

Basic Course Workbook Series Student Materials

**Learning Domain 19
Vehicle Operations
Version 6.3**

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Student Materials
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Vehicle Operations
Version 6.3**

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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 and ultimately a police officer dedicated to service and committed to safety.

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.

ROBERT A. STRESAK
Executive Director

LD 19: Vehicle Operations

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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 overview section at the start of each chapter to review the learning objectives.
3	Read the text.
4	Refer to the Chapter Synopsis section at the end of each chapter to review the key points that support the chapter objectives.
5	Complete the Workbook Learning Activities at the end of each chapter. These activities reinforce the material taught in the chapter.
6	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>).

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
-

Chapter 1

Defensive Driving

Overview

Learning need Peace 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:	Objective ID
<ul style="list-style-type: none">• Determine a safe distance when following another vehicle	19.01.20
<ul style="list-style-type: none">• Identify the effect of speed on a driver's peripheral vision	19.01.21
<ul style="list-style-type: none">• Discuss how perception and reaction time affects a vehicle's total stopping distance	19.01.22
<ul style="list-style-type: none">• Demonstrate appropriate actions to prevent intersection collisions	19.01.23
<ul style="list-style-type: none">• Recognize potential hazards of freeway driving and appropriate actions to prevent collisions	19.01.24
<ul style="list-style-type: none">• Demonstrate appropriate actions to prevent collisions when operating a vehicle in reverse	19.01.25
<ul style="list-style-type: none">• Demonstrate the importance and proper use of safety belts in a law enforcement vehicle	19.01.10

Continued on next page

Overview, Continued

Learning objectives (continued)

After completing study of this chapter, the student will be able to:	Objective ID
<ul style="list-style-type: none">Identify psychological and physiological factors that may have an effect on a peace officer's driving	19.01.14
<ul style="list-style-type: none">Identify hazards of various road conditions	19.01.16
<ul style="list-style-type: none">Discuss the components of a vehicle inspection	19.01.19
<ul style="list-style-type: none">Demonstrate proper techniques for recognizing and coping with distractions while operating a law enforcement vehicle	19.01.26

In this chapter

This chapter focuses on the law enforcement vehicle collisions and the peace 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
Psychological and Physiological Factors Affecting Law Enforcement Vehicle Operations	1-11
Driving Conditions Affecting Law Enforcement Vehicle Operations	1-13
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Components of Defensive Driving

Introduction

Safe driving habits can reduce risk of collision and injury. Peace 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.

Law Enforcement Driving Simulator (LEDS)

A **Law Enforcement Driving Simulator (LEDS)** is a tool used to introduce the concepts contained in this workbook in a simulated environment. This includes introduction to driving in a simulator, decision making processes, emergency response and pursuit.

Defensive Driving

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 as well as agency policies. 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
-

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Components of Defensive Driving, Continued

Space cushion

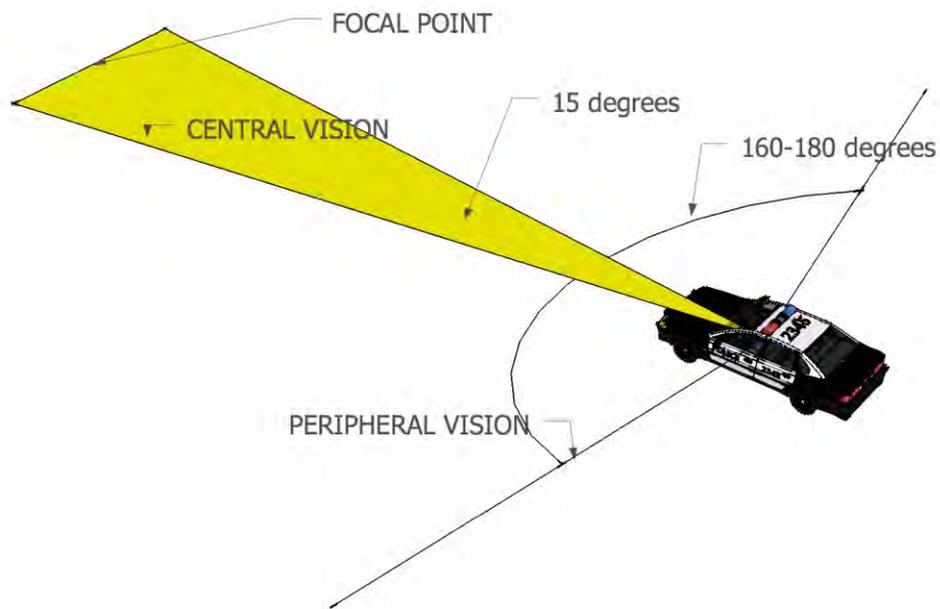
A **space cushion** is the clear area surrounding a vehicle. It includes the front, rear, and sides of the vehicle.

