Module 3
Basic Maneuvering Tasks

The following information is a review of the lesson you just completed. Take time to review and study this information. Remember, this important information will be needed to pass your upcoming assessment, so take the necessary time in order to feel secure about your knowledge of this segment. This is not a graded portion of the course, but should be completed as an additional exercise.

Lesson 1 - Vision and Perception
Topic 1 - Targeting

What is Targeting?

- A target is a fixed object that appears in the center of the path you intend to drive.
- A target helps drivers to visualize the space they intend to occupy and gets them use to looking far ahead.
- It also allows for the driver to begin using a searching process that allows th driver to plan ahead thus increasing steering accuracy.

Target Area

The target area is the driving environment to the left and right of where the target is located. Searching the target area for driving related information is more important than trying to identify a specific target. Identification of a specific target is only necessary while learning what a target is and how to identify the target area.

Target Area to Target Area

- Target Area Searching requires identification of the condition of the target area as open or closed, red light or green, stopped traffic or moving, curve or hill crest, left curve or right curve, to give you a clear picture of what to expect ahead in the vehicle’s targeting path.
- After knowing what the condition is in your target area, you then should assess your 12-15 second range to see what zone changes can or do affect your targeting path. Make assessments of your other zones to see what your options are. Then select the best lane position and get the best speed control in order to achieve the
lowest degree of risk en route to the target area. As you get within 4-6 seconds of
a zone change, you reevaluate it to ensure best control.

- Closer to the target area, you re-evaluate the condition of the target area and begin
assessing your next target area and the zone changes that you will encounter en
route. This process of searching from one target area to the next target area is
repeated continually.

**Targeting Advantages**

Some advantages to targeting include:

- Helps drivers to visualize the space they intend to occupy.
- Beginning of learning to use a searching process.
- Gets driver to look far ahead, rather than close to vehicle.
- Allows driver to plan ahead.
- Increases steering precision and reduces steering reversals.
- Develops skid avoidance skills.

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**Topic 2 - Focus Vision Area**

There are three basic ways in which a driver gains information through the eyes.

- The first is the **focal vision area**. It is used to read and identify distinct
  objects. It is often measured by determining visual acuity through an eye
  chart. It is the basis for the visual lead, targeting, and searching tasks in
  driving.
- The second is the **central vision area**. This describes the fringe area around
  the focal area that is used to judge depth and position. It is measured in
  testing through object identification and depth perception fields. It also gives
  support information to the focus vision and is used for determining standard
  visual references in driving, relative position in space, time, and movement
  into space/time.
- The thirds is the **peripheral vision**. This is conical in shape around the other
  vision fields. It functions to notice changes in color and object movement.
  Peripheral vision is strongly affected by fatigue, drugs, and speed. It often
  gives the driver an initial warning of a changing or closed space area.

**Standard Visual Reference for Lane Position 1**

When focus vision is on the target at the end of the path of travel, the central or inner
fringe vision will allow the driver to see the placement of vehicle in the roadway.
Topic 3 – Driver Vision Requirements

Search Process

- Target area searching is a method of being able to search more than 12 seconds ahead of your vehicle to plan for oncoming events. By using this concept, you get a picture in your mind what maneuvers will need to be executed, and the time and space required for those maneuvers as you plan for such an event.

- An organized searching process will need to start from the visual lead area. A visual search process can be described as eye focus movements from the path of travel in an organized pattern. The search for traffic flow information and potential risk situations is the function of a visual search process.

Searching Ranges

There are three ranges that should be constantly monitored. These search habits will provide the driver a high assurance of readiness for oncoming events.

- **Target area range** – Begin by finding a target as far ahead as possible. The target as well as the area to the immediate right and left is considered the target area. As you scan the target area, you will be able to identify the conditions of upcoming traffic. The target area will provide information on posted signs, road hazards and conditions as well as changes in the road such as severe turns or dangerous intersections.

