the appropriate lane, shoulder check and mirror check.

### 10. Move right

Move smoothly back into your normal driving lane, checking your mirrors to be sure that it is safe to do so, and that there is sufficient space.

### 11. Cancel your signal

At times you may also be required to pass other objects or pedestrians.

Passing parked vehicles:

- Be prepared for the unexpected such as a car door opening, a child darting out from between the vehicles, or the vehicle pulling out suddenly. Leave enough room between the bus and parked vehicles (1.5 metres).

Passing pedestrians and cyclist:

- Yield to pedestrians at all times
- Provide maximum clearance when using the same roadway (use the passing lane if available) and do not pass the vehicle ahead when pedestrians or cyclists are present in the lane. “Sound” your horn in advance if necessary.

Passing animals:

- Decelerate when entering animal crossing zones or when noticing animals on or along the roadway. Pass animals at reduced speed and stay alert.
- Prepare to stop or take evasive action if the animal approaches the road. If swerving the bus to avoid hitting the animal could jeopardize the safety of the operator, passengers or other motorists, do not swerve.

## THE MYSTERY CRASH

The “mystery crash” is a collision that is difficult for police authorities to determine it’s cause. It is the type of collision in which the driver, for some reason, loses control and runs off the road into an embankment, tree, abutment or other fixed object. This type of collision has a high mortality rate.

Although stemming from a variety of causes and contributing factors, generally the cause of the mystery crash is a loss of driver control. By control, we usually mean the driver’s ability to steer and to stop their vehicle. Loss of control frequently follows “driving too fast for prevailing conditions”.

Driving too fast for prevailing conditions sounds like a nice catch-all, but what it really means is too fast, with respect to one or more of the six conditions.

### Light Conditions

- Over driving your headlights at night. The average headlights are only capable of illuminating the highway for approximately 100 metres. Consequently, if you drive more than 80 km/h at night, it is unlikely that you will be able to stop in time should you have to.

- Suffering from headlight glare at night. The human eye takes about 7 seconds to recover from headlight glare.
- Suffering from sun glare in the morning or late afternoon, or from glare on a bright winter day. Be sure to keep your windshield clean and wear sunglasses to protect your eyes.

### Weather Conditions

- Driving rain, snow, sleet and fog all contribute to loss of vehicle control. Reduce your speed, drive with your headlights on and, if conditions get bad enough, don’t drive at all.

### Road Conditions

- Curves, crowns, dips and inclines all limit the speed at which you can drive your vehicle.

### Traffic Conditions

- Look far ahead, anticipate traffic situations, use good judgement and avoid getting into tight spots in the first place.

### Vehicle Conditions

- Bad tires finally blowing out at high speeds
- Bad tires unable to grip the road on a curve
- Defective brakes

### Driver Conditions

- Driving requires both mental and physical sharpness
- Driving demands that you keep your eyes moving – scanning the road ahead, and to the left and right of the roadway. Every few seconds, check your rear-view mirrors to be aware of any vehicles that may be following or trying to pass
- Driving under the influence of medication may affect your ability to drive
- Driving under the influence of alcohol will affect your ability to drive



Keep in mind these points about the “mystery crash”:

- It can happen to anyone – even the professional driver
- It is a very severe collision, fatalities are frequent and injuries are serious
- It is the most preventable type of crash because it involves maintaining control of the vehicle and yourself
- Keep your speed down, start slowing down sooner and always adjust your speed to conditions of light, weather, road, traffic, vehicle and driver
- Be sure of your own physical and mental fitness to drive. You cannot control your vehicle if you are not in control of yourself.

There are no magic formulas to avoiding these types of collisions, but the point of defensive driving is to do everything possible to prevent being involved in any type of collision. Being alert and aware of potential hazards. Be sure of your own physical and mental state along with practicing the basic collision prevention formula. This will diminish, if not prevent, the chance of you being involved in a collision.