Vision

The specific point at which a driver is looking at any given moment is called the **focal point**. That part of a driver's field of view that measures about 15 degrees around the focal point is called **central vision**. Vision is sharpest (clearest) within this area.

Peripheral vision is that part of a driver's field of view that lies outside central vision, and extends to approximately 160-180 degrees horizontally, and 100 degrees vertically. Peripheral vision is especially useful for detecting moving hazards outside central vision.

With increases in speed or stress, peripheral vision can significantly decrease making it more difficult to detect objects outside central vision. This is called **tunnel vision**. The driver should keep his/her eyes and head moving to maintain a **high visual horizon** in order to mitigate the effects of tunnel vision.



Components of Defensive Driving, Continued

Perception - reaction time

The average driver's **perception time** is .75 seconds and their **reaction time** (which includes the decision making process) 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-reaction time. The calculation for the distance covered during 1.5 seconds is:

$$\begin{aligned} \text{Speed} \times 1.1 &= \text{distance traveled in .75 seconds (perception time)} \\ \text{Speed} \times 1.1 &= \text{distance traveled in .75 seconds (reaction time)} \\ (60 \times 1.1 = 66) + (60 \times 1.1 = 66) &= 132 \text{ feet} \end{aligned}$$

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.

For example, a vehicle traveling at 60 MPH should be approximately 270 feet from the vehicle in front.

$$\begin{aligned} \text{Speed} \times 1.5 &= \text{feet per second (approximately)} \\ (60 \times 1.5 = 90) \times 3 \text{ seconds} &= 270 \text{ feet} \end{aligned}$$

Continued on next page

Components of Defensive Driving, Continued

Distractions while driving

Peace 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

Peace officers should understand the relevance and consider the priority of distractions while driving a law enforcement vehicle.

Intersections

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

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

The following table identifies intersection hazards and the appropriate response:

Hazard	Response
Clear intersections	<ul style="list-style-type: none">• Look left, then front, then right, then left again before proceeding• 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 left, then front, then right, then left again 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. • Look both ways before proceeding into an intersection to allow for unanticipated cross traffic.
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 oncoming traffic if hit from the rear • Make eye contact with other drivers or pedestrians who appear to be yielding the right of way • Clear oncoming traffic lane by lane before proceeding

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">• Accelerate to 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 to 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

Peace 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), peace 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 the vehicle stops
- 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 peace 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 if necessary • Be aware of obstacles and <u>blind spots</u>
Backing while on the 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 and blind spots
Backing onto the roadway	<ul style="list-style-type: none"> • Be aware of cross traffic on the sidewalk and roadway • Back slowly and smoothly • Be aware of obstacles and blind spots
Parking	<ul style="list-style-type: none"> • When possible, back into parking space when arriving rather than backing out when leaving

Changing lanes

Lane change collisions occur when drivers fail to check their blind spots and when they fail to signal. Drivers need to check blind spots (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

The number of peace officers injured or killed in traffic collisions due to the lack of seatbelt use continues to be significant. When worn properly, seatbelts are the single most effective way of protecting vehicle occupants from serious injury or death in a collision.

