

Basic Course Workbook Series Student Materials

**Learning Domain 19
Vehicle Operations
Version 5.0**

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Student Materials
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Vehicle Operations
Version 5.0**

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THE ACADEMY TRAINING MISSION

The primary mission of basic training is to prepare students mentally, morally, and physically to advance into a field training program, assume the responsibilities, and execute the duties of a peace officer in society.

FOREWORD

The California Commission on Peace Officer Standards and Training sincerely appreciates the efforts of the many curriculum consultants, academy instructors, directors and coordinators who contributed to the development of this workbook. The Commission extends its thanks to California law enforcement agency executives who offered personnel to participate in the development of these training materials.

This student workbook is part of the POST Basic Course Training System. The workbook component of this system provides a self-study document for every learning domain in the Basic Course. Each workbook is intended to be a supplement to, not a substitute for, classroom instruction. The objective of the system is to improve academy student learning and information retention.

The content of each workbook is organized into sequenced learning modules to meet requirements as prescribed both by California law and the POST Training and Testing Specifications for the Basic Course.

It is our hope that the collective wisdom and experience of all who contributed to this workbook will help you, the student, to successfully complete the Basic Course and to enjoy a safe and rewarding career as a peace officer serving the communities of California.

PAUL CAPPITELLI
Executive Director

LD 19: Vehicle Operations

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Preface

Introduction

Student workbooks

The student workbooks are part of the POST Basic Course Instructional System. This system is designed to provide students with a self-study document to be used in preparation for classroom training.

Regular Basic Course training requirement

Completion of the Regular Basic Course is required, prior to exercising peace officer powers, as recognized in the California Penal Code and where the POST-required standard is the POST Regular Basic Course.

Student workbook elements

The following elements are included in each workbook:

- chapter contents, including a synopsis of key points
 - supplementary material
 - a glossary of terms used in this workbook
-

How to Use the Student Workbook

Introduction

This workbook provides an introduction to the training requirements for this Learning Domain. It is intended to be used in several ways: for initial learning prior to classroom attendance, for test preparation, and for remedial training.

Workbook format

To use the workbook most effectively, follow the steps listed below.

Step	Action
1	Read the first two sections: Preface and How to Use the Workbook, which provide an overview of how the workbook fits into the POST Instructional System and how it should be used.
2	Refer to the Chapter Synopsis section at the end of each chapter to review the key points that support the chapter objectives.
3	Read the text.
4	Complete the Workbook Learning Activities at the end of each chapter. These activities reinforce the material taught in the chapter.
5	Refer to the Glossary section for a definition of important terms. The terms appear throughout the text and are bolded and underlined the first time they appear (e.g., <u>term</u>).

Chapter 1

Defensive Driving

Overview

Learning need Officers need to know the importance of defensive driving principles and techniques in order to develop safe driving habits.

Learning objectives The chart below identifies the student learning objectives for this chapter.

After completing study of this chapter, the student will be able to:	E.O. Code
<ul style="list-style-type: none">Determine a safe distance when following another vehicle	19.01.EO20
<ul style="list-style-type: none">Identify the effect of speed on a driver's peripheral vision	19.01.EO21
<ul style="list-style-type: none">Discuss how reaction time lapse affects vehicle stopping distance	19.01.EO22
<ul style="list-style-type: none">Demonstrate appropriate actions to prevent collisions when entering intersections	19.01.EO23
<ul style="list-style-type: none">Recognize potential hazards of freeway driving and appropriate actions to prevent collisions	19.01.EO24
<ul style="list-style-type: none">Demonstrate appropriate actions to prevent collisions when operating a vehicle in reverse	19.01.EO25
<ul style="list-style-type: none">Demonstrate the importance and proper use of safety belts in a law enforcement vehicle	19.01.EO10

Continued on next page

Overview, Continued

Learning objectives (continued)

After completing study of this chapter, the student will be able to:	E.O. Code
• Identify physiological and psychological factors that may have an effect on an officer's driving	19.01.EO14
• Identify hazards of varied road conditions	19.01.EO16
• Discuss the requirements for a vehicle inspection	19.01.EO19
• Demonstrate proper techniques for coping with distractions unique to operating a law enforcement vehicle	19.01.EO

In this chapter

This chapter focuses on the law enforcement vehicle collisions and the officers legal responsibilities while operating a law enforcement vehicle. Refer to the following chart for specific topics.

Topic	See Page
Components of Defensive Driving	1-3
Physiological and Psychological Factors Affecting Law Enforcement Vehicle Operations	1-10
Factors Affecting Law Enforcement Vehicle	1-12
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Components of Defensive Driving

[19.01.EO10, 19.01.EO20, 19.01.EO21, 19.01.EO22, 19.01.EO23, 19.01.EO24, 19.01.EO25]

Introduction

Safe driving habits can reduce risk of collision and injury. Officers have a duty to drive in an exemplary manner, as other drivers' attitudes toward law enforcement and their own driving can be affected by how peace officers drive.

Definition

Defensive driving is driving in a manner that avoids collisions at all times regardless of who has the right of way, whether in normal conditions, "Code 3," or pursuit operations.

Ethics

Peace officers are often called to respond to an emergency as quickly as possible knowing that the outcome of the emergency may rest in the balance. It is the obligation of all officers to respond to these calls in a responsible manner, balancing the risk of their driving behaviors against the risk to the public posed by the call. Peace officers operating emergency vehicles are accountable under Federal and State laws and agency policy as well. Failure to operate within the law and policy can result in criminal prosecution, civil liability and agency discipline.

Characteristics of a defensive driver

Defensive drivers:

- view safe driving as a personal responsibility
 - recognize the dangers involved in driving a law enforcement vehicle
 - drive at a speed that is safe for existing conditions
 - yield the right-of-way when necessary
 - make good and safe choices while driving
-

Space cushion

A **space cushion** is the clear area surrounding a vehicle. It includes the front, rear, and sides of the vehicle.

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Components of Defensive Driving, Continued

Peripheral vision

Peripheral vision is everything seen laterally when the eyes focus straight ahead. The average person has 180 degrees of vision when they are stationary.

With increases in speed or stress, peripheral vision can significantly decrease. This is known as **tunnel vision**.

Vision

Focal point is the specific point at which a driver is looking at a given moment in time. This, in great part, determines where a vehicle will go. A vehicle tends to go toward the drivers' focal point.

Defensive drivers will look at escape routes during an emergency situation, rather than looking directly at the hazard. This is known as "driving to the solution." Drivers should look a good distance down the road in order to identify hazards early. This allows for more **perception time** and **reaction time**. This is known as keeping a high **visual horizon**.

Perception time and reaction time

The average driver's perception time is .75 seconds and their reaction time is another .75 seconds. It takes a total of 1.5 seconds to perceive and react to a problem on the road. Depending on the speed of the vehicle, a significant distance can be covered during the 1.5 second period.

For example, a vehicle traveling at 60 MPH will cover 132 feet in 1.5 seconds during an average driver's perception and reaction time. The calculation for the distance covered during 1.5 seconds is:

$$\text{Speed} \times 2.2 = \text{distance traveled in 1.5 seconds}$$

Following distance

A safe minimum **following distance** is at least three seconds of time between vehicles. This allows sufficient time for a driver to react to sudden hazards.

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Components of Defensive Driving, Continued

Distraction while driving

Officers may be distracted by multiple factors while driving a law enforcement vehicle which may include, but are not limited to:

- Cell phone
- Texting
- Computer
- Food/drink
- Radio
- Other occupants
- Map/GPS
- Code-3 equipment
- Patrol activities
- Unsecure objects

Officers should understand the relevance and consider the priority of distractions while driving a law enforcement vehicle. Officers should not type on the computer while driving.

Intersections

Intersections pose the greatest potential for collisions. Defensive drivers, even if they have the right of way, visually clear intersections (lane by lane) by looking for cross traffic and pedestrians.

A defensive driver should always assume that every lane of traffic is occupied until they can prove otherwise.