## EMERGENCY DRIVING TECHNIQUES

### Skid Control

Any number of factors can cause a vehicle to go into a skid. During a skid, the tires lose proper traction with the road surface. The normal means of controlling the vehicle are affected – steering, braking, decelerating and accelerating. You must be able to detect a loss of traction in time to maintain or regain control. Loss of traction may include:

- Skids caused by tire failure, resulting from underinflation or sudden deflation from a blow-out
- Front wheel skids resulting from faulty brakes
- Rear wheel skids resulting from faulty brakes, excessive acceleration or speed on curves, rough or slippery surfaces
- Hydroplaning resulting from travelling too fast on a water covered roadway
- Skids caused by oil on the road after the first few minutes of rain

Once you lose traction and your vehicle goes into a skid, the correct way to regain control is through steering and braking properly.

### Steering

Turn your wheels in the same direction the rear of the vehicle is skidding. Be careful not to oversteer. You will be able to feel when the vehicle regains traction. Then, straighten the wheels. Frequently a skid in one direction is followed by one in the opposite direction (often caused by oversteering while in the first skid). As the vehicle fishtails in the opposite direction, steer in the direction of the new skid.

### Braking

Never apply the brakes during a side skid. After you feel the vehicle regaining traction, the best way to slow or stop, without causing a further skid, is to initiate “threshold braking”. Threshold braking is applying enough pressure on the brake pedal to slow down the vehicle without locking the brakes. As with any emergency situation, the important thing is to avoid panicking or overreacting.

### Tire Blow-out

Equally as frightening as going into an uncontrolled skid is a tire blow-out. If one of your front tires blows, there will be a strong pull in your steering towards the side with the blow-out. A back tire blow-out may or may not cause the back end to swerve. The flat tire acts as a brake and the bus will pull hard to that side. You will have to grip the wheel hard to maintain steering in a straight line. When a blow-out occurs:

- Grip the steering wheel firmly and steer your vehicle straight down the centre of your lane
- **DO NOT apply the brakes immediately**
- Remove your foot from the accelerator, if the vehicle starts to skid, follow skid procedures
- If a quick stop is required to avoid a collision, initiate threshold braking
- Activate the right turn signal, move right slowly, out of traffic and stop. Watch for soft shoulders that could make the control of the vehicle more difficult
- Activate four way hazard lights.

## Loss of Brakes

You are driving down the highway, you step on the brake pedal to slow down or stop and there is no response. What can you do?

- Pump the brake pedal. If there is any resistance at all, you may be able to work up enough pressure to help some.
- Downshift to the lowest gear possible. If the way ahead is clear, allow the engine compression to slow you down and stay on the road. Try to slow the vehicle down more by gradually applying the park brake so as not to lock the rear wheels. As you slow down, select a path for leaving the travel portion of the roadway and bring the vehicle to a stop on the shoulder.
- If you must leave the road to avoid a collision, select the path that will most likely minimize injury and property damage, in that order. Look for something to sideswipe like a roadside bank, snowbank, guard-rail, even parked cars – anything that will slow you down. If you must go into a ditch, do so at an angle to reduce the chance of a rollover.

## Loss of Visibility

Several things can happen to cause a sudden loss of visibility – your headlights fail, your hood flies up, mud and slush gets splashed on the windshield etc. Suddenly you can't see where you're going and you must attempt to stop as quickly as possible before losing steering control or hitting something. What can you do in each situation?

If your headlights fail:

- Immediately hit the dimmer switch
- Activate right turn signal
- Brake as hard as you can without going into a skid. The idea is to reduce your speed quickly before a slight steering error takes you off the road
- Steer out of the traffic lane and stop at the side of the road
- Activate your four way hazard lights

If your hood flies up:

- Look out the left and right windows to keep your sense of direction
- Apply brakes moderately
- Activate your right turn signal
- Steer out of the traffic lane and stop
- Activate your four way hazard lights

If mud or slush is splashed on the windshield:

- Turn on wipers and washers
- Look out side windows and apply brakes moderately
- If the windshield wipers have failed or you have no washer fluid, activate right turn signal
- Pull over as far as possible out of traffic and stop
- Activate four way hazard lights

## Emergency Evasive Action

When you suddenly see an obstruction such as a pedestrian, ball, another vehicle, construction barrier etc., in your path, you must take evasive action to avoid a collision. Evasive action to avoid a collision is simply the exercise of your fundamental driving maneuvers under conditions of stress, limited time, space and distance. You must decide which of these evasive actions you should perform:

- Controlled braking
- Quick steering, with or without braking
- Leaving the paved portion of the roadway, with or without roadside hazards present

For effective evasive action, you must resist the tendency to slam on the brakes. Generally drivers tend to apply the brakes at the first sign of trouble. While effective in many instances, braking can lock the wheels and cause loss of control, making a collision unavoidable. Deciding that braking is your best option will depend on how fast you are going, how far away the object is, how good your tires are and whether the road is wet or dry. Because this is an emergency situation, you will not have time to do lengthy calculations.