NOTE: Most agency policies require that peace officers wear seatbelts when driving. Strict adherence to agency policy should be followed.

Tactical Seatbelt Removal (TSR)

Tactical Seatbelt Removal (TSR) is a quick and effective way of disengaging and retracting the seatbelt to ensure it does not become entangled on items in the vehicle's interior or on personal equipment. This can be successfully accomplished through training and pre-planning. TSR should be performed every time the vehicle is coming to a stop and prior to the peace officer(s) exiting the vehicle.

Airbags

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

Air bags deploy 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.

Psychological and Physiological Factors Affecting Law Enforcement Vehicle Operations

Introduction

Peace officers have had training and extensive driving experience, but they must never assume they are immune from becoming involved in collisions which can lead to serious injury, disciplinary action, and lawsuits.

Contributing factors

The following are human factors that can contribute to peace officers becoming involved in collisions:

- Driving skills
 - Psychological factors
 - Physiological factors
-

Driving skills

Average driving skills are inadequate for driving a law enforcement vehicle. Peace officers must learn to drive safely in routine and emergency situations while fulfilling their duties. This requires a unique set of driving skills that must be learned and practiced.

Psychological factors

Peace 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
-

Continued on next page

Psychological and Physiological Factors Affecting Law Enforcement Vehicle Operations, Continued

Physiological factors

The attitudes and emotions of a peace officer can elicit a physiological response which can have an adverse effect on the 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
- Temporary loss of fine motor skills

Physiological factors can also be based on:

- Lack of sleep
 - Illness
 - Medication
 - Fatigue
-

Driving Conditions Affecting Law Enforcement Vehicle Operations

Driving conditions

Defensive drivers recognize and adapt to the changing road and weather conditions.

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

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

Condition	Hazard	Response
Rain or standing water	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

Continued on next page

Driving Conditions Affecting Law Enforcement Vehicle Operations, Continued

Driving conditions
(continued)

Condition	Hazard	Response
Hills	Hills can limit sight distance Downhill driving has the potential for overheating brakes resulting in brake fade and/or brake failure	Do not pass on hills without sufficient sight distance Shift to lower gear
Construction zones	Workers, ditches, and other hazards	Reduce speed and be alert to sudden hazards or changing conditions
Potholes	Potholes can damage tires and suspension, or cause a vehicle to lose control	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 stopping distance Black ice is a coating of ice frequently unseen on roadway surfaces, especially on bridges and shaded areas	Use gentle throttle, brake, and steering inputs Keep a large space cushion Drive slowly in temperatures when ice can form

Continued on next page

Driving Conditions Affecting Law Enforcement Vehicle Operations, Continued

Driving conditions
(continued)

Condition	Hazard	Response
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

Driving Conditions 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 peace 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/wheels
- Brake failure
- Engine failure
- Electrical system failure

The following table shows aspects of a proper vehicle inspection:

Area	Procedure
Tires	Proper tire pressure should be maintained. Visually inspect tires and wheels for any damage.
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/power steering fluid Green or Orange - coolant Clear water - condensation from air conditioning
Exterior	Check all sides for body damage.

Continued on next page

Driving Conditions 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, under front seats, and trunks for contraband and required equipment

Vehicle abuse

Peace officers have an ethical responsibility to treat all vehicles with care. A professional attitude leads to a higher standard of care of vehicles and other equipment.

Chapter Synopsis

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

Space cushion
[19.01.20] The clear area around the car and a safe following distance.

Peripheral vision
[19.01.21] Everything that can be seen side to side when the eyes are focused straight ahead.

Perception-reaction time
[19.01.22] Amount of time needed to detect and identify a hazard, make a decision and initiate an action (typically perception-reaction time is 1.5 seconds).

