UNIT SEVEN - MOUNTAIN DRIVING

This section provides information on safe travel in the mountains. Mountain driving presents unique situations that require greater attention to the same driving skills and expertise expected of all school bus drivers. Steep grades, winding roads, blind curves, falling rocks, wildlife, sightseeing motorists, bicyclists and unpredictable weather can present additional risks and consequences. There is a reduced margin for error and minor mistakes can develop into major problems. Mountain driving requires a high level of concentration and a respect for the terrain. (See personal pre-trip – Unit 3)

42-4-1901 (1) (a), C.R.S. Except as provided in paragraph (a) of subsection (2) of this section, passengers of any school bus being used on mountainous terrain by any school district of the state shall not occupy the front row of seats and any seats located next to the emergency doors of such school bus during the period of such use.

42-4-1901 (2) (a) The provisions of paragraph (a) of subsection (1) of this section shall apply to:

42-4-1901 (2) (a) (I), C.R.S. Passengers of any school bus which is equipped with retarders of appropriate capacity for purposes of supplementing any service brake systems of such school bus; or

42-4-1901 (2) (a) (II), C.R.S. Any passenger who is adequately restrained in a fixed position pursuant to federal and state standards.

This unit focuses on maintaining control, transmission and retarder usage, braking, pitch and grade, chains, and other skills for safe school bus operation in the mountains. CDE recommends frequent skill refresher training for mountain drivers.

TARGET SPEED

Target speed is the speed a driver determines is safe for a driving condition. When the bus speed increases above the target speed, the driver slows to 5 mph below the target speed and allows the bus speed to increase naturally back to the target speed. Repeat this process as needed. If this process is happening often, the driver has not shifted down to a gear that will provide the engine compression to hold the vehicle at or below the target speed.

MAINTAINING CONTROL

To maintain control of a school bus on steep mountainous terrain, follow the steps below for safe control:

1) Engine Compression/Transmission
2) Retarder Use (if equipped)
3) Service Brake Use

A driver is in control when the school bus is kept at a safe road and engine speed. A safe school bus speed is either at or below the posted limit. The bus manufacturer determines safe engine speed (revolutions per minute/rpms).

ENGINE COMPRESSION/TRANSMISSION

Engine compression is the first source of braking power, even if the bus is equipped with a retarder. When coming down a long steep grade, descend in a gear that is low enough to climb that same grade. On steeper grades and/or with a loaded bus, use at least one gear lower. Be aware that if the engine reaches maximum rpms, automatic transmissions can up-shift, even when manually locked in gear.

Select the proper gear for the grade before starting to descend and keep the bus in that gear to the bottom of the grade. Avoid the possibility of not being able to shift into the next lower gear, if needed. This is especially important with a standard transmission. Maintain the manufacturer's recommended rpm range for the gear selected in order to avoid over-revving or lugging, which may damage the engine.

Discuss recommended rpm ranges for all types of buses in the fleet.

RETARDER

The retarder is designed to slow the bus to maintain a safe speed. The retarder will not completely stop the bus. Use the retarder for all slowing needs. Proper use of the retarder will improve safety and save money by avoiding wear on the bus's braking system.

Retarders control only the rear wheels. This gives the driver complete control of the steering system. Some retarders work in reverse as well as forward gears. This helps to prevent the service brake from overheating. The retarder can overheat when used for long periods. Cool the retarder by discontinuing use for 10 minutes at a minimum of 15 mph before stopping the bus. Use only the service brakes in this cool down period.

301-25, 2251-R-30.00 Retarder (optional)

30.01 Retarder manufacturers shall certify that their product system shall maintain the speed of the bus loaded to maximum GVW at 20 miles per hour on a 7 percent grade for 3.5 miles.

30.02 School buses equipped with electro-magnetic retarder(s) shall have increased electrical system capacity commensurate with the needs of the retarder system.

30.03 Pilot light(s) shall indicate when retarder is in operation.

Types of Retarders

Electromagnetic

The most common type of retarder is electromagnetic. Mounted on the driveshaft of the bus, this retarder slows the driveline to the rear tires using electromagnetic forces. These retarders have four positions of braking. Positions 1 and 2 are the most commonly used. Use positions 3 and 4 only for short amounts of time due to the drain it places on the battery system. When an emergency stop is required, activate the hand control from the “off” position to the fourth position in one single action. Activation of electromagnetic retarders can also occur with the engine off as long as there is a source of electrical power on older models.