If it's not obvious that you can stop in time, you must choose to steer the bus in an alternate path. At a glance you must choose an "escape path".

- Is the escape path free of hazardous obstacles?
- Are clearances sufficient for larger vehicles?
- Will an off-road surface permit steering control?
- Is the path going to remain clear or will it be occupied by the time you get there?

Remember, if you focus on the obstruction, you will be unable to see any escape path. Look to where you want to go, taking in the "big picture". The size and weight of the larger vehicle limits its ability to swerve sharply to avoid an object or to leave the pavement with any great amount of control. Overturning is a danger. Steer firmly and as gradually as possible to clear the obstruction. Use controlled braking. Where a collision is unavoidable, try to:

- Avoid a head-on collision. Colliding at an angle reduces the force of the impact
- Avoid hitting human beings. If you have a choice, it's far better to hit inanimate objects than people or large animals.



## SERIES 3.2 Bus Maneuvers

During your daily travels, you will need additional skills not mentioned in the previous section such as:

- Lane positioning
- Steering and turning
- Stopping and parking on a hill
- Starting from a hill position
- Emergency driving techniques
- Railroad crossings

### Lane Positioning

Selecting the proper lane, positioning yourself within the lane, and adjusting your position to suit the circumstances is a skill that requires a great deal of practice. As you continue to practice you will improve your ability to maintain adequate separation distance between your bus and other vehicles, pedestrians etc. When possible, use the right hand lane or the lane closest to the shoulder of the road. This will leave you an “out” if you need one to avoid a collision.

### Steering and Turning

As you are no doubt aware, operating a school bus is considerably different than driving a standard size automobile. It generally requires a lot more room to conduct the same types of maneuvers. In addition, traffic patterns are becoming more complex, particularly in cities, necessitating added skill and judgement on the part of the school bus operator to turn and position the bus safely.

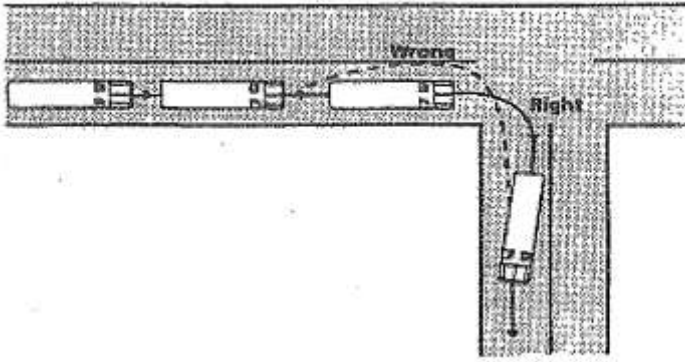
Before making any turn, make certain you check traffic to the front, sides and rear of the bus by using the mirror/shoulder/signal/shoulder check and that you are in the correct lane for the turn. During the turn, the hand-over-hand method is the best to use. See *diagram*.



One hand pushes the steering wheel up, across and down, while the other hand reaches up to the top of the wheel and pulls down. This action is repeated, grasping the wheel at the top again.

Making turns:

- Give the proper right or left hand turn signal approximately 30 metres from the turn; approximately 100 metres in rural areas
- Reduce speed and downshift to the proper gear needed to execute the turn
- Position the bus in the appropriate lane, depending on the direction of the turn
- Check for clear right-of-way
- Check for traffic signals, signs, pedestrians and other vehicles
- If stopped, waiting to turn left, keep your front wheels straight ahead and the brake pedal depressed to ensure
  - a) Your brake lights are on and you are stable and
  - b) If struck from behind, you will not be pushed into oncoming traffic
- Execute the turn (*see diagram next page*)
  - Turning left, take the left most lane available (unless directed otherwise by arrows)
  - Turning right, take the right most lane available
  - On a dual left turn, usually use the outer left lane
  - Never shift gears during a turn
  - Make the turn smoothly
  - Check the left and right mirrors as you are turning for bus body swing and clearance
- Check that your turn signal has been cancelled once turn is complete
- After completing a left turn on a multi-lane roadway, resume speed, activate your right turn signal and move into the right hand lane as soon as possible