Intersections
[19.01.23] Intersections pose one of the greatest risks for collisions.

Freeway driving
[19.01.24] Freeway driving poses different hazards than driving on city streets.

Backing
[19.01.25] Peace officers should be aware that a large percentage of collisions occur while backing.

Seatbelts
[19.01.10] When worn properly, seatbelts are 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**
[19.01.14]

Peace officers must be aware that situations and events can lead to psychological and physiological responses that can have an effect on their ability to drive safely.

**Various
road
conditions**
[19.01.16]

Defensive drivers recognize and adapt to changing road, weather, and traffic conditions.

**Vehicle
inspection**
[19.01.19]

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

**Recognizing
distractions**
[19.01.26]

Peace officers should understand the relevance and consider the priority of distractions while driving a law enforcement vehicle.

Workbook Learning Activities, Continued

**Activity
questions**
(continued)

5. Describe how a heavy rainstorm could affect a peace officer's ability to avoid a collision. What actions could peace officers take to decrease the risk to themselves and others when responding to an emergency call in the rain?

6. A peace officer has finished his FTO phase and has been on his own for a week. His sergeant has decided to ride with him to gather information for the peace officer's evaluation. During the first hour, they receive a radio call to respond to an officer needing urgent assistance. This is his first call of this type.

Discuss the likely psychological and physiological symptoms of stress that might affect the peace officer. What steps could he take to mitigate these effects on his driving?

Chapter 2

Emergency Driving

Overview

Learning need Peace officers must recognize that emergency response (Code 3) driving demands a thorough understanding of the associated liability and safety issues.

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:	Objective ID
<ul style="list-style-type: none">• Identify the objectives of emergency response driving	19.02.18
<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	19.02.19
<ul style="list-style-type: none">• Explain the importance of agency specific policies and guidelines regarding emergency response driving	19.02.20
<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	19.02.21
<ul style="list-style-type: none">• Demonstrate the use of emergency warning devices available on law enforcement vehicles	19.02.22
<ul style="list-style-type: none">• Identify factors that can limit the effectiveness of a vehicle's emergency warning devices	19.02.23

Continued on next page

Overview, Continued

Learning objectives
(continued)

After completing study of this chapter, the student will be able to:	Objective ID
• Demonstrate the use of communications equipment	19.02.26
• Identify the effects of siren syndrome	19.02.24
• Recognize guidelines for entering an intersection when driving under emergency response conditions	19.02.25

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	2-3
Chapter Synopsis	2-12
Workbook Learning Activities	2-14

Operating Emergency Response Vehicles

Introduction

Safe **emergency response driving** requires a unique set of driving skills. Peace 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 a peace 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 situation
 - Serious crime in progress
 - Peace 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 with due regard 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 regard test

Peace officers fail to exercise due regard 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, peace officers do not have to abide by certain traffic laws when they are driving under authorized emergency conditions.

Vehicle Code Section	What	When
21052	Peace officers must comply with all of the rules of the road	When not engaged in “Code 3” or pursuit driving
21055	Peace 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	Peace officers must drive with due regard for the safety of others. Peace officers can be held civilly and criminally liable if they fail to drive with due care	At all times

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Operating Emergency Response Vehicles, Continued

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
-

Duty to drive with due regard

Even though the public is required to yield the right-of-way, peace officers must use due regard.

The provisions of *Section 21806* shall not relieve the driver of an authorized emergency vehicle from the duty to drive with due regard for the safety of all persons and property. (*Vehicle Code Section 21807*)

Importance of agency policy

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

Good judgment

Peace officers must always use good judgment. Peace officers must always drive at a speed that is reasonable and prudent taking into consideration:

- Perception-reaction time
 - Safety of others (*Vehicle Code Section 21057*)
 - Traffic conditions
 - Weather conditions
 - Road conditions
 - Time of day
 - Physiological factors
-

Escorts

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

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

Continued on next page

Operating Emergency Response Vehicles, Continued

Passing other motorists

Peace 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, peace officers should avoid passing on the right. A driver who does not see the emergency vehicle may turn into its path. Peace 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, don't assume you will be seen or heard.