NEVER DRIVE AGAINST A RETARDER!

It will overheat and can cause a fire.

Stop and Go Traffic Use

Use positions 1 and 2 for normal slowing and 3 and 4 for firmer or emergency slowing. When it becomes necessary to slow down, release the accelerator and apply the retarder hand control to the desired position. To come to a complete stop, apply the service brake. Switch the retarder hand control to the “off” position when no longer needed.

Downhill Descent Use

Use the retarder to reduce speed and allow engine compression to keep the bus at a safe speed. Listen to the engine and watch the gauges for speed to increase; apply the retarder until 5 mph below target speed. The bus is in too high of a gear if the need for fourth position occurs. Slow the bus using the service brakes and shift the transmission to a lower gear.

Slippery Road Conditions

Use the retarder cautiously in the first position in order to slow the bus on slippery roads. Before shifting into position one, make sure the engine rpm's are low to minimize the torque from suddenly going to the rear wheels. Over-retarding on slippery roads can break the traction of the rear wheels. If this happens, disengage the hand control. As soon as the bus regains traction, you can lightly accelerate to pull out of a skid. If use of the retarder is still needed, use cautiously. The operator has little control when the retarder system is electronically hooked into the service brake system. It is best to turn the retarder switch off when slippery conditions exist.

Hydraulic

Hydraulic retarders are fluid braking systems, which decrease the speed of the bus by slowing the automatic transmission. Brake application or accelerator release activates this type of retarder. There is generally no other type of control. The hydraulic retarder does not have the four positions of braking, as the electromagnetic retarder does. These retarders have a variety of styles and positions. Please refer to your bus operation manual for detailed instructions. With all hydraulic retarders, avoid continuous use as the transmission can overheat. The transmission retarder will not function if the engine is off.

Engine/Exhaust Brakes

These systems are an optional auxiliary braking system that assists but does not replace the service brake system. Both brakes perform in the same manner. The engine brake is inside the engine, and the exhaust brake is in the exhaust system. The engine or exhaust brake switch, located on the control panel (in combination with the accelerator or brake pedals), allows the driver maximum use of the engine or exhaust brake. The exhaust brake is a butterfly valve mounted in the exhaust manifold pipe. An air cylinder shuts the butterfly valve when there is a release of the accelerator and the brake switch is in the “on” position. This restricts the flow of the exhaust gases and retards the engine. This retarding action carries throughout the engine and drivetrain, slowing the bus and reducing the need for frequent service brake applications.

When using on a steep grade, make sure that the brake switch is in the “on” position. Once there is a release of the accelerator pedal, the retarder will come on. While going down the grade, use a gear low enough to descend safely with minimum application of the service brakes. As a general guideline, use the same gear as you would to ascend that same hill. Do not allow the engine to exceed its governed speed or serious engine damage could result. Apply the service brakes to reduce the engine rpms. Shift into a lower gear to make a slower descent.

Engine or Exhaust Brake Operating Characteristics

Operators will experience the following when engine or exhaust brakes are in operation:

- Exhaust smoke will appear normal.
- Engine temperature will remain in the normal operating range.
- Road speed during descents will decrease.

Vehicle weight and grade of the decline will affect the amount of braking force required to slow the bus. If the bus is equipped with these types of brakes, the operator may not always be able to feel the retarding force; however, it is preventing the bus from gaining speed.

It is important to engage the different stages of the secondary braking system prior to the requirement or the need for additional braking in order to have the feel of the braking action.

SERVICE BRAKES

In mountain driving, the force of gravity plays a major role. Gravity will make the bus speed up when going down steep grades. The heavier the load, the faster the bus will gain speed. Go slowly enough to avoid the use the service brakes to maintain a safe speed. Prolonged use of the service brake causes brake “fade” (less stopping power). Brake fade occurs when heat build-up causes the brake lining to glaze or deteriorate at high temperatures. This decreases or eliminates the effectiveness of the brakes, and in extreme cases, can cause a fire. Never exceed a safe controlled speed. For long downhill grades, maintain safe speed by properly using engine compression and the retarder (if so equipped). This helps ensure minimal use of the service brakes. Use the service brakes intermittently, with enough time between applications to keep the linings, drums, and/or rotors cool.

PASS CHECKS

Pull over at a safe location prior to beginning a decent. As you enter the parking area, apply firm pressure on the brakes checking for proper stopping and that the bus does not pull. Do a walk around to ensure all lights are working. Stop at each wheel and feel the hub for signs of heat. Look at the slack adjusters to ensure they are all indicating proper adjustment. Look at all tires for damage and proper inflation. Place the bus in the proper gear to descend the downgrade.