## Backing

Baking up a school bus is not a recommended practice, however there are cases in which it may be necessary. Backing up a school bus on school property or a location adjacent to the school is illegal, unless, you have a responsible/reliable ground guide providing direction from the outside of the bus and at the rear of the bus.

BC law states: "No person shall operate a school bus in reverse where the school bus is

- a) On a school ground or
- b) At a location adjacent to a school ground, at which the school bus is loaded or unloaded, unless there is a responsible person located outside at the rear of the school bus giving direction as to the operating of the school bus in reverse."

There are two types of backing up you must be able to do:

### 1. Backing in a straight line

- Stop the bus in the desired position ready to back up
- Direct the responsible person (if available) to stand near the rear of the bus, on the driver's side to give signals
- Check that the way is clear using both mirrors and a shoulder check. If you do not have assistance and the view is not clear, get out of the bus and walk around it to identify any obstacles that may or may not be present

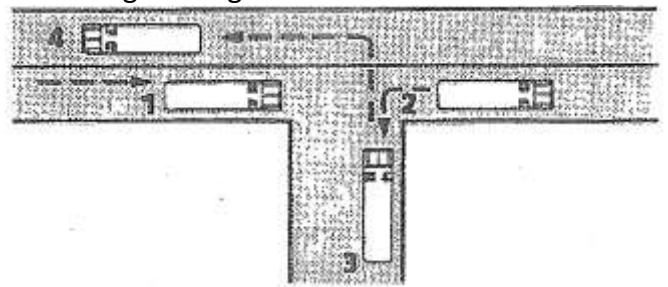
- Shift the transmission into reverse gear, sound the horn and activate the hazard lights
- Back slowly and smoothly in a straight line, constantly checking both mirrors

### 2. Making a turnaround

On most bus routes you may have to make at least one turnaround to avoid driving a few extra kilometres. There is only one way you can make a turnaround safely and that is backing into a roadway from the right. When the turnaround cannot be made this way, turning at that point should be avoided as it is extremely dangerous to back onto a main road.

Backing into a side road or driveway:

- Slow down well in advance of the turnaround
- Stop the bus in proper position on the roadway (approximately one bus length ahead of the road to be backed into)
- Check traffic in all directions ensuring enough space to permit the maneuver
- Shift into reverse, tap horn and activate hazard lights
- Back into side roadway when clear, checking both mirrors
- Turn back onto main road when safe to do so using turn signal



The obvious advantage of this method is that by backing from a main roadway to a less travelled one, you reduce the potential hazard to traffic on the main road. It should be kept in mind that if the turnaround is taking place at a pick-up or drop-off point, **never back the bus when students are either waiting to load or have just been dropped off. Turnarounds must be made before unloading and after loading.**

NOTE: While travelling on rural roads, there may be situations where the conditions and terrain would make backing into another road difficult without backing into a ditch, snowbank, etc. In such situations, driving into the other roadway and backing out may be the best solution. While this is not illegal, it should be done only where there is no safe alternative, keeping in mind that backing up is potentially dangerous and great caution must be exercised. Never turn around at a roadway that necessitates backing out onto a primary highway or other heavily travelled roadway.

## Stopping Your Vehicle

Few drivers are fully aware of the total stopping distance or time it takes to bring a vehicle to a full stop. Consequently, they make errors in their decisions which, in turn, may result in a collision. There are three factors that determine how long it takes for a vehicle to stop. They are:

- Perception time
- Reaction time
- Braking time

Perception time is the time it takes for a driver to see a situation and understand that there is a reason to stop the vehicle. The average perception time is approximately  $\frac{3}{4}$  of a second. Perception time and the distance travelled in this time will vary from driver to driver. Less experienced drivers are often slower to realize a danger exists. Also, the distance will vary greatly depending upon the driver's visual search, level of attention, decision-making capability, degree of fatigue, use of alcohol or other drugs and many other vehicle and/or environmental variables. Reaction time is the time it takes the driver to physically react to a need to stop by releasing the gas pedal and by moving the right foot to the brake pedal. The average reaction time is  $\frac{3}{4}$  of a second. The reaction distance is how far a vehicle travels during the reaction time.