- **Second Range** – This range is your 12 to 15 second range. This is the minimum distance that provides information for such things as speed, lane position and communications.

- **Second Immediate Range** – This range is your 4 to 6 second range. This range provides information on managing your current path of travel.

Line of Sight Limitations or Restrictions

- The ability to see the center of your path of travel from the vehicle to your targeting area is your line of sight. This can be blocked by a curve, hill, bush, building, vehicle, etc. The driver’s ability to have an unrestricted line of sight is the visual basis for speed and steering adjustments. An interrupted line of sight means changes in speed and position are necessary for reestablishing a clear line of sight to your path of travel and targeting area.

- When line of sight is restricted or blocked, a speed adjustment is needed until visual lead, target area, and the line of sight are restored.
Path of Travel

The path of travel is a combination of targeting area, line of sight, standard visual references, and guided experiences. Learning about path of travel and alternate paths of travel is critical for driver performance.

Visual Lead

A visual lead is an area targeted 20 to 30 seconds from the front of the vehicle. The novice driver needs to develop a visual lead in order to keep steering reversals to a minimum. With very little free play in new vehicle steering mechanisms, it becomes critical to limit wheel movements to the left and right of the path of travel. Keeping the eyes focused farther away from the vehicle will allow the driver to take more time to make decisions. Various driver systems have methods designed to keep eye focus centered in the path of travel at an interval that is 20 to 30 seconds away from the vehicle. This task is critical to gaining as much information as possible from the driving scene. Good targeting sets up good sightlines for referencing and good peripheral fields for seeing changes and identifying alternate paths of travel.

Topic 4 – Speed and Affect on Vision

As You Go Faster

There are things to remember about Speed and how it affects your vision:

As speed increases, the amount of information to keep car position and detect movements increases. The ability of peripheral vision to detect the motion of other objects is affected by the speed and movement of the vehicle. Minor changes to car position occur in shorter time frames, causing significant or exaggerated vehicle movements.

Visual adjustments are needed to lengthen or increase visual lead which:

- Allows more time to gather information
- Increases peripheral vision area, which allows for motion detection farther away from your vehicle in order to give time for adequate response
- Puts more space between other vehicles and your vehicle, so abrupt responses are held to a minimum

Determining Following Intervals

The need for adjustments in following time occurs when speed or road conditions change. Note the distance for steering is much shorter than the distance for stopping. Response time with the hands is close to \( \frac{1}{2} \) - second while response time with the foot is normally \( \frac{3}{4} \) - second. This does not take into account any lag in perception time due
to fatigue, drugs, or inattention, etc. All time and distance relationships are designed for the best driving conditions.

Another concern to note is following vehicles of different weights changes the ability to stop.

- A two-second interval provides the driver time to steer out of problem areas at all listed speeds on a dry surface and braking out of problems at speeds under 35 mph.
- A three-second interval provides the driver time to steer out of problem areas at all listed speeds on dry surfaces and braking out of problems at speeds to 45 mph.
- A four-second interval provides the driver time to steer out of problems at all listed speeds on dry surfaces and braking out of problems at speeds up to 70 mph. It is important to note that many passenger car tires are not designed to steer out of problem areas at speeds beyond 75 mph. High speed rated tires are required due to sidewall flexion at higher speeds and turning movements.

**Time, Speed and Distance Relationships**

This chart will give you a guide as to the time it takes to stop on a clean and dry surface depending on the speed you are going.

*Example:*

If you are going 40 mph, you are traveling 58 feet per second. As you have learned in earlier lessons, you should try to stay three (3) seconds behind the car in front of you if traveling at or around 40 mph. This means that you should be 232 feet from the next car.

At 40 mph, your response time for steering is ½ of a second or 29 feet while the braking response is ¾ of a second or 44 feet with a total stopping distance of 125 feet.