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	<ul style="list-style-type: none">• As traffic noise increases, the ability to hear the siren decreases
Fog, rain, and snow	<ul style="list-style-type: none">• 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, 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 watching a video

Continued on next page

Operating Emergency Response Vehicles, Continued

Drivers reactions

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

- Panic stopping
 - Turning suddenly
 - Sudden lane changes
 - 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, peace 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 peace officers must consider when responding “Code 3”.

Factors	Considerations
The Vehicle	<ul style="list-style-type: none">• Vehicle condition• Performance characteristics
Route Considerations	<ul style="list-style-type: none">• Weather• Time of day• Pedestrians• 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. Peace 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 peace 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
- Temporary loss of fine motor skills
- Sweating, elevated heart rate
- Impaired decision making

The following are things a peace officer can do to mitigate the effects of siren syndrome:

- Make a conscious decision to remain calm
 - Control breathing
 - Recognize tunnel vision and maintain a high visual horizon
 - Check speedometer to maintain speed reference
-

Continued on next page

Operating Emergency Response Vehicles, Continued

Entering intersections

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

Guidelines for entering 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• Keep looking left, then front, then right, then left, all the way through the intersection, clearing lane by lane if necessary• 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 thorough understanding of the associated liability and safety issues.

Emergency response driving [19.02.18] The objectives of law enforcement driving are to get to the scene of life threatening situations, serious crimes, or assist other peace officer(s) quickly and safely.

Statutory conditions [19.02.19] Vehicle Code Sections define the conditions for exempting peace officers from certain rules of the road in the line of duty.

Importance of agency specific policies [19.02.20] Agency policies and guidelines regarding emergency response driving operations can be more restrictive than state law.

Non-law enforcement responses [19.02.21] *Vehicle Code Section 21806* 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 [19.02.22] Emergency devices that may be available on law enforcement vehicles include emergency lights and sirens.

Continued on next page

Chapter Synopsis, Continued

Limitations and effectiveness of emergency devices
[19.02.23]

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

Use of communication equipment
[19.02.26]

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

Siren syndrome
[19.02.24]

Psychological and Physiological condition caused by the stresses of “Code 3” operations that affects the decision making skills of a law enforcement officer.

Clearing an intersection
[19.02.25]

Many serious law enforcement collisions occur at intersections. There are a number of precautions that peace 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 emergency lights and siren. Approximately two blocks from the house, the officer drives through a red light without properly clearing the intersection. 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 peace 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 peace 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:	Objective ID
<ul style="list-style-type: none">• Discuss the requirements of <i>Penal Code Section 13519.8</i>	19.03.23
<ul style="list-style-type: none">• Discuss the requirements of <i>Vehicle Code Section 17004.7</i>	19.03.27

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

Introduction Peace 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 operating a motor vehicle while attempting to avoid arrest by using high speed driving or other evasive tactics, such as driving off a highway, turning suddenly, or driving in a legal manner but willfully failing to yield to the officers signal to stop.

Impact of pursuits Vehicle pursuits can have a major impact on the agency and the involved officers by exposing the:

- Public to serious injury or death
- Officer to serious injury or death
- Agency to civil liability
- Officer to civil and/or criminal liability

Liability *Vehicle Code Section 17004.7* 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 Agency Policies may differ, but all policies will include certain provisions as required by *Penal Code Section 13519.8*. Peace officers are required to review their agency's pursuit policy annually. Each peace officer is responsible for knowing and following their agency's pursuit policy. Each policy must include:

- 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, peace officers should coordinate with other peace 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.

When a suspect is aware of a peace officer's signals to stop but ignores them and continues to flee, peace 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.