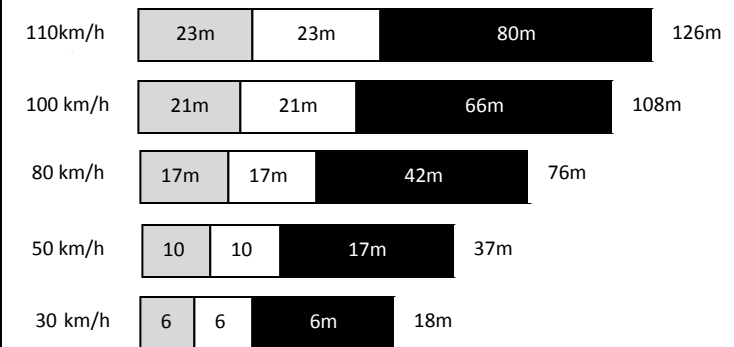
Braking time is how long it takes a vehicle to stop from the time the brake is pressed until the vehicle actually stops. How far a vehicle travels during this time is called the braking distance.

The total stopping distance is the sum of the perception distance, the reaction distance and the braking distance.

Many factors such as the condition of the roadway, your vehicle, the vehicle's speed and your vehicle's performance ability, work in combination to determine stopping time and distance. As a driver, you must attempt to adjust to or modify these factors to avoid a collision. Do not drive when you are tired or have been taking drugs or alcohol.

The chart below illustrates the minimum stopping distance for various speeds. The stopping distances are averages for stopping on smooth, dry pavement.

### Stopping Distances Under Normal Road Conditions



Distance travelled while perceiving the need to stop (based on average perception time of  $\frac{3}{4}$  second)



Distance travelled while reacting (based on average reaction time of  $\frac{3}{4}$  second)



Distance travelled after brakes applied (under normal road conditions and brake efficiency)

### Other Tips for Stopping

- It is the total stopping distance that increases dramatically as your speed or load increases. For example, a 66 passenger bus at 100 lbs. per passenger equals 6600 extra pounds over the weight of the vehicle itself, will take dramatically longer to stop than the average car.
- When coming to a stop, do not leave your braking too late
- Ease off the accelerator in advance of your stop to reduce your speed
- To brake smoothly, ease up on the brake pedal slightly and then reapply pressure on the pedal to come to a complete and final smooth stop.

## Stopping and Parking on Hills

- Check following traffic, side mirrors and signal to pull over
- Downshift if necessary to reduce speed as you are stopping
- Apply brakes lightly at first (on a downgrade you should probably tap the brakes with your right foot a couple of times) and then apply firm, even pressure for a smooth stop
- Depress clutch as you are near a stop; and when stopped, shift to neutral
- Allow extra room between vehicles for safety
- Turn all wheels into the curb on a downgrade; away from curb on an upgrade. If no curb, always turn the wheel to the right on either grade
- Set the park brake and turn off the ignition

## Starting on a Hill

Starting on an upgrade in a bus with standard transmission can be difficult even for the most experienced operators, particularly in areas with heavy traffic. On less steep grades and with considerable experience, it may be possible to use the normal starting procedure. The recommended procedure for starting on a hill however, requires that you use the parking brake as outlined here.

- When stopped on a hill, the parking brake should already be engaged
- Depress the clutch and shift into the appropriate gear
- Grasp the parking brake handle
- Release the clutch slowly to the friction point while gradually depressing the accelerator
- Release the parking brake as the clutch begins to grab, depressing the accelerator as necessary and, finally, removing your foot from the clutch

With practice this will become a smooth single action.

## Railroad Crossings

All school buses with passengers must stop at railroad crossings (controlled and uncontrolled crossings).