When approaching a downgrade where a full check of the vehicle is not possible, prior to reaching the apex of the hill, firmly apply the brakes to feel for proper brake response and no pulling in either direction. Shift down to the proper gear prior to the apex of the hill.

PULLOUTS

Use pullouts to allow traffic backed up behind the bus to pass safely. If a pull out is large enough, maneuver the front of the bus so that you can look over your shoulder for oncoming traffic before reentering the roadway. Do not rely solely on the mirror if the opportunity to square off and look exists.

PITCH AND GRADE

One of the hardest techniques to learn may be reading terrain. Maintain a safe scanning distance and scan the entire area for changes in grade, upcoming curves, wildlife, and traffic. When possible, look through the trees beyond the curve before entering.

Tips for Reading Terrain

- Whitewater – indicates a steep grade
- Objects that seem to change size rapidly – indicate a steep grade
- Canyon walls that appear to close in ahead of the bus – indicate a possible narrow road ahead
- Do not blindly follow the traffic ahead of you – other drivers may misinterpret terrain.

CURVES

Pitch and Grade

Pitch and grade affect how mountain drivers maneuver through curves. Long, wide curves in the mountains may remain slippery for continuous periods, due to the pitch of the road or position of the sun. During a downhill curve, the bus may accelerate on its own. Do not brake in a turn, especially during adverse conditions. Apply the retarder or service brake (depending on conditions) well in advance of the curve and allow the speed of the bus to decrease gradually. Once the bus has reached the apex of the turn, gradually accelerate. This helps the bus track correctly through the lane. Braking through a turn may cause the bus to skid and make control difficult.

When approaching curves, notice how the road pitches from side to side in relation to the curve and the grade. Often, the operator can drive at a higher speed if the curve maintains a pitch that follows the direction of the turn (on-camber) than if the curve is flat or off-camber. The amount of acceleration out of the curve will depend on the degree of pitch. A skid can occur by accelerating too early when negotiating curves with a relatively flat pitch.

Speed

Slow to a safe speed before entering any curve. Braking in a curve is dangerous because it is easier to lock the wheels and cause a skid. Do not exceed the posted speed limit for the curve. Since the posted speed limit is for small vehicles, the bus speed should be 5-10 mph below the posted limit. To help maintain control, be in a gear that will allow slight acceleration through the curve. When entering a curve while going downhill, allow gravity to provide the slight acceleration.

Lane Position

Watching the lane position will help avoid head-on collisions. On tight curves, especially switchbacks, watch the tail swing. Stay centered in the lane to keep a safe clearance on all sides of the bus. Hugging the outside of a curve increases the chance of dropping a tire off the paved portion of the road onto a soft shoulder. Hugging the inside of a curve places your mirrors into the space of other motorists. If possible, adjust the speed and space to avoid driving alongside another vehicle in a curve on a multilane highway. On a right hand curve, move as far to the outside of the lane as possible. It is essential to pay attention to where the right rear tires are in relation to the pavement. On-coming traffic tends to take their half out of the middle when negotiating a left hand curve.

Overhead

Be aware of rocks that overhang the road. Off-tracking brings the center of the bus closer to the overhanging objects. When entering a tunnel, be aware of the curve of the edges and top. The vehicle height may fit through the middle, but not on the outer edges.

CHAINS

Chaining is crucial to mountain driving in adverse weather. The Department of Transportation requires the use of chains on commercial motor vehicles on many mountain passes. The two most common types of chains are automatic and conventional. There are several methods for installation. Below are some commonly used methods and tips for safely chaining a bus.

Automatic Chains

These chains permanently fasten to the rear suspension of the bus. They activate from a dashboard switch that opens an electric over air solenoid mounted on the frame rail. Air pressure from the bus's on board air brake system or an auxiliary air source flows to two air cylinders that lower two chain wheels down until they contact the tire sidewall. The friction between the tire and the chain wheel causes the chain wheel to rotate. Each chain

wheel has lengths of chain attached to it. The centrifugal force created causes the chains to flail out and pass between the tire and road surface to enhance traction in snow and ice. The additional traction also reduces stopping distance in these same slippery conditions. When in the “off” position, the solenoid exhausts the air in the cylinder, and the spring in the cylinder returns the chains to the retracted position.