The following table identifies intersection hazards and the appropriate response:

Hazard	Response
Clearing intersections	<ul style="list-style-type: none">• Look left, then center, then right, then left again before proceeding• Clear intersections lane by lane• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way• Be prepared to stop if necessary

Continued on next page

Components of Defensive Driving, Continued

Intersections (continued)

Hazard	Response
Fresh green light	<ul style="list-style-type: none">• Pause and look both ways before proceeding into the intersection to allow for cross traffic running the red light• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way
Stale green light	<ul style="list-style-type: none">• A stale green is one that has been green for awhile. Drivers should anticipate it turning to yellow and slow down• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way
Right turns	<ul style="list-style-type: none">• When waiting for another vehicle ahead of you to make a right turn, do not anticipate that the other driver will proceed when it is clear. This assumption may result in a rear end collision• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way
Left turns	<ul style="list-style-type: none">• When waiting to make a left turn, keep the front wheels straight to avoid being pushed into traffic if hit from the rear• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way

Continued on next page

Components of Defensive Driving, Continued

Freeway driving

Freeway driving poses different hazards than driving on city streets. The following table identifies potential hazards and appropriate responses while driving on the freeway:

Hazard	Response
Merging onto freeway	<ul style="list-style-type: none">• Match the speed of the flow of traffic• Signal your intention to merge
Re-entering freeway after a traffic stop	<ul style="list-style-type: none">• Use the shoulder as an acceleration lane• Match the speed of traffic before merging• Signal your intention to merge
Driving at high speed for long periods	<ul style="list-style-type: none">• Checking your speedometer frequently will assist in maintaining appropriate speed awareness

Operating a vehicle in reverse

Officers should be aware that a large percentage of collisions occur while operating a vehicle in reverse. When operating a vehicle in reverse (also known as backing), officers should:

- Get out and see what is behind the vehicle if you are not certain
- Look out the rear window over their right shoulder for maximum visibility
- Continue looking back until applied brake brings the vehicle to a stop
- Use someone else to assist you while backing when necessary
- Use all available mirrors if the view out the back window is obstructed

Continued on next page

Components of Defensive Driving, Continued

Operating a vehicle in reverse (continued)

The following table identifies specific backing situations that officers may encounter:

Hazard	Consideration
Backing at greater than 10 mph	<ul style="list-style-type: none">• Avoid unless necessary• Back in a straight line when possible• Use minimum and smooth steering input
Backing on roadway	<ul style="list-style-type: none">• Use the shoulder of the road• Avoid erratic movements that could confuse other drivers• Back slowly and smoothly• Be aware of obstacles
Parking	<ul style="list-style-type: none">• When possible, back into parking space when arriving rather than when leaving

Changing lanes

Lane change collisions occur when drivers fail to check their blind spot and when they fail to signal. Drivers need to check the **blind spot** (which can be large in law enforcement vehicles with cages and roll bars) by looking over their shoulder and checking the mirrors.

Continued on next page

Components of Defensive Driving, Continued

Seatbelts

Seatbelts have proven to be the single most effective way of protecting vehicle occupants from serious injury or death in a collision when worn properly. For tactical safety reasons, the officer should disengage and retract the seatbelt just prior to arriving at a scene which may involve law enforcement activity.

NOTE: Most agency policies require that officers wear seatbelts when driving.

Airbags

Air bags are a **supplemental** restraint system and **do not replace safety belts**. Air bags cushion the occupant in collisions. Air bags inflate with explosive force, and then immediately deflate.

Air bags deploy from the steering wheel at a high rate of speed. If the driver's hands or arms are in front of the steering wheel when this happens, serious injury could result.

Air bag deployment is dependent upon speed, the angle at which the vehicle strikes an object, and the rigidity of the object.

Air bags do not prevent occupants from being ejected from the vehicle.

Physiological and Psychological Factors Affecting Law Enforcement Vehicle Operations

[19.01.EO14]

Introduction	Because officers have had training and have extensive driving experience they must never assume that they are immune from becoming involved in collisions which can lead to serious injury, disciplinary action, and lawsuits.
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Contributing factors	The following are factors that can contribute to officers becoming involved in collisions:
-----------------------------	--------------------------------------------------------------------------------------------

- Driving skill
 - Psychological factors
 - Physiological factors
 - Vehicular factors
 - Driving conditions
-

Driving skills	Average driving skills are inadequate for driving a law enforcement vehicle. Officers must learn to safely drive in routine and emergency situations while fulfilling their duties. This requires a unique set of driving skills that must be learned and practiced.
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Psychological factors	Officers must be aware that psychological factors have an effect on their ability to drive safely. These attitudes and emotions influence judgment and decision-making:
------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------

- Excitement
 - Impatience
 - Aggression
 - Overconfidence
 - Lack of confidence
 - Self-righteousness
 - Fear
 - Peer pressure
 - Preoccupation
-

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Physiological and Psychological Factors Affecting Law Enforcement Vehicle Operations, Continued

Physiological factors

The attitudes and emotions of a driver can elicit a physiological response which can have an adverse effect on an officer's ability to drive safely.

Physiological responses include:

- Increased adrenaline flow
- Rapid pulse
- Rapid breathing
- Tunnel vision
- Loss of sensory perception
- Deterioration of decision-making ability
- Loss of motor skills

Physiological factors can also be based on:

- Lack of sleep
 - Illness
 - Medication
 - Fatigue
-

Factors Affecting Law Enforcement Vehicle Operations

[19.01.EO16, 19.01.EO19]

Driving conditions

Good defensive drivers recognize and adapt to the changing conditions encountered on the road.

The primary consideration for an officer regarding safe speed is not necessarily the posted limit, but it is the safe speed for conditions.

The following table lists conditions drivers may encounter and the appropriate response:

Condition	Hazard	Response
Standing water or rain	Hydroplaning can occur in as little as 1/16 inch of water	Reduce speed and minimize steering
Loose gravel	Loose gravel causes reduced traction	Reduce speed and minimize steering Maintain space cushion with other vehicles
Mud	Mud will fill tire tread and cause reduced traction During a skid at high speed, mud can build up on one side of the wheel and cause a rollover	Reduce speed Keep moving to avoid getting stuck Use good throttle control to avoid wheel spin
Hills	Hills can limit visibility Potential for overheating brakes to the point of failure (brake fade)	Do not pass on hills without sufficient visibility Shift to lower gear
Construction zones	Workers, ditches, and other road hazards	Reduce speed and be alert to sudden hazards

Continued on next page

Factors Affecting Law Enforcement Vehicle Operations,

Continued

Driving conditions (continued)

Condition	Hazard	Response
Potholes	Potholes can damage tires and suspension	Maintain a firm grip on the steering wheel Reduce speed and let off brake if hitting a pothole is unavoidable
Snow and ice	Reduced traction Increased <u>stopping distance</u> <u>Black ice</u> is a frequently unseen coating of ice on roadway surfaces, especially on bridges and shaded areas	Use gentle throttle, brake, and steering Keep a large space cushion Drive slowly in temperatures when ice can form
Fog	Limited visibility	Drive slowly and keep a large space cushion around vehicle Use low beam headlights
Night driving	Limited visibility	Avoid looking directly at headlights of oncoming vehicles Maintain a larger space cushion than during the day Be mindful of stopping distance and do not overdrive headlights

Continued on next page

Factors Affecting Law Enforcement Vehicle Operations,

Continued

Vehicle inspection

Improperly maintained vehicles can experience mechanical failure, which can jeopardize the safety of the driver and others on the road. Therefore, it is essential that officers properly inspect their vehicle before and after each tour of duty.

The following mechanical problems can result in a collision:

- Low **tire pressure**
- Worn or damaged tires
- Brake failure
- Engine failure
- Electrical system failure

The following table shows aspects of a proper vehicle inspection:

Area	Procedure
Tires	Check tire pressure using a pressure gauge. Pressure should be maintained at the vehicle manufacturer's recommendations.
Vehicle attitude	Check to see if the vehicle is sitting at a normal attitude, not leaning to one side.
Under the vehicle	Check for fluids on the ground: Brown - engine oil Red - transmission fluid Green or Orange - coolant Clear water - condensation from air conditioning
Exterior	Check all sides for body damage.

Continued on next page

Factors Affecting Law Enforcement Vehicle Operations, Continued

Vehicle inspection (continued)

Area	Procedure
Lights	Check: Headlights Brake lights Tail lights Turn signals Emergency lights
Interior	Check: Radio equipment Siren PA system Rear seat for contraband

Vehicle abuse

Officers have an ethical responsibility to treat all vehicles with care. Agencies spend money that could have been used for better purposes, to repair damage from vehicle abuse. Abuse often results from unprofessional attitudes displayed when officers think because the car does not belong to them they can mistreat it.

Chapter Synopsis

Learning need	Officers need to know the importance of defensive driving principles and techniques in order to develop safe driving habits.
Space cushion [19.01.EO20]	The clear area around the car and a safe following distance.
Peripheral vision [19.01.EO21]	Everything seen laterally when the eyes focus straight ahead.
Reaction time [19.01.EO22]	Amount of time after a driver has perceived an object or potential hazard until the driver can make a decision and initiate an action (for the average driver, the decision/reaction time is .75 seconds).
Entering intersections [19.01.EO23]	Intersections pose the greatest potential for collisions.
Freeway driving [19.01.EO24]	Freeway driving poses different hazards than driving on city streets.
Backing [19.01.EO25]	Officers should be aware that a large percentage of collisions occur while backing.
Seatbelts [19.01.EO10]	When worn properly seatbelts have proven to be the single most effective way of protecting vehicle occupants from serious injury or death in a collision.