- Stop 8 to 15 metres away from the railway crossing
- Do not activate red load lights

- Activate noise suppression switch (to cut heater, radio noise etc.)
- Open left side drivers' window and loading door and listen for train traffic
- Move across tracks when safe to do so

Although many people fail to realize it, crossing railroad tracks represents one of the greatest hazards in school bus transportation in so far as mass casualties and fatalities. It only takes one slip or thoughtless moment to cause a major disaster with a train. Consequently, it's easy to understand why the law requires school buses, whether empty or loaded, to come to a complete stop before proceeding across an uncontrolled crossing.

Uncontrolled crossings are those that have no mechanical flashing lights or other safety devices. The procedure at uncontrolled railway crossings is:

### Prepare To Stop

- Gear down, have the vehicle under control
- Before reaching the crossing, request that your passengers be silent to permit you to listen for an approaching train
- As you get closer to the crossing, take in the "big picture". Check for control devices, trains, railcars on the tracks and the traffic behind you

### Bring the Bus to a Complete Stop

- The bus should be not less than 8 metres and not more than 15 metres from the nearest rail
- Shift transmission into neutral
- Set the parking brake
- Maintain pressure on the brake pedal

### Look and Listen

- Turn off any heaters, fans or radios
- Open the front door and the driver's window
- Look in both directions, listen for the sound of an approaching train
- If there is no indication of an approaching train, shift the bus into the appropriate gear, close the door and release the parking brake

## Proceed Across the Tracks

- When you are absolutely certain that it is safe to, proceed quickly and smoothly **without** shifting gears
- When crossing multi-track crossings, make certain there are no trains approaching before crossing **any** of the tracks
- After a train passes on a multi-track crossing, wait until all tracks become visible before proceeding. A second train may be approaching from the opposite direction
- If bright sunlight, fog, snow, smoke, obstructions, etc., makes it hard for you to see, walk to the track to see if you can cross the track safely

NOTE: As the driver of the school bus, you must never leave the bus without turning *off* the engine, setting the brakes, putting the transmission in its lowest gear or park position and taking the key out.

When you are sure that it is safe to go:

- Select an appropriate low gear
- Disengage the park brake
- Check left and right
- Close the door and window
- Cross the track
- Do not shift gears until you are clear of the last rail

## Railway Crossing Safety Information

Because of the high risk of death in collisions involving trains, this segment has been added to furnish the driver with further information regarding railway crossings.

Collision Statistics \*\*

- In 1996 in Canada, 535 people were killed and 41.7 injured in 343 rail/highway crossing incidents
- In 1996 in BC, three people were killed and 38 injured in rail/highway crossing incidents
- The number of rail/highway crossing incidents has decreased in recent years from 1,000 annually to about 350 annually
- About 43% of all rail/highway crossing collisions occur at crossings equipped with flashing lights and bells or flashing lights, bells and gates!

- Approximately 40% of all rail/highway crossing incidents involve a vehicle striking a train
- Rail/highway crossing collisions are the most severe type of collision. They are at least 15 times more likely to result in death than any other collision
- The major cause of rail/highway crossing collisions is the failure of motor vehicle operators to stop or exercise due care and attention or to observe and comply with existing laws and regulations
- At least 32% of the drivers involved are in the 21-30 years of age range

\*\* *Statistics and facts were derived from the Operation Lifesaver Program.*

## Railway Facts

- An approaching train activates the flashing lights, bells and gates 20 seconds before the train reaches the crossing
- The average 100 car loaded freight train travelling at 80 km/h needs 2 kilometres to stop
- An automobile travelling at 100 km/h requires about 108 metres to stop
- The locomotives on freight trains weigh between 118 and 191 tonnes and a loaded freight car weighs 120 tonnes
- The average automobile weighs 2 tonnes

When the facts are considered it is obvious the average vehicle will not win in a collision with the average train. Drivers need to be aware of the three E's: Education, Engineering and Enforcement.