Advantages:

- Increased safety as the bus is always equipped and has quick access on short notice. Typical engagement time is two seconds.
- Automatic chains dramatically reduce the time spent installing conventional chains, increasing productivity of the operator. More importantly, routes can remain on schedule.
- Automatic chains can eliminate body damage caused by broken conventional chains, which at times can be a mission disabling failure.
- Advantages in hauling force, acceleration and stopping distance are dramatic.

Disadvantages:

- The operator must realize that this system is not a “fix all” (avoid a false sense of security).
- Operator activation is required.
- The system, per design, is limited to ice and a maximum of up to four inches of snow. The operator may have to install conventional chains in deep snow conditions.

The operator may lower or raise automatic chains at any time during speeds less than 30 mph. To avoid damage, do not raise the chains if the bus is not in motion. If the chains are raised when not in motion, damage can occur to the chains, arm mechanism, and air system.

Conventional Chains

The operator must install and remove conventional chains. Always plan ahead when chaining is a possibility. If there are is any doubt about traction, it is best to chain up to avoid safety issues.

When determining locations to install and remove conventional chains, always find a safe location that is out of the way of traffic. If passengers are on-board, they should remain inside of the bus. Make sure the engine is off and the brake is set so the bus will not move.

Chaining Steps:

- Operator Preparation - Stretch muscles before lifting chains.
- Lay chains out on the ground to confirm that the chains are lying correctly with each side parallel. If not, straighten them to assure that all reinforcement bars will face the road surface instead of gouging into tire.
- Choose the proper chaining method to use.
  - Drape over the tire (Recommended in most circumstances).
    - Hooks on inside, clasps on outside, cross-links be perpendicular to tire and all reinforcement bars on cross-links facing away from the tire.
    - Roll the bus over chains. Determine the optimal direction to roll (forward or backward) by assessing which direction has the most room. Avoid rolling over the hook and clasp end of the chain, if possible. If on a slope, always make sure the operator is on the upward side of the tire when fastening chains.
    - Place a mark at one side of the front passenger door and drive the bus with the front wheels straight until the opposite side of the entry door is lined up with the mark.
    - Fasten the chains. The inside hooks should be fastened first. Do not hook on the end link. The identical number of links on the inner hook and outside clasp is ideal to fasten the chains. Attach the stretchers/tighteners on the outside of the tire. Drive forward 50-100 yards, remove the stretchers, tighten the chains and reattach the tighteners.
  - In-place chaining (usually done if bus is unable to move).
    - Drape the chains over tire so that the cross-links at the bottom do not hinder the effort to fasten the inside hook to the chain link.
    - Use a chain tightener or coat hanger to guide the link between the dual tires to fasten the chain link with the inside hook.
    - Pull the chains as tight as possible. A good tip is to use your knee against the tire to spare using only your back. Fasten the chains with the outside clasp and attach the tighteners. When the bus is moving and out of danger, remove the tighteners, readjust the chains, fasten both the inside hook and outside clasp, and reattach the tighteners.

Remember that when the bus is empty, chain traction is limited. Never drive over 30 mph when chains are installed on the tires.

Removal Steps:

Remove conventional chains only when the road surface provides safe traction without the use of chains.

- Find a safe area away from traffic and keep the students on the bus.
- Remove the tightener.
- Loosen the outer clasp.
- Unhook the inner hook first to prevent the chains from dropping between freezing wheels.
- Drive over the chains in a manner that prevents the tires from running over clasps or hooks.
- Stretch the chains out to check for broken or badly worn links.
- Bundle chains for storage.
- Place the tightener perpendicular to the cross-links and pull each individual link over the tightener while inspecting the condition of each link.
- Fasten the tightener at the ends and place in the desired storage area.

If there are any doubts about the condition of any part of the chains, take them to a mechanic or other repairperson for inspections and/or replacement.

Additional Tips:

- Carry additional tighteners in case of breakage.
- Inspect and install all chains in the fall to ensure proper condition and fit. Every element of a chain is a moving part. Check for broken chain links and verify the hooks and clasps are in good operating condition.
- Label all chains with paint to confirm they are the proper ones for that particular bus and add this check to the daily pre-trip inspection.
- If installation of new tires occurs on the bus, always check the chains for proper size.

CDOT (Colorado Department of Transportation) has provided a fact sheet covering chaining. When is it required and how it effects student transportation when transporting in the mountains during the winter months. You will find this information at the end of this chapter.