Peace officers must balance:

- **the need to apprehend against the threat to public safety**

Peace 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 peace 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 available, request air support as soon as possible. The primary purpose of air support is to reduce the potential danger to peace 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. Peace 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 peace 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 a peace 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 need to apprehend or the pursuit violates agency policy
 - There is a clear and unreasonable danger to the peace 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 a peace 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 peace officers may be over-stressed. Peace officers can avoid problems by making a conscious effort to stay calm, or by taking over for another peace officer who is over stressed. If other peace officers begin to act improperly by using unreasonable force or other unauthorized tactics, peace 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, peace 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 peace 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 peace officers and the public.

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

**Vehicle Code
17004.7
[19.03.27]** Public agencies must have a written policy governing pursuits and regularly train officers in that policy.

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:	Objective ID
• Distinguish between longitudinal and lateral weight transfer	19.04.26
• Demonstrate the ability to mitigate the effects of spring loading	19.04.27
• Demonstrate proper techniques for two-handed shuffle steering	19.04.28
• Demonstrate proper throttle control	19.04.29
• Demonstrate proper roadway position and the three essential reference points of a turning maneuver	19.04.30
• Explain the primary effects speed has on a vehicle in a turning maneuver	19.04.31
• Demonstrate proper braking methods	19.04.32

Continued on next page

Overview, Continued

Learning objectives (continued)

After completing study of this chapter, the student will be able to:	Objective ID
<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- Centrifugal skid	19.04.33 19.04.34 19.04.35 19.04.36 19.04.38
<ul style="list-style-type: none">• Identify the causes and contributing factors of vehicle hydroplaning	19.04.37

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	4-15
Workbook Learning Activities	4-17

Vehicle Dynamics

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 buildup and release of energy in the springs of the suspension system. This weight transfer can result in excessive **spring loading** causing energy buildup in the vehicle's 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 by smoothly releasing the steering input at a controlled rate releasing the stored energy in the springs loss of control can occur.

Spring loading also occurs longitudinally through braking and acceleration.

Type of Action	Cause	Correction
Spring loading - a buildup 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">• Smooth steering input and recovery• <u>Caster effect</u> can be used to dissipate the energy added to each turn by the springs

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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 front tires stop rolling and begin skidding, there will be a loss of steering control.

Vehicle Control Techniques

Introduction

Peace officers are often required to drive under extreme conditions. Knowledge and practice of proper steering technique will enable the peace 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 positioned 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 or 6 o'clock position as the driver executes a turn. Both hands move up and down the wheel parallel to each other until touching at 12 o'clock position or the 6 o'clock position at which time the transfer of control from one hand to the other occurs.

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.

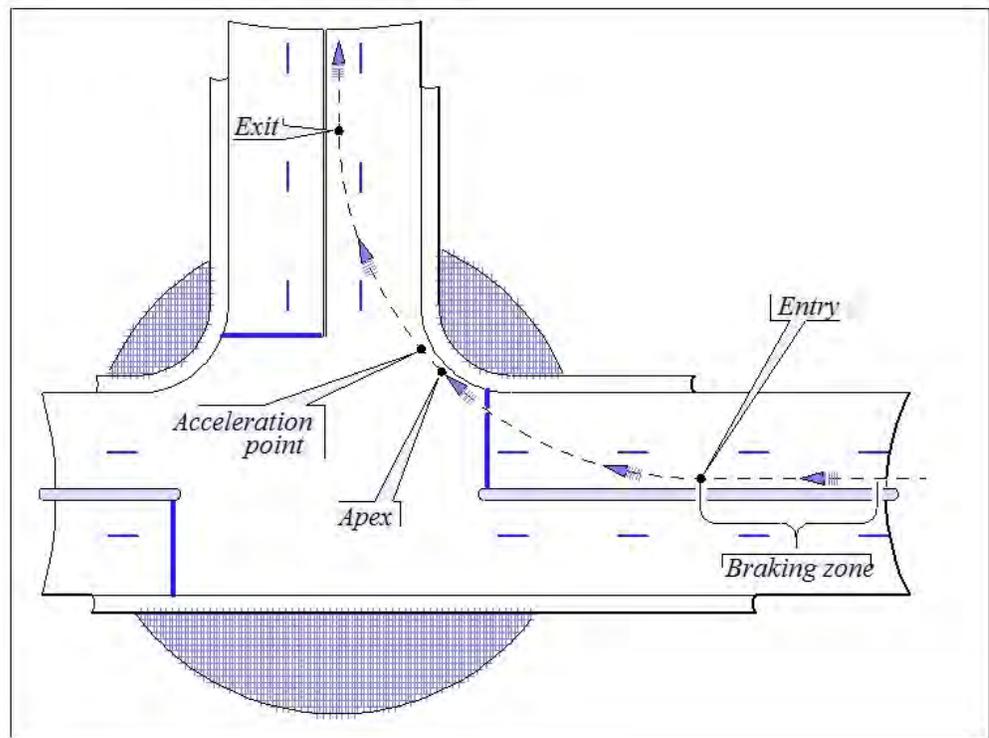
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Vehicle Control Techniques, Continued