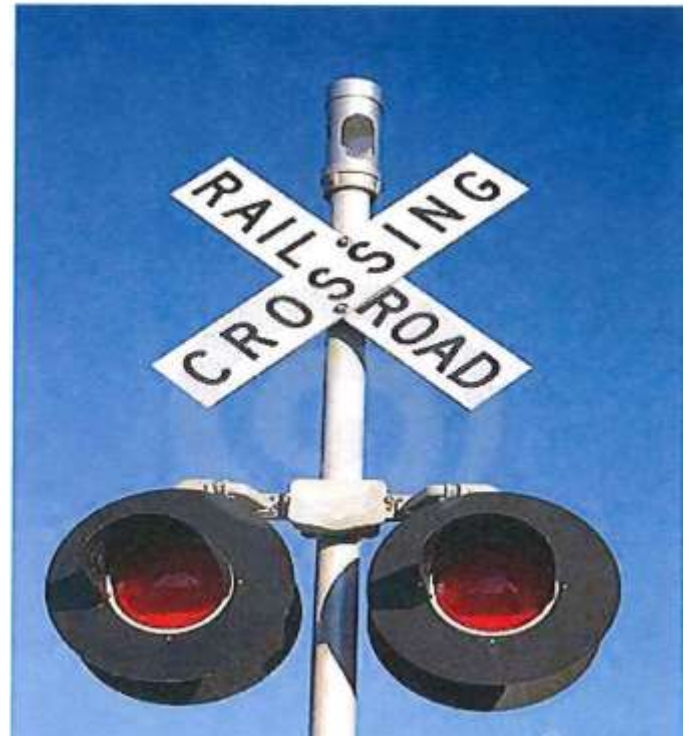
- Educating the public to the hazards of train collisions is the primary focus of programs such as Operation Lifesaver
- Engineering. Here the railways, federal, provincial and local authorities work together to make crossings safer. Cost is a factor here. \$3,000 yearly is required to maintain a crossing with standard flashing lights! If this seems expensive, the cost for building a rail/highway separation in which the train travels either above or below the traffic is almost prohibitive running into the millions of dollars



- Enforcement of the law can help to reduce the numbers of accidents by coming down hard on motorists who violate the laws regarding rail/highway crossings.

### **Common Driver Errors at Crossings**

- Misjudging the speed and distance of the train from the crossing. Because of its size, it is easy to misjudge speed and distance.
- Never race a train to the crossing. Many drivers have been hit by the train or have run into the side of it.
- When the train clears the crossing, the driver immediately proceeds across the tracks without checking for other trains. Drivers must be patient and wait for a train to proceed a sufficient distance to allow for good visibility in both directions. A driver should never move while the flashing lights are still operating and even when stopped, drivers should proceed with caution
- “Anytime is Train Time!” Familiarity breeds complacency. When approaching a familiar crossing, a driver should always be looking for trains as the schedule changes from day to day.
- Drivers should reduce speed and be especially observant if weather conditions or sight observations limit visibility of the rail/highway crossing and/or approaching trains.



## ENERGY SAVING DRIVING TIPS

Safe, smooth driving could save as much as 15 to 20% of the annual fuel costs of a school bus.

### **Attitude**

The right attitude is essential for safe and economical driving. A responsible professional operator is concerned about the safety of the vehicle, passengers and the financial well-being of the bus owner and school jurisdiction.

### **Safe, Smooth Driving**

You use energy to accelerate and gain momentum; you waste energy when you brake to slow down or stop. Looking ahead 12 seconds down the road at the traffic situation and maintaining a 4 second following distance between vehicles gives you space to slow down, accelerate or change lanes safely and smoothly. The objective is to try to minimize speed changes by being in harmony with the traffic tempo and, in urban areas, sync with the traffic lights.

### **Reduce Speed**

As speed increases so does the potential for collisions and the fuel consumption.

### **Tire Pressure**

Keeping tires inflated to their recommended pressure will result in safer, longer tire life.

### **Shifting Gears**

Get into high gear quickly. An automatic will shift earlier if you reduce pressure on the gas pedal as you gain speed.

### **Avoid Idling**

Ten seconds of idling uses more fuel than restarting your engine.

### **Auxiliary Equipment**

Turn off energy consuming equipment when not required, i.e. auxiliary rear heaters, electric defrost, fan motors, etc.

### **Pumping the Gas Pedal and Revving the Engine**

Rapid depression of the gas pedal pumps a jet of gas into the carburetor. This pumping action may be required for cold weather starts or after a vehicle has been standing idle for days. However, unnecessary pumping of the gas pedal or revving the engine wastes fuel and can cause engine damage.