DELINEATORS

Delineator posts are carsonite posts with colored reflectors. They are in high risk and informational areas of roadways to convey a variety of messages to motorists. Below are some specifics on delineators.

> **Delineator—a retro-reflective device mounted above the roadway surface and along the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather.**

Type III

1) Three Amber Front Reflectors - These are designed to warn the motorist of existing objects. These objects may not always be in the roadway, but are close enough to the edge of the road, to be a potential hazard. Typically, they are near underpass piers, bridge abutments, guardrails, and culvert heads. If a guardrail approach end is not flared, there will be a Type III delineator immediately in advance of the approach end.
2) Two White Front and One Red Back Reflector - These are designed to warn motorists of acceleration and deceleration lanes ahead. The red reflector is for warning motorists of the wrong way.
3) Two Amber Front and One Red Back Reflector – These are normally installed in medians for left-turn deceleration lanes.
4) One Blue and Two Yellow Front Reflectors - These are installed at crossover locations of divided highways.
5) Three Blue Front Reflectors - These are for Department of Transportation maintenance crew workers. These are installed at the bridge joints.
6) Three Green Front Reflectors – These are for Department of Transportation maintenance workers. These are installed in front of approaching guardrails with flare ends, not on bridges. They can be found in front of curb heads.
7) Red Reflectors – Runaway truck ramps are bordered on each side by red reflectors spaced not more than 50 feet apart.

Delineation Posts - The white and amber reflectors on the green posts along the roadway are called cat eyes. The color and number of cat eyes on a post indicate a particular hazard or condition at the edge of the roadway.

- Edge of the road — single white
- Right side of roadway — single white
- Left side of roadway — single amber
- On and off ramps — two white
- Minor problem area — single amber
- Moderate to serious problem area — two amber

- Life-threatening problems three amber

  (Culverts, bridges, guardrails, heavy crossroad traffic)

Delineator panels are a striped marker consisting of a vertical rectangle with alternating black and retro-reflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. These types of delineators can be seen on the end of guard rails, on bridges, etc.

EMERGENCY STOPS

The braking systems on the bus are mechanical systems and can fail. The following emergency stopping procedures are to be demonstrated and practiced during on-the-road (hands-on) training. These simulations will prepare the operator for cases in which any or all braking systems fail. Except where noted, use a road or highway with little or no traffic and with good visibility for the simulations.

Every Which Way Simulation

This simulation is to practice when there is a need to stop the bus when the service brakes fail to operate. The operator will experience the use of all available means to stop a bus. Shift down to the first gear of the automatic transmission, set the retarder to the fourth position, and pull the park brake. As the bus slows, the transmission will automatically downshift. In a standard transmission, the operator will downshift through the sequence as the engine speed slows.

Full Four Wheel Lock Simulation

This simulation is to practice when the service brakes are functioning and the engine is running. The operator will experience the forces involved in severe use of the brakes. The operator will get the feel of a bus skidding. At 25 mph, the driver will release their grip on the steering wheel and press hard on the brake pedal. Note any tendency of the bus to pull right or left. Make sure there is room on both sides of the lane for the bus to pull in either direction.

Retarder Stop Simulation

This simulation is to practice when the engine stalls, the parking brake is broken, and there are hot fading brakes (engine failure in which the automatic transmission is inoperable). Use the electric retarder to slow the bus. Let up on accelerator and place the retarder in position four. When slowed to an idle, shift the transmission into neutral and use a soft shoulder to stop.

Park Brake Simulation

This simulation is to practice when the service brakes and retarder are inoperable with the speed too fast for downshifting to slow the bus. Depending on the service brake defect, the park brake may be inoperable or already set due to a loss of air pressure. Select a flat, straight portion of the road with a full-width shoulder lane where the bus can pull completely out of the travel lane. At highway speed, turn on the hazard lamps, let up on the accelerator, pull the park brake, and carefully pull the bus into the shoulder lane as it slows to a stop.

Ride-It-Out Simulation

This simulation is to practice when the retarder is inoperable or not present, the parking brake is broken and hot, the brakes are fading, and the engine is running. Simulate stopping a bus without the use of the brakes or retarder. Select a downgrade that will allow the bus transmission, when placed in the highest gear, to maintain the approximate posted speed limit. The downgrade should decrease for safe simulation of the procedure. At the top of the descent, let up on the accelerator, put the gear selector in first (if automatic), and ride out the descent. As the bus slows, the transmission will automatically downshift. In a standard transmission, the operator will downshift through the sequence as the engine and road speed slow. Turn on the hazard lamps at 25 mph and pull into the shoulder lane. At an idle in first gear, pull the right side wheels into the soft shoulder dirt, shift the transmission into neutral, and allow the bus to stop.