**Topic 5 – Preventing Blind Spot Crashes / Eliminating Mirror Glare**

**What is a “Blind Spot”**

A “Blind-spot” or “Blind-zone” is created when a vehicle is located at a point where neither the inside or outside mirrors has a view of that vehicle. Your first real encounter with a blind-zone was probably when you tried to change lanes and got a horn blast in your ear. The adrenaline instantly kicked in as you reversed your maneuver. Your heart jumped to your throat, and you suddenly felt hot as you realized you had just made a dangerous mistake. You asked yourself, “What happened? Why didn’t I see that car? Did I forget to look?”

Lots of people make that mistake every year, and sometimes it results in more than just a horn blast. The National Highway Traffic Safety Administration (NHTSA) has studied a
category of accidents they call Lane Change/Merge (LCM) crashes. They estimate there are 630,000 LCM crashes with 225 fatalities annually. A NHTSA study found that about 60% of drivers involved in LCM crashes did not see the other vehicle, and about 30% of drivers misjudged the position or speed of the other vehicle.

All LCM crashes cannot be blamed on the blind-zones, but blind-zones are extremely important. They are not well understood by the average driver, yet they are involved in every LCM maneuver.

**Blind-zone Mirror Setting**

- To understand why the blind-zones are important, let’s see how they are created. Most passenger cars are equipped with one inside mirror and two outside mirrors. The inside mirror provides the driver with the widest field of view and by far the most important about traffic to the rear. For this reason, drivers should consider the inside mirror their primary mirror.
- The field of view of an outside mirror is about half that of the inside mirror. The outside mirrors have reduced the size of the blind-zones, but have added relatively little to the field of view seen in the inside mirror. Blind-zones capable of hiding a vehicle still exist. With this conventional setting of the outside mirrors, it is still necessary to turn and look into the blind-zones when changing lanes. This setting is called the “Blind-zone Setting.”

**BGE Mirror Settings**

“BGE” or “Blind-zone/Glare Elimination Setting,” is a new mirror setting technique that significantly reduces the blind-spot area.

The BGE Setting requires turning the field of view of each outside mirror outward by about 15 degrees from the Blind-zone Setting. For the driver’s side mirror, this can be done by placing your head against the side window and then setting the mirror to just see the side of the car. Do the same with the passenger’s side mirror, but position your head at the middle of the car. You should next check to see that the blind-zones are truly eliminated. From the normal driving position, watch a car as it passes you. It should appear in the outside mirror before it leaves the inside mirror, and it should appear in your peripheral vision before leaving the outside mirror. This is your proof that the blind-zones have now been eliminated.

Remember, the two outside mirrors are simply rotated outward to look into the blind-zones instead of looking along the sides of the car. There are now four mini blind-zones, but none is large enough to hide a vehicle. With this new setting, it is no longer necessary to turn and look into the blind-zones. All that is required is a glance at the outside mirror to see if a car is there.
BGE Advantages

The new mirror setting has five major advantages.

- *First*, turning to look into the blind-zones, which can be uncomfortable and annoying, is no longer necessary.

- *Second*, only a brief glance at the mirror is required to view the blind-zone, as opposed to the longer time required when turning the head. At highway speeds, turning takes your eyes off the road for about 100 feet.

- *Third*, glancing at the mirror leaves the forward scene in your peripheral view, while turning your head completely eliminates the forward view.

- *Fourth*, the blind-zones can be easily included in your visual scanning.

- *Fifth*, at night, glare from the outside mirrors is virtually eliminated. The reason for this is that a following car’s headlamps are not visible until the car moves into the blind-zone, and at that point, the high intensity portion of the headlamp’s beam does not hit the mirror.

BGE Tips

When driving with the BGE Setting, most drivers initially feel a sense of confusion with the outside mirrors. You are not sure where they are pointed; you miss not seeing the sides of the car; and you do not know how to interpret what you see. Don’t give up. The confusion will go away, especially if you do a few simple things.

- *First*, understand that the inside mirror is truly your primary mirror. THE INSIDE MIRROR SHOWS YOU EVERYTHING EXCEPT THE BLIND-ZONES.

