

This document is from the  
**Commercial Driver's Handbook**

## 2.16 – Mountain (Downhill) Driving

In mountain driving, gravity plays a major role. On any upgrade, gravity slows you down. The steeper the grade, the longer the grade, and/or the heavier the load, the more you will have to use lower gears to climb hills or mountains. In coming down long, steep downgrades, gravity causes the speed of your vehicle to increase. You must select an appropriate safe speed, and then use a low gear, and proper braking techniques. You should plan ahead and obtain information about any long, steep grades along your planned route of travel. If possible, talk to other drivers who are familiar with the grades to find out what speeds are safe.

You must go slowly enough so your brakes can hold you back without getting too hot. If the brakes become too hot, they may start to “fade.” This means you have to apply them harder and harder to get the same stopping power. If you continue to use the brakes hard, they can keep fading until you cannot slow down or stop at all.

### 2.16.1 – Select a “Safe” Speed

Your most important consideration is to select a speed that is not too fast for the:

- Total weight of the vehicle and cargo.
- Length of the grade.
- Steepness of the grade.
- Road conditions.
- Weather.

If a speed limit is posted, or there is a sign indicating “Maximum Safe Speed,” never exceed the speed shown. Also, look for and heed warning signs indicating the length and steepness of the grade.

You must use the braking effect of the engine as the principal way of controlling your speed. The braking effect of the engine is greatest when it is near the governed rpms and the transmission is in the lower gears. Save your brakes so you will be able to slow or stop as required by road and traffic conditions.

### 2.16.2 – Select the Right Gear Before Starting Down the Grade

Shift the transmission to a low gear before starting down the grade. Do not try to downshift after your speed has already built up. You will not be able to shift into a lower gear. You may not even be able to get back into any gear and all engine braking effect will be lost. Forcing an automatic transmission into a lower gear at high speed could damage the transmission and also lead to loss of all engine braking effect.

With older trucks, a rule for choosing gears is to use the same gear going down a hill that you would need to climb the hill. However, new trucks have low friction parts and streamlined shapes for fuel economy. They may also have more powerful engines. This means they can go up hills in higher gears and have less friction and air drag to hold them back going down hills. For that reason, drivers of modern trucks may have to use lower gears going down a hill than required to go up the hill. You should know what is right for your vehicle.

### 2.16.3 – Brake Fading or Failure

Brakes are designed so brake shoes or pads rub against the brake drum or disks to slow the vehicle. Braking creates heat, but brakes are designed to take a lot of heat. However, brakes can fade or fail from excessive heat caused by using them too much and not relying on the engine braking effect.

Brake fade is also affected by adjustment. To safely control a vehicle, every brake must do its share of the work. Brakes out of adjustment will stop doing their share before those that are in adjustment. The other brakes can then overheat and fade, and there will not be enough braking available to control the vehicle. Brakes can get out of adjustment quickly, especially when they are used a lot. Also, brake linings wear faster when they are hot. Therefore, brake adjustment must be checked frequently.

## 2.16.4 – Proper Braking Technique

**Remember.** The use of brakes on a long and/or steep downgrade is only a supplement to the braking effect of the engine. Once the vehicle is in the proper low gear, the following are the proper braking techniques:

1. Apply the brakes just hard enough to feel a definite slowdown.
2. When your speed has been reduced to approximately 5 mph below your “safe” speed, release the brakes. (This brake application should last for about 3 seconds.) When your speed has increased to your “safe” speed, repeat steps 1 and 2.

For example, if your “safe” speed is 40 mph, you would not apply the brakes until your speed reaches 40 mph. You now apply the brakes hard enough to gradually reduce your speed to 35 mph and then release the brakes. Repeat this as often as necessary until you have reached the end of the downgrade.

Escape ramps have been built on many steep mountain downgrades. Escape ramps are made to stop runaway vehicles safely without injuring drivers and passengers. Escape ramps use a long bed of loose, soft material to slow a runaway vehicle, sometimes in combination with an upgrade.

Know escape ramp locations on your route. Signs show drivers where ramps are located. Escape ramps save lives, equipment, and cargo.

## Take Aways:

- \*Company trucks are much heavier than your personal car or pickup. They will NOT have the same braking effect.
  - \*Pay close attention to the condition and adjustments of the brakes during your pre-trip inspection.
  - \*Make sure you have reduced your speed BEFORE starting down a hill.
  - \*Shift the transmission into a lower gear BEFORE starting down a hill. Do NOT try to downshift while going down a hill.
  - \*Do NOT ride the brakes. Better to rely on the engine’s compression than to rely on the brakes.
  - \*If over-revving the engine while in a lower gear, apply enough brake pressure just long enough to reduce speed again, then let off the brakes.
  - \*The heavier the truck and load, the slower the driver must go down the hill.
  - \*When brakes get too hot, they will not stop the truck. This is the fault of the driver not the brakes.
  - \*The driver is responsible for maintaining control of the truck.
- FACT: In the vast majority of truck accidents on hills, driver error is the cause!!