Continued on next page

Chapter Synopsis, Continued

**Psychological/
physiological
factors
[19.01.EO14]**

Officers must be aware that psychological factors can have an effect on their ability to drive safely, and attitudes and emotions of a driver can elicit a physiological response.

**Varied
road
conditions
[19.01.EO16]**

Good defensive drivers recognize and adapt to the changing conditions encountered on the road.

**Vehicle
inspection
[19.01.EO19]**

Improperly maintained vehicles can experience mechanical failure, which can jeopardize the safety of the driver and others on the road.

Workbook Learning Activities

Introduction

To help you review and apply the material covered in this chapter, a selection of learning activities have been included. No answers are provided. However, by referring to the appropriate text, you should be able to prepare a response.

Activity questions

1. Describe how peripheral vision changes from stopped to 60 miles per hour.
2. Describe a correctly performed vehicle inspection of the exterior of a law enforcement vehicle. What action should you take, if any, if you note severe rear tire wear?

Continued on next page

Activity questions (continued)

- Continued on next page*

Workbook Learning Activities, Continued

Activity questions (continued)

5. Describe how a heavy rainstorm could affect an officer's ability to avoid a collision. What actions could officers who must respond to an emergency call in a downpour do to decrease the risk to themselves and others?

Workbook Corrections

Suggested corrections to this workbook can be made by going to the POST website at: www.post.ca.gov

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Workbook Corrections, Continued

Student notes

Chapter 2

Emergency Driving

Overview

Learning need Peace officers must recognize that emergency response (Code 3) driving demands a high level of concentration and instant reactions.

Learning objectives The chart below identifies the student learning objectives for this chapter.

After completing study of this chapter, the student will be able to:	E.O. Code
<ul style="list-style-type: none">• Identify the objectives of emergency response driving	19.02.EO18
<ul style="list-style-type: none">• Recognize the statutes governing peace officers when operating law enforcement vehicles in the line of duty<ul style="list-style-type: none">- Rules of the road- Liability	19.02.EO19
<ul style="list-style-type: none">• Explain the importance of agency specific policies and guidelines regarding emergency response driving	19.02.EO20
<ul style="list-style-type: none">• Identify the statutory responsibilities of non-law enforcement vehicle drivers when driving in the presence of emergency vehicles operated under emergency response conditions	19.02.EO21
<ul style="list-style-type: none">• Demonstrate the use of emergency warning devices available on law enforcement vehicles	19.02.EO22
<ul style="list-style-type: none">• Identify factors that can limit the effectiveness of a vehicle's emergency warning devices	19.02.EO23

Continued on next page

Overview, Continued

Learning objectives (continued)

After completing study of this chapter, the student will be able to:	E.O. Code
• Demonstrate the use of communications equipment	19.02.EO26
• Identify the effects of siren syndrome	19.02.EO24
• Recognize guidelines for entering a controlled intersection when driving under emergency response conditions	19.02.EO25

In this chapter

This chapter focuses on emergency driving operations. Refer to the following chart for specific topics:

Topic	See Page
Operating Emergency Response Vehicles	2-2
Chapter Synopsis	2-12
Workbook Learning Activities	2-14

Operating Emergency Response Vehicles

[19.02.EO18, 19.02.EO19, 19.02.EO20, 19.02.EO21, 19.02.EO22, 19.02.EO23, 19.02.EO24, 19.02.EO25, 19.02.EO26]

Introduction

Safe emergency response driving requires a unique set of driving skills. Officers need a thorough understanding of the demands placed on them when driving "Code 3." A combination of good driving habits and sound judgment will allow an officer to drive to the scene of an emergency quickly and safely.

Objective of driving "Code 3"

The objective of emergency response driving is to get to the scene of an emergency quickly and safely.

A situation requiring an emergency response is one that requires an immediate law enforcement response for the protection of life or property. It is also generally known as a "Code 3" response. Refer to your specific agency policy for emergency response guidelines.

Examples of emergencies where a "Code 3" response would be appropriate:

- Any life threatening emergency
 - Serious crime in progress
 - Officer needs assistance
 - Traffic collision involving major injuries
 - Fire
-

Continued on next page

Operating Emergency Response Vehicles, Continued

Extent of liability

The authorization for emergency response driving is very limited. The following table identifies California Vehicle Code sections relating to emergency response driving and the resulting liability exposure.

Vehicle Code Section	What	When
17001	Public entities are liable for death, injury, or property damage	Officers: <ul style="list-style-type: none">• are not acting within the scope of their law enforcement duties• commit a negligent or wrongful act or omission• actions are the cause of death, injury, or property damage
17004	Officers are not liable for civil damages for death, injury, or property damage	Operating an authorized law enforcement vehicle while in the line of duty: <ul style="list-style-type: none">• responding to an emergency call• in immediate pursuit• responding to but not returning from a fire alarm

Continued on next page

Operating Emergency Response Vehicles, Continued

Due care test

Officers fail to exercise due care if:

- they violate a statute, ordinance, or regulation of their agency
 - the violation causes death, injury, or property damage
-

Rules of the road

Vehicle Code Section 21055 provides that, as drivers of law enforcement vehicles, officers do not have to abide by certain traffic laws when they are driving under authorized emergency conditions.

Vehicle Code Section	What	When
21055	Officers may do the following if it is accomplished in a safe manner with due regard for the safety of others: <ul style="list-style-type: none">• Proceed through a red light or stop sign• Exceed the maximum speed limit• Violate other rules of the road with respect to turning movements and road position	Displaying a forward facing solid red light and sounding a siren as reasonably necessary (refer to your agency policy) When responding to: <u>F</u>ire <u>E</u>mergency <u>R</u>escue <u>P</u>ursuit
21056 & 21057	Officers must drive with due regard for the safety of others. Officers can be held civilly and criminally liable if they fail to drive with due care	At all times

Continued on next page

Operating Emergency Response Vehicles, Continued

Importance of agency policy

Since policies differ from agency to agency, officers must know and follow their specific agency policy regarding emergency response driving.

Good judgment

Officers must always use sound judgment. Officers must always drive at a speed that is reasonable and prudent taking into consideration:

- The safety of others (*Vehicle Code Section 21057*)
 - Traffic conditions
 - Weather conditions
 - Road conditions
 - Time of day
-

Escorts

Officers may conduct a “Code 3” escort only under the following circumstances:

- For preservation of life
 - Escorting supplies during emergency or time of war
-

Response to emergency vehicles

Drivers encountering an emergency vehicle displaying red lights and sounding a siren must (*Vehicle Code Section 21806*):

- Yield the right-of way
 - Immediately pull to the right side of the road
 - Stop
-

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Operating Emergency Response Vehicles, Continued

Passing other motorists

Officers need to give other drivers a chance to yield the right-of-way. Since other drivers are to yield by pulling to the right side of the road, officers should avoid passing on the right. A driver who does not see the emergency vehicle may turn into its path. Officers should drive as close to the center portion of the roadway as possible to be better seen by other drivers. Care should be taken when driving into opposing lanes.

Emergency warning devices

Emergency warning devices, such as lights and siren, can enhance your ability to move through traffic, but they will not guarantee you will be seen or heard. When driving with lights and siren, assume people will not always see you.

The following table identifies the most common emergency warning devices:

Device	Description
Light Bar	Contains rotating or flashing red, blue and amber lights
Wig-Wag Lights	Alternately flashing high beam headlights, when activated in conjunction with emergency lights
Siren	“Wail” and “Yelp” settings are the only legally available settings. Switching from one to the other when clearing intersections can be helpful. (The Vehicle Code requires that the siren be used as reasonably necessary, but refer to agency policy for specific guidelines.)

Continued on next page

Operating Emergency Response Vehicles, Continued

Limitations of warning devices

Warning devices do not guarantee the right-of-way. Certain factors can limit their effectiveness. The following table identifies these factors:

Condition	Explanation
Heavy traffic	As traffic noise increases, the ability to hear the siren decreases
Fog, rain, and snow	Emergency lights are less effective
Congested urban areas	<ul style="list-style-type: none">• Buildings can block or deflect the sound of the siren• Trees and bushes can absorb the sound of the siren• Others may have a difficult time differentiating emergency lights from the array of other lights in the area
High speed	<ul style="list-style-type: none">• As speed increases, the effectiveness of the siren decreases• By the time they hear the siren, other drivers may not have sufficient time to react
Other drivers	<ul style="list-style-type: none">• Other drivers may be distracted or prevented from hearing or seeing emergency vehicles by things such as:<ul style="list-style-type: none">- listening to loud music- talking on cell phone- looking at GPS or DVD

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Operating Emergency Response Vehicles, Continued

Drivers reactions

Other drivers can be unpredictable when they encounter an emergency vehicle. Drivers may respond by:

- Panic stopping
 - Turning suddenly
 - Accelerating suddenly
 - Not responding at all
-

Other responding units

Your own siren will drown out the sound of other sirens, so watch for other units responding to the same call or another call. (i.e., firetrucks, paramedics, etc.)