- *Second*, do not look at the outside mirror except to see if a vehicle is in the blind-zone. THE OUTSIDE MIRRORS SHOW YOU ONLY THE BLIND-ZONES.

- *Third*, if you are in doubt about the position of the driver’s side mirror, move your head to the side window and check to see that the side of the car is just visible. For the passenger’s side mirror, move your head to the middle.

It will take time to overcome your previous habits and accept the new way, but it will happen. Perseverance will reward you with a new dimension in driving which will enhance your safety and comfort.
Lesson 2 - Basic Maneuvers

Topic 1 – Entering Roadway Tasks

There are 9 steps to prepare for entering a roadway.

1. **Maintain Service Brake Pressure** - Holds vehicle motionless until ready to proceed.
2. **Select Proper Gear (Drive, Overdrive, or Reverse)** - This will put the vehicle in forward motion gear.
3. **Traffic Check, Including Rear and Side Mirrors** - What possible traffic might you see.
4. **Proper Signal** - Signals are used to show direction of movement away from curb into flow of traffic. The lane changer signal device (slight pressure halfway down or up on lever to activate signal) may be more appropriate in this situation.
5. **Release Parking Brake** - It needs to be released to avoid damage to the car. The driver’s foot should be placed firmly on the service brake when the parking brake is released.
6. **Traffic Recheck Including Mirror Blind Spots** - To avoid conflicts that are impossible to see in the mirror.
7. **Look to Appropriate Lane Position** - Visually target lane space prior to moving into it.
8. **Release Service Brake, Move to Accelerator** - Vehicle will begin motion as brake is released, gradually apply accelerator.
9. **Progressive Application of Pressure to Accelerate** - Gradually, firmer and firmer pressure will allow vehicle to accelerate smoothly.

Topic 2 – Moving to Curb/Side of Road

There are eight steps to prepare for Moving to Curb/Side of Road:

1. **Traffic Check Including Rear and Side Mirror Areas** - Reveals traffic conditions behind the vehicle and to the sides.
2. **Proper Signal** - Inform others of your intentions to move from the roadway.
3. **Target Visual Reference Point** - Use center visual reference guide for 0-6 inches to position close to curb or edge of roadway.
4. **Mirror Blind Area** - A visual check is the only way mirror blind areas are eliminated if mirror setting is in traditional mode. Alternative settings can reduce and eliminate mirror blind spot.
5. **Brake Control** - Controlled braking pressure eliminates jerky stops; also informs others of your intentions to stop the vehicle.
6. **Stabilize Steering Wheel** - Big steering movements are not necessary to align with curb. Move the wheel and maintain hand position on steering wheel. Use visual targeting and sightlines to align.
7. **Recheck Traffic** - Traffic to sides and rear are important as lane position is established.
8. **Check Signal** - If lane changer device is not used, slight recovery steering may not automatically cancel the signal.

**Topic 3 - Backing**

There are eight steps to prepare for backing up.

1. **Restraints Adjustment** - Head restraint may need to be lowered or readjusted. Seat belt may need to be loosened by moving buckle to straight position and pulling belt strap for adjustment.
2. **Traffic Check and View Target Area** - Area must be free of pedestrian and vehicle movement.
3. **Foot on Service Brake** - In some cases right foot may be used to keep balance and left foot used to operate brake pedal. Brake will be used to move car, so good visual and seat position must be established first.
4. **Gear Selector to Reverse** - Place gear selector lever from Park (P) or Neutral (N) to Reverse (R). Both gears are found on either side of Reverse (R) on automatic transmission or transaxle. One of the reasons to start vehicle in Neutral (N) is to be able to shift to an appropriate gear without going across Reverse (R).
5. **Proper Signal** - Often drivers use the turn signal inappropriately when backing out of a parking space. Backup lights are the appropriate signal, more visible to the rear than a red turn signal. Backup lights come on automatically when the gear selector is moved to the R position.
6. **Release Parking Brake** - It is appropriate to release the parking brake when fully prepared to move.
7. **Readjust Seat Position** - After turning to release brake, the seat position for good view of target area is often lost. Reestablish target and recheck pedestrians and vehicle movements.
8. **Visually Target Position/Maintain Reference Points** - Look to target area and visual turn point while maintaining lane position. This can only be done by looking at least three lengths of the car to the rear, since two lengths are not visible when looking to the rear.
Lesson 3 - Reference Points

Topic 1 – What are Reference Points?