Escape Ramps

To stop runaway vehicles safely without injuring operators or passengers, escape ramps are on many steep mountain grades. These ramps use a long bed of loose soft material (pea gravel) to slow a runaway vehicle, sometimes in combination with an upgrade. The operator should know all escape ramp locations on any assigned route. Signs show operators where ramps are located. Escape ramps save lives and equipment. Use them if the bus has lost all forms of braking.

DESTINATION PRE-TRIP

Conduct a modified post-trip once at the destination. This will help discover any mechanical defects before leaving. Some very important items to check when in the mountains are:

- Retarder Operation – Check this while driving. When in first position, check that brake lights activate. This will only occur when moving at 6 mph or higher in some newer models.
- Left and right turn signals.

- Headlights, brake lights, tail lights, and clearance lights are all operational.
- Emergency door buzzer.
- Tires, lug nuts, tire chains, and exhaust system.
- Leaks under the bus.
- Perform a standard brake test.

Your district may require other items. Follow district procedures for checking any additional items.

CRASHES

If faced with a head-on collision, take the head-on collision if the other vehicle is a car or small truck (rather than swerving violently). This is a better option because of the size and weight of the bus and the fact that the operator and passengers sit above the impact zone. Swerving may cause the bus to slide out of control and leave the roadway and/or cause the bus to rollover. However, if facing a head-on collision with a large truck, avoidance by steering out of the way into the oncoming lane may be the best option, even if you must take the right-of-way from a car.

Plan ahead as you drive. Look for spots to use as escape routes. Sideswiping hillsides, rocks, trees, or guardrails may be the best alternative to slow the bus in an emergency.

Deer, elk, or other wildlife may suddenly appear in the roadway. The operator's choices are to swerve or hit the animal. The safer choice is to hit the animal rather than swerving and possibly losing control of the bus. Swerving will place your passengers in greater danger. It is natural to react by swerving, but knowledge of the possible consequences should override that decision.

OTHER MOTORISTS/BICYCLES

Sightseeing motorists and/or tourists may drift to either side of the roadway. Many motorists are also uncomfortable driving on mountain roads. They may fear driving towards the outside of the lane and crowd the center of the road. Pay attention to other vehicles' tire to ground contact, which indicates their exact position in their lane. Be aware that motorists may park on mountain shoulders, around curves, and walk on the roadway.

More and more people are riding bicycles in the mountains. In most cases, they ride in the traffic lane. Bicycles, especially when ridden by children can be unpredictable. Give them plenty of room when passing.

- 42-4-1008.5, C.R.S. – Crowding or threatening bicyclist. The driver of a motor vehicle shall not, in a careless and imprudent manner, drive the vehicle unnecessarily close to, toward, or near a bicyclist.
- Any person who violates subsection (1) of this section commits careless driving as described in 42-4-1402, C.R.S.

Never outdrive your ability to stop in the distance you can see.

PASSENGER WELL-BEING

When planning a mountain trip and driving in the mountains, think about your passengers. When was the last break for them to stretch their legs? Take stretch breaks, as needed, in safe pullout areas.

Remember that many passengers suffer from motion or carsickness. Have these passengers sit up front with one or more windows open for fresh air. If known ahead of time, discuss other remedies with parents/guardians. Slowing down more in curves may help these individuals. The driver may feel comfortable with the speed on winding roads; however, they should watch the passengers in the rear of the bus to determine if they are comfortable as well.

Anyone can suffer from altitude sickness. Make sure they drink fluids and remain quiet (sitting or laying down), and get them to a lower altitude as soon as possible.

DRIVER CARE

When driving long distances, note that operators may experience fatigue or minor aches and pains. Be sure before leaving to position the bus seat so the back is completely against the seat back with feet flat on the floor. Consider using a lumbar roll or rolled-up towel between the lower back and seat back. Adjust the seat up or down, so the hips are slightly higher than the knees. The back of the knees should not rest on the edge of the seat. Adjust the seat forward or back, so the knees are at a slight bend when fully pushing the pedals. Arms should comfortably reach the steering wheel and controls with minimal leaning or twisting.

Remember to adjust the mirrors to avoid twisting or placing the body in an uncomfortable or awkward position. To combat fatigue, perform stretches before and after driving.