Response considerations

In order to assist in any emergency, officers must arrive safely. **Using emergency warning devices fulfills the requirements of the law, but it does not guarantee the right-of-way.** The following are some things officers must consider when responding “Code 3.”

Factors	Considerations
The Vehicle	<ul style="list-style-type: none">• Vehicle condition• Performance characteristics
The Environment	<ul style="list-style-type: none">• Weather• Time of day• Pedestrians
Route Considerations	<ul style="list-style-type: none">• Traffic conditions• Road conditions• Intersections• Location of emergency

Continued on next page

Operating Emergency Response Vehicles, Continued

Communication equipment

Maintaining communication during an emergency response is important. Officers should:

- Stay calm and speak clearly
 - Use the radio on straight stretches of road
 - Roll windows up to reduce outside noise
 - Avoid using the computer while driving
 - Avoid using the radio while clearing intersections
-

Siren syndrome

The increased stress caused by the sound of the siren and the nature of the call the officer is responding to may cause an increase in adrenaline flow. This increase in adrenaline can result in both a psychological and physiological response. As a result, judgment can be affected.

Negative effects of siren syndrome may include:

- Tunnel vision
- Loss of speed reference
- Elevated voice/rapid speech
- Loss of fine muscle control
- Sweating, elevated heart rate
- Impaired decision making

The following are things an officer can do to mitigate the effects of **siren syndrome**:

- Make a conscious decision to remain calm
 - Regulate breathing
 - Recognize the potential for tunnel vision and keep looking for hazards
 - Check speedometer to maintain speed reference
-

Continued on next page

Operating Emergency Response Vehicles, Continued

Entering controlled intersections

The greatest potential for collisions during an emergency response is at intersections. The following guidelines will help in safely entering controlled intersections when responding "Code 3."

Guidelines for entering controlled intersections when responding "Code 3"	
The Approach	<ul style="list-style-type: none">• Evaluate traffic conditions• Position for maximum visibility• Slow down• Fluctuate the siren to get the attention of others• Stop when necessary
Clearing an Intersection	<ul style="list-style-type: none">• Allow time for other drivers to react• Clear lane by lane• Keep looking left, then center, then right, then left, all the way through the intersection• Look for other "Code 3" vehicles• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way• Be prepared to stop if necessary

Chapter Synopsis

Learning need	Peace officers must recognize that emergency response (Code 3) driving demands a high level of concentration and instant reactions.
Emergency response driving [19.02.EO18]	The objectives of law enforcement driving are to get to the scene of life threatening situations, serious crimes, or assist other officer(s) quickly and safely.
Statutory conditions [19.02.EO19]	Vehicle Code Sections define the conditions for exempting officers from certain rules of the road in the line of duty.
Importance of agency specific policies [19.02.EO20]	Agency policies and guidelines regarding emergency response driving operations can be more restrictive than state law.
Non-law enforcement responses [19.02.EO21]	<i>Vehicle Code Section 21806</i> requires that, upon the immediate approach of a law enforcement vehicle operating under emergency response conditions (siren, warning lights), all drivers shall yield the right-of-way, immediately drive to the right hand edge or curb of the roadway and stop.
Emergency warning devices [19.02.EO22]	Emergency devices that may be available on law enforcement vehicles include emergency lights and sirens.

Continued on next page

Chapter Synopsis, Continued

Limitations of effectiveness of emergency devices
[19.02.EO23]

Warning devices do not guarantee the right-of-way, as certain factors can limit their effectiveness.

Use of communication equipment
[19.02.EO26]

Maintaining communication is important. Officers should always remain calm, speak clearly, minimize outside noise and use communication equipment carefully at all times.

Siren syndrome
[19.02.EO24]

Siren syndrome is a psychological and physiological condition caused by the excitement of the moment while operating a law enforcement vehicle during emergency response or pursuit driving conditions.

Clearing a controlled intersection
[19.02.EO25]

Many serious law enforcement collisions occur at intersections. There are a number of precautions that officers should take when clearing an intersection during an emergency response.

Workbook Learning Activities

Introduction

To help you review and apply the material covered in this chapter, a selection of learning activities has been included. No answers are provided. However, by referring to the appropriate text, you should be able to prepare a response.

Activity questions

1. Responding to an emergency call in a domestic violence situation, a peace officer proceeds toward the residence using the siren and lights. Approximately two blocks from the house, the officer drives through a red light without stopping. Another driver, using a cell phone, enters the intersection on a green light without noticing the oncoming police vehicle. The officer strikes the other person's car, injuring the driver. Is the officer civilly liable for the other driver's injury? Why or why not? Is the city employing the officer liable for the injury or property damage? Explain.

Continued on next page

Workbook Learning Activities, Continued

**Activity
questions**
(continued)

2. A young family (mother, father, and two small children) is driving slowly through an urban area. It is a hot day and the car windows are rolled up. The driver is glancing back and forth frequently as the other parent holds a map. A law enforcement vehicle approaches the car rapidly from the rear with all emergency vehicle warning devices activated. The family's car fails to move, and after several seconds the law enforcement vehicle is forced to pass the car in the oncoming traffic lane. Why might the car have failed to move? What lessons might the law enforcement driver take from this occurrence?

Continued on next page

Workbook Learning Activities, Continued

Student notes

Chapter 3

Vehicle Pursuits

Overview

Learning need All officers who operate law enforcement emergency vehicles must recognize that even though the purpose of pursuit driving is the apprehension of a suspect who is using a vehicle to flee, the vehicle pursuit is never more important than the safety of officers and the public.

Learning objectives The chart below identifies the student learning objectives for this chapter:

After completing study of this chapter, the student will be able to:	E.O. Code
• Identify the requirements of <i>Penal Code Section 13519.8</i>	19.03.EO23
• Recognize the risk to officer/public safety versus the need to apprehend	19.03.EO24
• Discuss common offensive intervention tactics	19.03.EO25
• Recognize conditions that could lead to the decision to terminate a vehicle pursuit	19.03.EO26

Continued on next page

Overview, Continued

In this chapter

This chapter focuses on the components of vehicle pursuits. Refer to the following chart for specific topics:

Topic	See Page
Components of Vehicle Pursuits	3-3
Chapter Synopsis	3-10
Workbook Learning Activities	3-11

Components of Vehicle Pursuits

[19.03.EO23, 19.03.EO24, 19.03.EO25, 19.03.EO.26]

Introduction	Officers must balance the need to pursue criminal suspects against the threat to public safety caused by the pursuit. Sound judgment and good driving skills are necessary when managing pursuits.
Definition	A vehicle pursuit is an event involving one or more law enforcement officers attempting to apprehend a suspect who is operating a motor vehicle using high speeds or other evasive tactics while attempting to avoid apprehension.
Impact of pursuits	<p>Vehicle pursuits can have a major impact on the agency and the involved officers by exposing the:</p> <ul style="list-style-type: none">• Public to serious injury or death• Officer to serious injury or death• Agency to civil liability• Officer to civil and/or criminal liability
Liability	<i>Vehicle Code Section 17004.7</i> requires every agency to have a written pursuit policy. It gives statutory immunity to government entities for injury or damage caused by a fleeing suspect.
Agency policies	<p>Agency Policies may differ, but all policies will include certain provisions as required by <i>Penal Code Section 13519.8</i>. Officers are required to review their agency's pursuit policy annually. Each officer is responsible for knowing and following their agency's pursuit policy. Each policy must include:</p> <ul style="list-style-type: none">• When to initiate a pursuit• Number of involved units permitted• Responsibility of primary and secondary units

Continued on next page

Components of Vehicle Pursuits, Continued

Agency policies (continued)

- Driving tactics
 - Helicopter assistance
 - Communications
 - Capture of suspects
 - Termination of the pursuit
 - Supervisory responsibilities
 - Blocking, ramming, boxing, and roadblock procedures
 - Speed limits
 - Inter-jurisdictional considerations
 - Conditions of the vehicle, driver, roadway, weather and traffic
 - Hazards to uninvolved bystanders or motorists
 - Reporting and post-pursuit analysis
-

Additional backup

When there is a likelihood of a pursuit, officers should coordinate with other officers and/or resources before attempting to initiate a stop.

When to initiate or continue the pursuit

Pursuits may be initiated when a suspect clearly exhibits an intention to avoid arrest by using a vehicle to flee.