Definition

- From the driver’s seat, see some part of the vehicle as it relates to some part of the roadway, to know where the vehicle is actually located.

- But what does this really mean? From your viewpoint behind the steering wheel, it is difficult to see the exact location of the wheels, both front and back bumpers and side of the car when parking or turning. Reference points are visual guides to help you judge your distance when performing parking or turning tasks.

Reference Point Usage

- Drivers cannot see the actual position of the car in relation to the roadway. The reason for this is that the driver’s view of the road is blocked by the dashboard and by the hood of the car. Reference points can be developed to serve as a guide to overcome the vision problems a driver encounters.

- The reference point to tell where the right tires are located is the hood ornament. If the car doesn’t have a hood ornament, the curb would appear to be at the center of the hood. When the front of the car is even with a line, the driver will see that line appear near the passenger’s side mirror. When the car is 3-6 inches away from a line to the left, the driver will see that line appear to be one foot in from the edge of the left fender.

Standard Reference Points

- The reference points presented in this lesson show the way most drivers will see them. They are referred to as “standard” reference points. When attempting to discover a reference point, first use the “standard” reference point. If the “standard” reference point was accurate for you, continue to use it. If any reference point cited varies, then make note of your “personal” reference point. It won’t be more than a few inches away from the “standard” reference point. Once you succeed, remember the correct picture of your “personal” reference point for future use.

- Reference points are the tools necessary for the driver to receive accurate feedback for successful performance. If a driver parks alongside a curb perfectly but didn’t use reference points, there was no learning of what gave the perfect results. It would be difficult to repeat the same actions with the same results.
Topic 2 – Limitations

Front Limitations

Target the line to the side of the vehicle and look from the line under the side view mirrors to the curb. Together they will help you determine where the front limitation of your vehicle is.

- **Front bumper to curb line**

  The reference point is marked by the line appearing to go across the left outside mirror when looking left and the right outside mirror when looking right.

  You would use this method to tell where the front bumper is in relation to curbs when parking.

- **3-6 inches from left**

  The reference point is marked by the line appearing to go across the hood that is about one foot from the left edge of the car.

  You would use this method to tell where the left tires are tracking, when the car is in lane two and when preparing to turn left.

- **3-6 inches from right**

  The reference point is marked by the line appearing to go across a point near the center of the hood.

  You would use this method to tell where the right tires are tracking, and when parking the car to the right of the curb.

- **3 feet from the right**

  The reference point is marked by the line appearing to go across the middle of the right half of the hood. You would use this method when preparing to turn right, to back into a parallel parking space or when there is no lane line to the right.

- **6 feet from the right**

  The reference point is marked by the line appearing to go across the right headlight. You would use this method when turning right into a driveway as well as when pulling forward into an angled parking space.
Back Limitations

Rear or Back limitations are used to know where the rear end of your vehicle is when you are backing into a parking space or any other backing position or when perpendicular parking.

- **Rear bumper 3-6” from line**

  The reference point is marked by the line appearing to go across the right passenger window when turning head right and when turning left will appear near the middle of the left passenger window.

  You would use this method to know where the rear bumper is positioned and backing into a rear parking space.

- **Rear bumper is 3 feet from line**

  The reference point is marked by the line appearing to go across the rear of the right passenger window.

  You would use this method when backing. It would let you know when to turn the steering wheel while backing around a corner.

Left Side Limitations

Left side limitations are used to know where the left side of your vehicle is when you are parking in a space on the left side.

- **Beyond curb line**

  The reference point is marked by the line appearing to go across from the driver’s point of view to the curb line.

  You would use this method when turning left.

Right Side Limitations

Right side limitations are used to know where the right side of your vehicle is when you are parking in a space on the right side. It is also used to position you in Lane Position 3.

- **6 feet from the right**

  The reference point is marked by the line appearing to go from the passenger side mirror.
You would use this method to alert you when your front bumper has become in position with the aimed object -- for making a right turn -- and the safety stop position where you would gain the best view of an intersection without being in position danger.

**Topic 3 - Lane Positions**

**Definition – Lane Position**

- Lane positions or placement will allow the driver to make adjustments to potential problems and create more space between the car and problem situations. There are actually five choices for lane positions, but the most frequently used will be discussed in this lesson. The fourth and fifth require straddling the line and would only be used in an extreme emergency.

- On most highways or streets the width of a lane is twelve feet. The average vehicle has a width of six feet. This gives you six feet to maneuver your vehicle within the lane should it be required.

**Lane Position 1**

Position number 1 is in the middle of the lane and will be used for the majority of driving situations.

- In position number 1, you are in the center of your lane with your car approximately three feet from the right or left line.
- Your line of sight through the driver’s side left fender to the center line.
- Your line of sight through the center of passenger’s side is the right half of the hood to the edge or edge line of the roadway.

**Lane Position 2**

- Position 2 is a placement to the left when a restriction to your path of travel or line of sight exists. Without having to move out of the lane of travel.
- In position number 2, you are in the left side of your lane. Your car is approximately six inches away from the line to the left.
- Your line of sight reference is about one foot from left side or may be the crack line between your left fender and hood of your vehicle to the curb.
- Your line of sight through the right side of the hood to the edge or edge line of the roadway.

**Lane Position 3**

- Position 3 is a placement to the right when a restriction to your path of travel or line of sight exists -- without having to move out of the lane of travel.
• In position number 3, you are in the right side of your lane. Your car is approximately six inches away from the edge line to the right.
• Your line of sight reference is the edge of the side mirror to the left.
• Your line of sight through the center of your hood to the right edge or edge line of the roadway.

Angle Parking

When parking in an angled parking space, it is necessary to utilize some of the techniques just learned. Reference points will be used by placing vehicle five feet from right side, target the middle of the parking space, and use right front turn point to initiate steering into middle of space.
Lesson 4 - Vehicle Balance

Topic 1 – Understanding Vehicle Balance

What is Vehicle Balance?

Vehicle Balance refers to the distribution of the weight of the vehicle on the tires as they meet the ground. This down-force of the tire patch to the roadway is affected by tire pressure and the suspension geometry. The ideal tire patch size and balance for a vehicle is only reached when the vehicle is still. As soon as motion occurs, changes to the vehicle balance or weight on the tire patches change. A transfer of weight from one point of the vehicle to another is caused by acceleration, deceleration, cornering, or a combination of these actions. If there is no acceleration or deceleration, the vehicle is traveling at a constant speed or stopped, the suspension is set on center and the steering and traction condition is considered to be in balance.

Vehicle Balance Terms

- **YAW** - The term Yaw means vehicle movement to the left or right around the center of gravity. Loss of traction to rear tires causes vehicle to spin while sudden steering, sudden braking, or sudden acceleration may cause vehicle top spin around its center of gravity due to traction loss in rear.

- **ROLL** - The term Roll means vehicle movement to the left or right side. Steering to the left makes vehicle roll to the right, while steering to the right makes vehicle roll to the left.

- **PITCH** - The term Pitch means vehicle movement to the front or to the rear, braking causes a drop in the front and lifts the rear while acceleration lifts the front and drops the rear.

Topic 2 - Seat Adjustment

In order to establish vehicle balance and improve ability to see, drivers should sit in a comfortable, erect position squarely behind the steering wheel.