If a suspect is aware of an officer's signals to stop but ignores them and continues to flee, officers may initiate a vehicle pursuit if:

- They have reason to believe the suspect presents a clear and immediate threat to the safety of others
 - The suspect has committed or attempted to commit a violation of the law
 - The necessity of immediate apprehension outweighs the level of danger created by the pursuit
-

Continued on next page

Components of Vehicle Pursuits, Continued

Balance test

If the threat to public safety is greater than the need for apprehending the suspect, then the pursuit should not be initiated or it should be terminated.

Officers must balance:

- **the seriousness of the crime against the threat to public safety**

Officers also need to consider the following when deciding to initiate or continue with the pursuit:

- Agency policy
 - Condition of the vehicle
 - Condition of the driver
 - Roadway conditions
 - Traffic conditions
 - Weather conditions
-

Responsibilities of involved units

Generally, the **secondary unit** is responsible for communications and the **primary unit** is responsible for apprehension of the suspect. These are not rigid guidelines, and thus, can be adapted to each unique situation.

Role of involved units

The primary unit and the appropriate number of assisting units should be the only units involved in the pursuit. All other officers should stay clear of the pursuit and operate their vehicles in compliance with the rules of the road. Uninvolved units should remain alert to the progress and location of the pursuit to assist as needed.

All vehicles actively involved in a pursuit must be equipped with lights and sirens.

Specialized units may have limited roles in a pursuit. These units include:

- Unmarked law enforcement vehicles
 - Specially equipped law enforcement vehicles
 - Four-wheel drive vehicles
 - Motorcycles
-

Continued on next page

Components of Vehicle Pursuits, Continued

Pursuit driving tactics

Pursuit driving tactics should include the following factors:

- Proper following distance
 - Speed awareness
 - Anticipation of hazards
 - Proper road positioning
 - Maintaining self-discipline
-

Air support

If the circumstances of the pursuit indicate that the apprehension of the suspect appears unlikely, the primary unit or supervisor may direct the air unit to follow the suspect vehicle. The primary purpose of air support is to reduce the potential danger to officers and the public.

Communication

Communication and coordination are critical to safely manage a pursuit. Information must be relayed to other units responding to assist, and to the supervisor in overall command of the pursuit. Officers must communicate the following information:

- Unit identification
- Location of pursuit
- License plate number/description of the suspect vehicle
- Reason for the pursuit
- Number of occupants
- Continuous updates on location, speed, and traffic conditions
- Any additional important information

Consideration should be given to terminating the pursuit if communication fails.

Continued on next page

Components of Vehicle Pursuits, Continued

Offensive intervention tactics

Agency policies vary greatly with respect to **offensive intervention tactics**. It is critical for officers to know and follow their agency policy regarding:

- Ramming
- Pursuit intervention technique (PIT)
- Boxing in
- Heading off
- Driving alongside
- Tire deflation devices
- Road blocks

NOTE: Some, even if allowed by policy, are not necessarily safe to perform.

Speed limit and considerations

The primary consideration for an officer or supervisor regarding safe speed is not necessarily the posted limit, but it is the safe speed for conditions.

Agency policy may specify factors regarding reasonable speed. These factors may include:

- Public and officer safety (need to apprehend vs. threat to public safety)
 - Nature of the offense
 - Pedestrian and vehicular traffic volume
 - Environment
 - Weather conditions and visibility
 - Types of vehicles involved in the pursuit
-

Inter-jurisdictional considerations

Prompt notification is necessary when it appears a pursuit is about to enter another agency's jurisdiction.

Notification by another jurisdiction of a pursuit in progress should not be construed as a request to join the pursuit.

Continued on next page

Components of Vehicle Pursuits, Continued

Reasons for terminating a pursuit

A pursuit should be terminated when the following conditions exist:

- The threat to public safety outweighs the seriousness of the crime
 - The pursuit violates agency policy
 - There is a clear and unreasonable danger to the officers or the public
 - Traffic conditions necessitate dangerous maneuvering
 - There is no compelling need for immediate apprehension
 - A supervisor terminates the pursuit
 - Pursuing units lose communication capability
-

Procedures for terminating a pursuit

When discontinuing a pursuit an officer should:

- Advise on the radio
 - Reduce speed to the posted limit
 - Turn off emergency lights and siren
 - Stop following the suspect
 - If necessary move to the side of the road and regain composure
-

Ethical considerations

Psychological and physiological factors can play a large part in the safe apprehension of the suspect. The suspect may not immediately comply with commands and officers may be over-stressed. Officers can avoid problems by making a conscious effort to stay calm, or by taking over for another officer who is over stressed. If other officers begin to act improperly by using unreasonable force or other unauthorized tactics, officers need to exercise ethical leadership and intervene to stop the unethical behavior.

NOTE: Refer to previous instruction in LD 1: *Leadership, Professionalism and Ethics* and LD 20: *Use of Force*.

Continued on next page

Components of Vehicle Pursuits, Continued

Supervision

Supervisors are ultimately responsible for the conduct of the pursuit. In order to make sound decisions, they need accurate and timely information from the involved units. If the supervisor does not receive the necessary information, the pursuit may be terminated. If a supervisor orders a pursuit terminated, officers must immediately discontinue the pursuit.

Post pursuit analysis

As with other major incidents, a post-event analysis should be undertaken in order to improve training and tactics. The law also requires that all pursuits be reported to the California Highway Patrol (CHP) for statistical tracking purposes via form CHP-187.

Chapter Synopsis

Learning need	All officers who operate law enforcement emergency vehicles must recognize that even though the purpose of pursuit driving is the apprehension of a suspect who is using a vehicle to flee, the vehicle pursuit is never more important than the safety of officers and the public.
----------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Penal Code 13519.8 requirements [19.03.EO23]	Agency pursuit policies may differ but all policies will include certain provisions required by law.
-----------------------------------------------------------------	------------------------------------------------------------------------------------------------------

Risk to officer/public [19.03.EO24]	If the threat to public safety is greater than the need to apprehend the suspect, then the pursuit should not be initiated or continued.
----------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------

Offensive intervention tactics [19.03.EO25]	The intervention tactics used are ramming, pursuit intervention technique (PIT), boxing in, heading off, etc.
----------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------

Termination of pursuit [19.03.EO26]	A pursuit should be terminated when public safety outweighs the seriousness of the crime or other factors that may endanger public safety.
----------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------

Workbook Learning Activities

Introduction

To help you review and apply the material covered in this chapter, a selection of learning activities has been included. No answers are provided. However, by referring to the appropriate text, you should be able to prepare a response.

Activity questions

1. Why is it critical that all peace officers know and follow their agency's policies on vehicle pursuits? Consider both legal and safety rationale in your response.

2. Officer Callas has 10 years experience in a suburban police agency. He has recently transferred to an urban precinct. At approximately 4:45 p.m., on a drizzly October day, he is driving to the scene of a liquor store robbery. Shots have been fired, and the suspects pull away in a late model sports car just as the officer arrives. The suspects fire a shot at the officer as they pull away. Should Officer Callas initiate a vehicle pursuit if it is in line with his agency's policy? What considerations support your opinion? What supports the opposite viewpoint?

Continued on next page

Workbook Learning Activities, Continued

**Activity
questions**
(continued)

3. At 3:00 p.m. peace officers are engaged in a vehicle pursuit of a carjacker who shot and seriously wounded the car's driver at the scene of the carjacking. The pursuit has now been ongoing for approximately 10 minutes, most of it on a relatively uncrowded freeway. At this time, the suspect has accelerated to approximately 75 mph. As the driver of the primary pursuit unit, name at least five circumstances that would cause you to terminate the pursuit at this point.

Chapter 4

Vehicle Dynamics

Overview

Learning need Peace officers must be proficient in the operation of the vehicle, and know the dynamic forces at work. Proper steering control, throttle control, speed judgment, and brake use enhances driving expertise.

Learning objectives The chart below identifies the student learning objectives for this chapter.

After completing study of this chapter, the student will be able to:	E.O. Code
• Distinguish between longitudinal and lateral weight transfer	19.04.EO26
• Demonstrate the ability to mitigate the effects of spring loading	19.04.EO27
• Demonstrate proper techniques for two-handed shuffle steering	19.04.EO28
• Demonstrate proper throttle control	19.04.EO29
• Demonstrate proper roadway position and the three essential reference points of a turning maneuver	19.04.EO30
• Explain the primary effects speed has on a vehicle in a turning maneuver	19.04.EO31
• Demonstrate proper braking methods	19.04.EO32

Continued on next page

Overview, Continued

Learning objectives (continued)

After completing study of this chapter, the student will be able to:	E.O. Code
<ul style="list-style-type: none">• Distinguish between and describe the causes of the following types of vehicle skids:<ul style="list-style-type: none">- Understeer skid- Oversteer skid- Locked-wheel skid- Acceleration skid	19.04.EO33 19.04.EO34 19.04.EO35 19.04.EO36
<ul style="list-style-type: none">• Identify the causes and contributing factors of vehicle hydroplaning	19.04.EO37

In this chapter

This chapter focuses on the components of vehicle control. Refer to the following chart for specific topics.

Topic	See Page
Vehicle Dynamics	4-3
Vehicle Control Techniques	4-5
Chapter Synopsis	4-14
Workbook Learning Activities	4-16

Vehicle Dynamics

[19.04.EO25, 19.04.EO26]

Introduction

A **vehicle dynamic** is any force or condition that affects the path of a vehicle in motion. A driver using proper techniques can reduce the effects of these forces, resulting in better control of the vehicle.

Weight transfer

Vehicle weight is transferred during turning, braking, and acceleration. Smooth control inputs can minimize this transfer of weight, resulting in better vehicle control.

Lateral weight transfer: side-to-side **weight transfer** caused by turning movements.

Longitudinal weight transfer: front-to-back weight transfer caused by braking and acceleration.

Spring loading

A vehicle turning from side to side, such as when swerving to avoid a hazard, causes a build up and release of energy in the springs of the suspension system. Weight is transferred from one side to the other, with each successive turn becoming more exaggerated as the springs unload their energy. If the driver does not compensate properly, this can result in loss of control.

When a turning maneuver requires the driver to abruptly turn one direction and then immediately back in the other direction, excessive weight transfer can occur. This weight transfer can result in excessive **spring loading** and oversteer.

Type of Action	Cause	Correction
Spring loading - a build-up and release of energy in the springs of the suspension system	<ul style="list-style-type: none">• Swerving from side to side• Braking• Acceleration	<ul style="list-style-type: none">• Allow the caster effect to dissipate the energy added to each turn by the springs• Smooth steering input and recovery

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Vehicle Dynamics, Continued

Co-efficient of friction

Coefficient of friction is the cohesive quality or “stickiness” between the rubber and the roadway. When one or more tires exceed the coefficient of friction, the vehicle will begin to skid.

Contact patch

The **contact patch** is where the rubber of the tire actually contacts the road surface.

Rolling friction

Rolling friction simply refers to tires rolling over the road surface. If the tire rotation stops, the wheels no longer track. If the front wheels stop rolling and begin skidding, there will be a loss of steering control.

Vehicle Control Techniques

[19.04.EO27, 19.04.EO28, 19.04.EO29, 19.04.EO30, 19.04.EO31, 19.04.EO32, 19.04.EO33, 19.04.EO34, 19.04.EO35, 19.04.EO36, 19.04.EO37]

Introduction

Peace officers are often required to drive under extreme conditions. Knowledge and practice of proper steering technique will enable the officer to maintain maximum control of the vehicle in both extreme conditions and everyday driving.

Shuffle steering

Shuffle steering has great advantages over other steering techniques. It allows for greater steering control, weight transfer control, and it minimizes the potential for air bag injury in the event of a collision. It also helps to maintain a firm grip on the wheel in adverse driving conditions. Minimizing steering input will minimize the amount of weight transfer resulting in better vehicle control.

The driver's hands are kept at 8 o'clock and 4 o'clock or 9 o'clock and 3 o'clock on the wheel as much as possible. The hands shuffle up and down on the wheel never crossing the 12 o'clock position as the driver executes a turn.

For example, when turning left:

- the right hand grasps the wheel and pushes up
 - the left hand slides up the wheel at the same time
 - when the right hand approaches the 12 o'clock position, the left hand grasps the wheel and pulls down while the right hand slides back down the wheel
-

Throttle control

The throttle, or gas pedal, regulates the speed of the vehicle. The operation of the throttle has a definite and immediate affect on weight transfer. Smooth operation of the throttle is critical for maximum vehicle control.

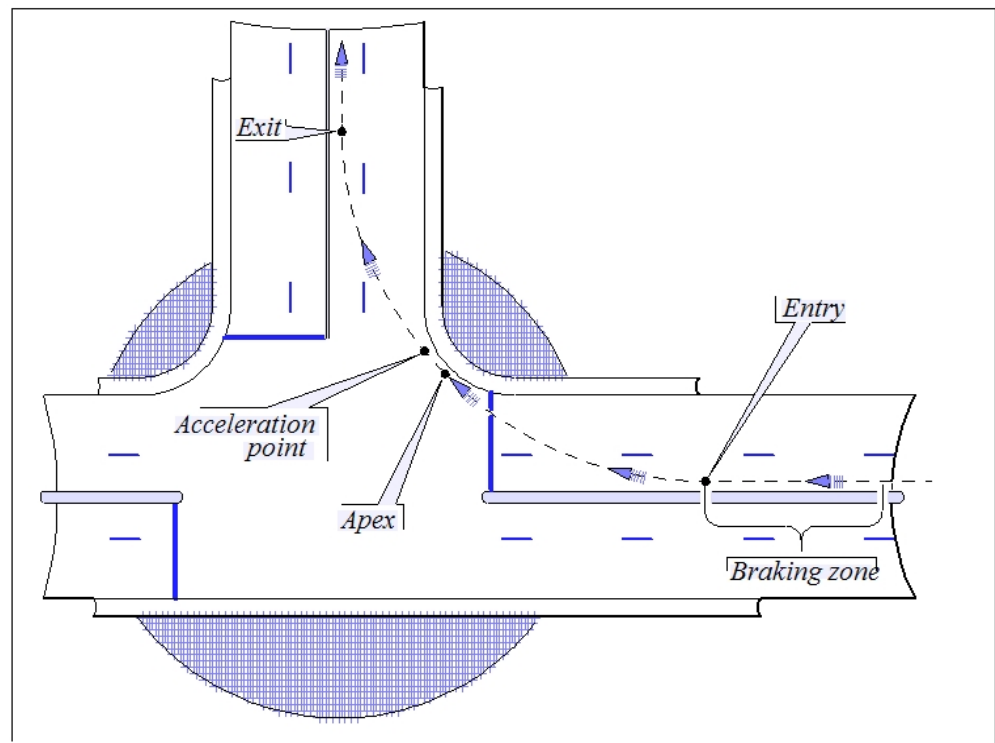
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Vehicle Control Techniques, Continued

Points of a turn

Knowledge of **roadway position** will allow officers in high-speed driving situations to take the safest and most efficient driving line through corners. There are three reference points that can be used by a driver to take the most efficient line or route through a corner. The most efficient route through a corner may include multiple lanes, but should not include the opposing lanes of traffic.

- **Entry**: The outside edge of the available roadway where turning begins.
- **Apex**: The innermost part of a turn and point of maximum steering.
- **Exit**: The outside edge of the available roadway where the turn is concluded.



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Vehicle Control Techniques, Continued

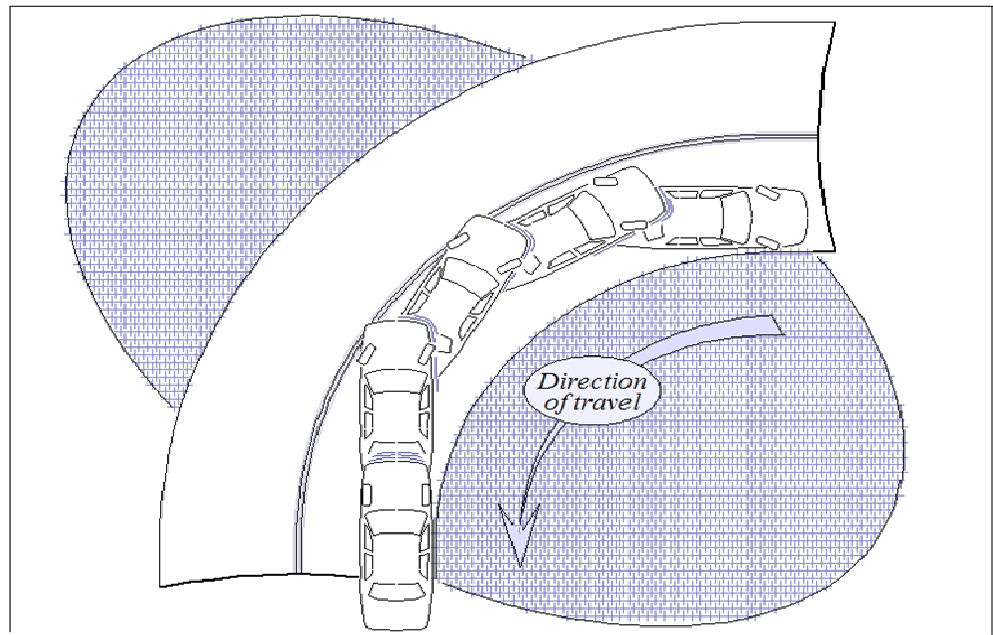
Front end swing

Front end swing occurs when the driver turns the steering wheel while driving in reverse. When the steering wheel is turned, the front end of the vehicle will swing out in a direction opposite the direction the steering wheel was turned. The more the steering wheel is turned, the farther out the front end will swing.