- Adjust seat height so that the top of the steering wheel is in line with the top of the shoulders.
- The top of the wheel should never be more than one inch higher than the top of the shoulders. (In vehicles without power seats and/or adjustable steering columns or tilt steering wheels, some drivers will need to use a wedge-shaped driver’s cushion.)
- Proper distance from the steering wheel can be determined by extending the arm straight forward and adjusting the position of the seat, forward or back, until the top of the steering wheel is in line with the wrist joint.

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Drivers under 5’ 5” in height or with short legs may need to use brake and accelerator pedal extensions to comfortably reach and operate the pedals and to maintain a distance of 10 inches between their body and the steering wheel to reduce the chance of injury in the event of air bag inflation.

Steering Wheel Control

Due to changes in steering ratios and effort needed to turn the wheel, recommendations relative to hand position on the steering wheel have become more flexible. In order to maximize vehicle control, normal steering control involves the balance of the steering wheel to avoid sudden movements and minimize steering wheel reversals.

Hand Position

- Placing the hands at shoulder height (the left hand between 9 and 10 o’clock and the right hand between 2 and 3 o’clock) allows for balanced shoulder strength to control the wheel.
- Placing the left hand between 7 and 9 o’clock and the right hand between 3 and 5 o’clock with the upper arms resting against the rib cage also improves stability by lowering the body’s center of gravity and reduces unintended steering wheel reversals. Because of its more natural seating position, it also facilitates keeping both hands on the wheel and reduces upper and lower back pain often associated with trip driving.
- The driver’s grip of the steering wheel should be firm but gentle.
- Grip the steering wheel by the outside rim.
- For greater sensitivity to information communicated by the vehicle, use fingers instead of palms of hands and keep thumbs up along the face of the steering wheel.
- Never turn the wheel while gripping it from the inside of the rim, hand facing outward.

Steering Techniques

To steer when turning and moving forward, use both hands—one pushing; the other pulling. In general, when backing and turning, use one hand. Four types of steering movements will be used during various in-car exercises. They are: hand to hand, limited evasive steer, hand over hand, and one hand steer.

Hand to Hand Steering

- Sometimes referred to as Push/Pull/Feed Hand to hand steering permits the driver to make steering inputs ranging from very minor, one to two degrees, to gross adjustments up to a half turn of the wheel, while keeping both hands on the wheel for precision adjustments.
• If turning through a slight curve, both hands will typically retain their original grip on the wheel, making only slight finger or wrist adjustments as necessary to maintain path of travel.
• However, when moving through a turn, the hands may move up to 165 degrees (neither hand moves beyond the 6 or 12 o’clock positions).
• The process is reversed to return to a straight path. The wheel is not allowed to slip through the fingers to straighten when coming out of a turn and both hands are always on the wheel to make adjustments as necessary.
• Hand to hand steering is particularly well suited for precision maneuvers, steering through curves, intersection entry and exit, and front wheel traction loss control (vehicle under-steer).

Hand Over Hand Steering

• Hand over hand steering is particularly well suited when speed of the steering movement is critical such as skid recovery in a rear wheel traction loss (vehicle over-steer).
• When used to control or recover from a skid, it is important to hold the wheel in a pattern that allows the driver to use the upper left third of the wheel when steering to the left and the upper right third when turning right. This procedure allows for maximum movement of the wheel with knowledge of its neutral position.
• Hand over hand steering is also useful when maneuvering in a space with limited sightlines, such as perpendicular parking in a congested shopping center. When using hand over hand steering, quick movements of the hands are recommended on entry to the maneuver, with smooth slow movements when returning the wheel upon completion of the maneuver.
• Drivers should be aware that employing hand over hand steering under all conditions does expose one to some additional risk of injury to arms, hands, and/or face in the event of a crash that results in air bag inflation.
• Use of hand over hand as the primary steering technique raises the risk of off-road crash occurrences.