Type of Action	Cause	Correction
Front-end swing - front end swings out from center	<ul style="list-style-type: none">Steering input while backing	<ul style="list-style-type: none">Minimize steering inputAdjust lane position when driving forward in anticipation of backing

Example:

Imagine you are parked in a parking stall with vehicles parked on either side of you. If you turn your steering wheel all the way in one direction or the other before you move, then try to back out, the front end would swing out and collide with the vehicle next to you.



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Vehicle Control Techniques, Continued

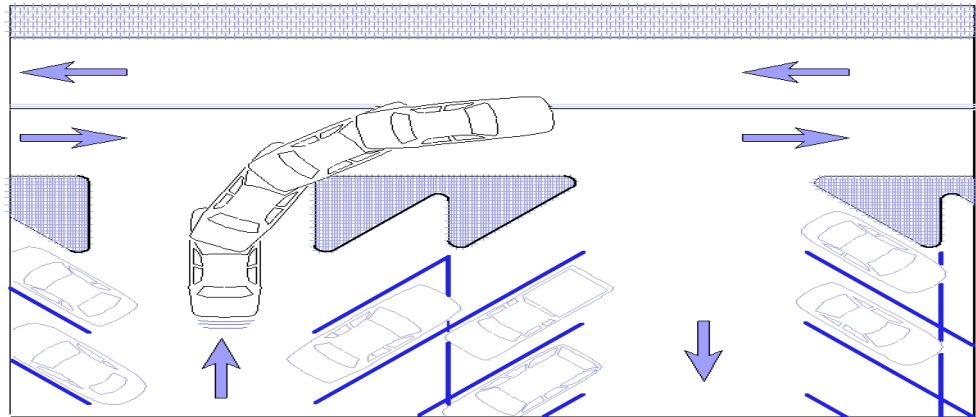
Rear wheel cheat

When driving forward, the rear wheels will take a path inside that of the front wheels when the vehicle is turning. The sharper the turn, the greater the **rear wheel cheat**.

Type of Action	Cause	Correction
Rear Wheel Cheat - rear wheels track inside the front wheels while turning	<ul style="list-style-type: none">Steering input while driving forward	<ul style="list-style-type: none">Turn wide or late enough to allow space for the rear wheels to clear the hazardAdjust lane position prior to turn

Example:

When entering a driveway from the street, the front wheels track up the ramp and the inside rear wheel runs over the curb. This is caused by rear wheel cheat.



Caster effect

The front wheels of a vehicle are casters, just like on a shopping cart. The **caster effect** tends to straighten out the front wheels when the vehicle is moving forward. This is a stabilizing influence when used properly. When driving in reverse, however, this caster effect is a destabilizing influence.

Continued on next page

Vehicle Control Techniques, Continued

Braking methods

Braking during performance driving situations is different from normal driving circumstances, requiring braking in the shortest practical time and distance necessary.

Antilock brakes (ABS)

The **Antilock Braking System**, or ABS, is a computerized system that helps maintain rolling friction during hard braking. This provides for maximum braking effectiveness by preventing wheel lockup. It also provides the potential for steering capability during maximum braking by maintaining rolling friction.

ABS failure

In the event of ABS failure, the normal braking system continues to operate. Since ABS is not available, **threshold braking** techniques should be used. Threshold braking is accomplished through maximum application of the brakes just prior to locking the wheels.

Brake fade

Brake fade is the loss of braking efficiency due to heat build up. Brake fade can result from improper use of brakes. Threshold braking can help minimize heat buildup.

Type of Action	Cause	Correction
Brake fade - the loss of braking efficiency	<ul style="list-style-type: none">• Overuse of brakes	<ul style="list-style-type: none">• Shift to lower gear if speeds allow• Use proper braking techniques

Continued on next page

Vehicle Control Techniques, Continued

Acceleration skid

Acceleration skid occurs when torque to the drive wheels exceed the traction limits and the wheels spin. This is an inefficient way to accelerate and can result in loss of control.

Type of Action	Cause	Correction
Acceleration skid - torque to the drive wheels exceeds the traction limits and the wheels spin	<ul style="list-style-type: none">• Too much acceleration	<ul style="list-style-type: none">• Ease off the throttle until the tires stop spinning

Locked-wheel skid

In the event the ABS system fails or the vehicle is not equipped with ABS, hard braking can result in a **locked-wheel skid**. This means that the wheels have stopped turning and are skidding over the roadway surface. This will result in loss of steering control.

Type of Action	Cause	Correction
Locked-wheel skid - the wheels have stopped turning and are skidding	<ul style="list-style-type: none">• ABS failure• Hard braking	<ul style="list-style-type: none">• Ease off the brakes until rolling friction is regained

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Vehicle Control Techniques, Continued

Understeer (front wheel) skid

Understeer skid is the loss of traction to the front wheels while attempting a turn. This results in the vehicle continuing in a straighter line than intended. This typically happens to a vehicle entering a corner too fast.

Type of Action	Cause	Correction
Understeer - is the loss of traction to the front wheels while attempting a turn	<ul style="list-style-type: none">• Excessive speed while entering a corner• Aggressive steering input	<ul style="list-style-type: none">• Allow vehicle to slow without hard braking• Remove some steering input to lessen the severity of the skid

Oversteer (rear wheel) skid

Oversteer skid is the loss of traction to the rear tires. This typically happens during a turning movement causing the rear wheels to slide to the outside of the turn. It is sometimes referred to as fishtailing.

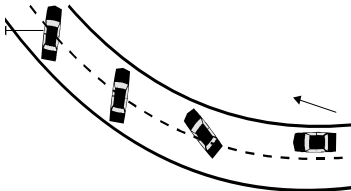
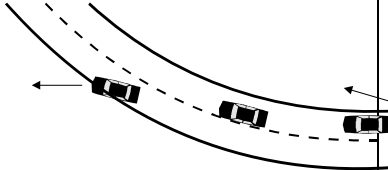
Type of Action	Causes	Correction
Oversteer - Loss of traction to the rear tires causing them to slide to the outside of the turn, aka: "Fishtailing"	<ul style="list-style-type: none">• Excessive lateral weight transfer• Excessive acceleration when cornering	<ul style="list-style-type: none">• Use the caster effect and allow the front wheels to naturally turn in the direction of the skid OR <ul style="list-style-type: none">• Steer in the direction of the skid (counter steer)

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Vehicle Control Techniques, Continued

Oversteer (rear wheel) skid (continued)

The following shows examples of oversteer and understeer causes and recovery.

	Vehicle Oversteer	Vehicle Understeer
Description	<ul style="list-style-type: none"> Loss of traction to the <i>rear</i> tires of vehicle Rear of car skids toward outside of the turn 	<ul style="list-style-type: none"> Loss of traction to the <i>front</i> tires of vehicle Vehicle forced to continue in a straighter line than intended
Causes	<ul style="list-style-type: none"> Excessive speed in a turn Sudden and/or excessive steering input Overbraking in a turn Excessive weight transfer 	<ul style="list-style-type: none"> Excessive acceleration while turning Entering a curve at too high a speed Excessive weight transfer 
Recovery	<ul style="list-style-type: none"> Reduce throttle Counter steer or caster effect Remove braking input <p>Remove the counter steer when the vehicle begins to recover to prevent a secondary skid.</p>	<ul style="list-style-type: none"> Allow vehicle to slow Reduce steering input <p>Traction will be restored and steering regained.</p>

Continued on next page

Vehicle Control Techniques, Continued

Hydroplaning

Hydroplaning occurs when a tire loses full contact with the road due to water build up under the tire. The amount of water build up under the tire is directly related to the speed of the vehicle.

Similar effects can occur as a result of anything that separates the tires from the roadway (i.e., ice, snow, sand, fuel, oil, and its own tire rubber).