Limited Evasive Steering

• Crash studies indicate that inattention to the path ahead was the primary cause of nearly 21% of the reported crashes. However, 5.6% occurred as a result of failure to make a quick turn, or improper evasive action. Whether performed at low or high speed, a quick turn results in a shift of weight or center of mass to the left or right side of the vehicle.
• Speed of travel and steering input have a direct influence on the level (increase) of weight transferred to the front corner opposite the direction of the turn with a reduction in the weight to the rear, particularly on the side in the direction of the turn.
• When an error has been committed and closure is occurring at higher speeds, the quickness and amount of steering input needed to make a 12-foot lane change increases. This added, sudden, steering input coupled with the speed of travel,
unless dampened by a smooth, rapid, limited steering effort is capable of
generating sufficient weight transfer to cause a loss of directional control.

One Hand Steering

- Movement of the steering wheel with one hand is recommended only for backing
  maneuvers which do not require full left or right turns or when operating
  information, safety, or comfort devices.
- Backing and steering with one hand requires shifting one’s hip and seat position
  so the driver’s head can be turned to see past the head restraint.
- To improve balance, the driver’s right arm is often draped over the back of the
  seat.
- Visual checks to the front should be made prior to starting the backing maneuver.
- The left hand grips the steering wheel near the top and is moved in the direction
  the driver wishes the rear of the vehicle go.
- The left hand at the bottom may be used to back a trailer.
- Sharp turns while backing may require the use of both hands. Since it is more
difficult to maintain steering control when backing, all reverse movements should
be made at slow speed.

Changing Vehicle Balance from Side to Side

Sudden steering, acceleration, or braking inputs can affect vehicle balance from side to
side.

- Steering Movements. Weight or center of mass shifts to left or right side of
  vehicle depending on speed, traction and amount of steering input. Occupants
  may or may not feel forward movement toward the corner of the vehicle opposite
  the direction of the turn.
- Brake and Steering Combinations. Depending on degree of steering and brake
  input, braking may improve traction, such as in trail braking through a turn, when
  performed at an appropriate speed. However, applying the brakes when cornering
  at too high a speed has little effect relative to slowing the vehicle, but may have a
  highly noticeable effect on producing traction loss due to severe weight shift.

Changing Vehicle Balance from Front to Rear (Pitch).

Sudden steering, acceleration, or braking inputs can affect vehicle balance from front to
rear. When acceleration is applied, weight or center of mass is transferred toward the
rear of the vehicle. If acceleration is sudden and hard there is a noticeable drop of the rear
of the vehicle and occupants feel a rearward thrust.

- **Releasing Brake** -- Simply releasing pressure from the brake pedal results in a
  shift of weight to the rear.
• **Covering Accelerator** -- The purpose of covering the accelerator is to provide a smooth transition from brake release to progressive acceleration. It is similar to trail braking in that speed and vehicle balance are maintained prior to braking.

• **Light Accelerator Pressure** -- The purpose of light accelerator pressure is to maintain weight balance while maintaining slow forward motion or allowing speed to slow gradually with minimal weight shift.

• **Progressive Accelerator Pressure** -- Firm, steady acceleration to increase speed and gradually shift balance of vehicle to the rear suspension. This action eases steering control and improves rear wheel traction moving out of a turn or curve.

• **Thrust Accelerator Pressure** – A firm push or thrust of accelerator used to shift more weight to the rear wheels for traction or to make a shift to a lower gear in a vehicle with an automatic transmission for increased rate of acceleration. This process is sometimes called for in passing and lane change maneuvers in higher speed traffic situations.

**Changing Vehicle Load from Rear to Front (Pitch).**

Sudden steering, acceleration, or braking inputs can affect vehicle balance from rear to front. When brakes are applied, weight or center of mass is transferred to the front of the vehicle. If braking is hard, there is a noticeable drop of the hood and rise of the rear of the vehicle and occupants feel forward movement. The most efficient way to slow or stop your vehicle is to brake while traveling in a straight line. This allows the braking force to have an evenly distributed effect on all four wheels.