Type of Action	Causes	Correction
Hydroplaning - tire loses full contact with the road due to water buildup under the tire	<ul style="list-style-type: none">• Speed• Water depth• Tire condition	<ul style="list-style-type: none">• Slow down by easing off accelerator or lightly applying the brake• Make no drastic control inputs

Chapter Synopsis

Learning need	Peace officers must be proficient in the operation of the vehicle and know the dynamic forces at work. Proper steering control, throttle control, speed judgment, and brake use enhances driving expertise.
Weight transfer [19.04.EO26]	Weight transfer is the shifting of the vehicles' weight.
Spring loading [19.04.EO27]	When the vehicle experiences weight transfer, spring loading takes place as energy builds in a vehicle's springs.
Proper shuffle steering [19.04.EO28]	Allows for greater steering control, weight transfer control, and minimizes the potential for air bag injury in the event of collision.
Throttle control [19.04.EO29]	Operation of the throttle has a definite and immediate effect on weight transfer. Smooth operation of the throttle is critical for maximum vehicle control.
Roadway positioning reference points [19.03.EO30]	Roadway position, also referred to as the <i>driving line</i> through a turn, is the position of the vehicle on the roadway to best facilitate the negotiation of a turn or curve at a safe rate of speed. There are three essential points of reference that are relevant to all turning maneuvers.

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Chapter Synopsis, Continued

**Vehicle speed
and turning
maneuvers**
[19.03.EO31]

Speed has three primary effects on a vehicle in a turning maneuver. *Turning radius* increases as speed increases and decreases as speed is reduced (if steering input remains constant). *Traction limits* may be exceeded as speed increases. *Weight transfer* occurs in the opposite direction of the turn and increases as speed increases.

**Braking
methods**
[19.04.EO32]

Performance driving and normal driving situations require the use of different braking methods. Short distance and lack of time may require threshold braking.

**Understeer
skid**
[19.03.EO33]

An understeer skid (also known as a front-wheel skid) is the loss of traction of the front tires and reduction of steering ability, forcing the vehicle to travel in a straight line.

**Oversteer
skid**
[19.03.EO34]

An oversteer skid (also known as a rear-wheel skid) is the loss of traction of the rear tires during a turn, causing the rear of the vehicle to slide to the outside of the turn.

**Locked-wheel
skid**
[19.03.EO35]

A locked-wheel skid occurs when one or more of the vehicle's wheels lock and the vehicle is still moving.

**Acceleration
skid**
[19.03.EO36]

An acceleration skid occurs when the engine overpowers the traction of the driving tires. Acceleration skids involve only the drive wheels.

**Vehicle
hydroplaning**
[19.03.EO37]

Hydroplaning occurs when one or more of the vehicle tires lose contact with the surface of the road and begin to skim across the surface of the water on the road. When a vehicle is hydroplaning, the normal contact patch between the tire tread and the road has been lost.

Workbook Learning Activities

Introduction

To help you review and apply the material covered in this chapter, a selection of learning activities has been included. No answers are provided. However, by referring to the appropriate text, you should be able to prepare a response.

Activity questions

1. A peace officer, driving on a winding stretch of highway, smoothly negotiates a relatively gentle curve to the right. If the officer accelerates and decelerates to maximize vehicle performance, describe the resulting longitudinal weight transfer.

Continued on next page

Workbook Learning Activities, Continued

**Activity
questions**
(continued)

2. On routine patrol on a suburban street, a child's toy ball suddenly rolls out in the street in front of the law enforcement vehicle. Because the ball rolled into the street from the right, the officer swerves to the left to avoid the ball. Describe the positioning and action of the driving officer's hands on the steering wheel during this maneuver. Given this situation, what, if any, other factors in the driving environment should the officer have considered before swerving to avoid the ball? Explain

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Workbook Learning Activities, Continued

Student notes

Glossary

Introduction	The following glossary terms apply only to Learning Domain 19: Vehicle Operations.
acceleration	An increase in the speed of a vehicle
acceleration skid	Loss of traction when excessive acceleration for the roadway conditions causes the vehicle's force to carry it into a skid
antilock braking system (ABS)	The <u>Antilock Braking System</u> , or ABS, is a computerized system that helps maintain rolling friction during hard braking. This provides for maximum braking effectiveness by preventing wheel lockup. It also provides the potential for steering capability during maximum braking by maintaining rolling friction
apex	Point in a turn where the vehicle comes closest to the innermost part of the available roadway
black ice	An invisible, thin sheet of extremely slick ice that is nonreflective and resembles bare pavement
blind spot	Area which cannot be seen by a driver when using a vehicle's mirrors
brake fade	Loss of braking efficiency normally due to heat buildup resulting from excessive use
caster effect	Design characteristic of a vehicle that helps to straighten out the front wheels after driving around a corner

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Glossary, Continued

Code 3 response	See emergency response driving
coefficient of friction	Measure of adhesion between two surfaces (e.g., a tire and the roadway); the lower the coefficient of friction, the more slippery the road surface
contact patch	Area of the tire in contact with the roadway surface
defensive driving	Operating a vehicle in such a manner as to be able to avoid involvement in a collision, no matter what the conditions
emergency response call	A situation which requires immediate law enforcement attention for the protection of persons or property (also known as Code-3 response)
emergency response driving	Operation of an emergency vehicle with red lights and siren in compliance with <i>Vehicle Code Sections 21055 and 21056</i> (also known as Code-3 driving)
entry	Point of a curve where the driver begins to input steering to maneuver a turn
exit	Point of a curve where a vehicle comes out of a turn and is pointed in a straight path
focal point	The specific point at which a driver is looking at a given moment in time

Continued on next page

Glossary, Continued

following distance	Distance maintained between a vehicle and the vehicle immediately in front of it
front-end swing	Movement of the front end of a vehicle in the opposite direction of the steering input when driving in reverse
hydroplaning	When the tires of a vehicle ride upon the water's surface causing loss of contact with the surface of the road
lateral weight transfer	Weight transfer to the left side of a vehicle when a vehicle is turning right, or weight transfer to the right side of the vehicle when a vehicle is turning left
locked-wheel skid	Loss of traction when one or more of the vehicle's wheels are locked by excessive braking pressure on the part of the driver (also known as a braking skid)
longitudinal weight transfer	Weight transfer to the rear axle caused by acceleration, or weight transfer to the front axle caused by deceleration or braking
offensive intervention tactic	Specific operational tactic used by law enforcement officers with the intent to disable a fleeing vehicle or otherwise prevent further flight or escape (e.g., PIT, boxing, tire deflation devices, heading off, channeling and road blocks)
oversteer (rear wheel) skid	Loss of traction of the rear tires during a turn, causing the rear of the vehicle to slide to the outside of the turn (also known as a rear-wheel skid)

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Glossary, Continued

perception time	The time it takes a driver to receive data through the senses and become aware of an object or potential hazard (for the average driver, the perception time is .75 seconds)
peripheral vision	Lateral degree of perception present when the eyes are focused straight ahead
primary unit	Initial pursuing officer in a vehicle pursuit
pursuit driving	The act or instance of chasing or pursuing a fleeing vehicle in an attempt to apprehend the driver and/or occupants
reaction time	Amount of time after a driver has perceived an object or potential hazard until the driver makes a decision and initiates an action (for the average driver, the decision/reaction time is .75 seconds)
rear wheel cheat	Tracking of the rear tires of a vehicle along a path different from the front tires during a forward turn
roadway position	Position of the vehicle when negotiating a curve
rolling friction	Maintaining tire rotation without skidding
secondary unit(s)	Back up unit(s) in a vehicle pursuit

Continued on next page

Glossary, Continued

shuffle steering	A balanced two hand steering method with the right hand controlling the right half of the steering wheel, and the left hand controlling the left half of the steering wheel. Both hands remain in contact with the steering wheel at all times and do an equal amount of work
siren syndrome	Psychological and Physiological condition caused by the stresses of Code-3 operations that affects the decision making skills of a law enforcement officer
skid	Loss of traction to one or more wheels
space cushion	Open area and maneuvering room surrounding a vehicle while it is in motion (also known as an “escape route” to the front, rear, and sides of the vehicle)
spring loading	Energy buildup in a vehicle’s springs when the vehicle experiences weight transfer
stopping distance	The total of perception time and decision/reaction time plus the actual braking distance
threshold braking	Maximum brake application prior to wheel lockup
throttle	Vehicle gas pedal accelerator
tire pressure	Amount of air in pounds per square inch

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Glossary, Continued

**tunnel
vision**

Reduction of peripheral vision

**understeer
(front wheel)
skid**

Loss of traction to the front wheels while attempting a turn. This results in the vehicle continuing in a straighter line than intended

**vehicle
dynamic**

Any force or condition that affects the control and direction of a vehicle in motion

**vehicle
pursuit**

An event involving one or more law enforcement officers attempting to apprehend a suspect who is operating a motor vehicle using high speeds or other evasive tactics while attempting to avoid apprehension

**visual
horizon**

Everything the driver can see a good distance down the road

**weight
transfer**

Transfer of a vehicle's weight to the front, rear, or either side caused by acceleration, deceleration, steering, or braking