Points of a turn

Knowledge of roadway position will allow peace officers in high-speed driving situations to take the most efficient driving line by using the least amount of steering input necessary 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.



Continued on next page

Vehicle Control Techniques, Continued

Vehicle speed and turning maneuvers

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.

Vehicle Control Techniques, Continued

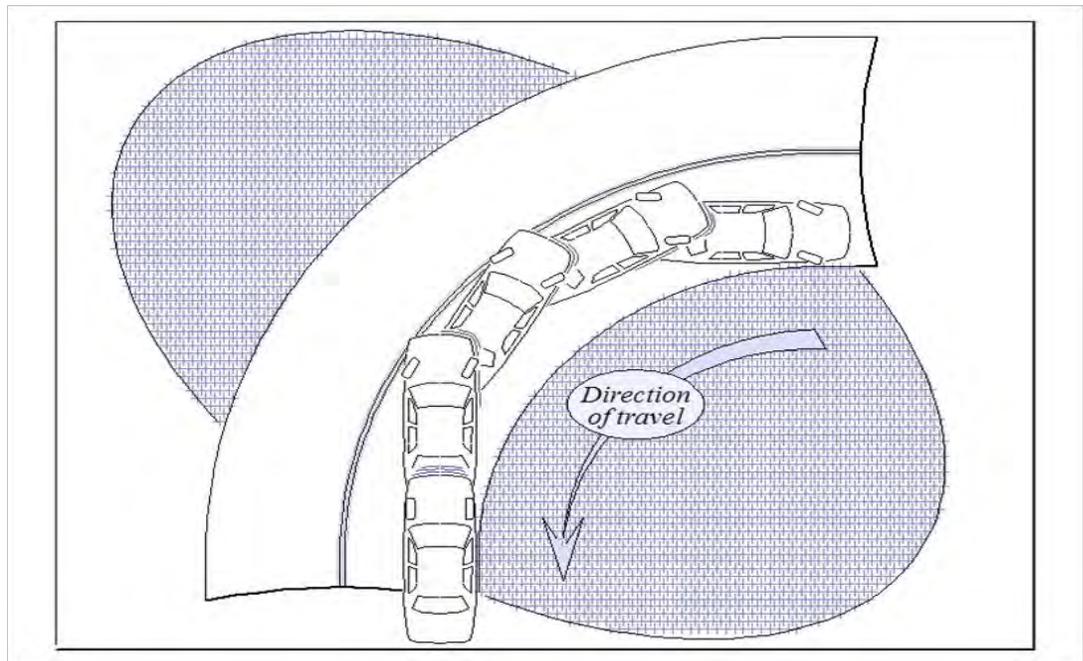
Front end swing

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

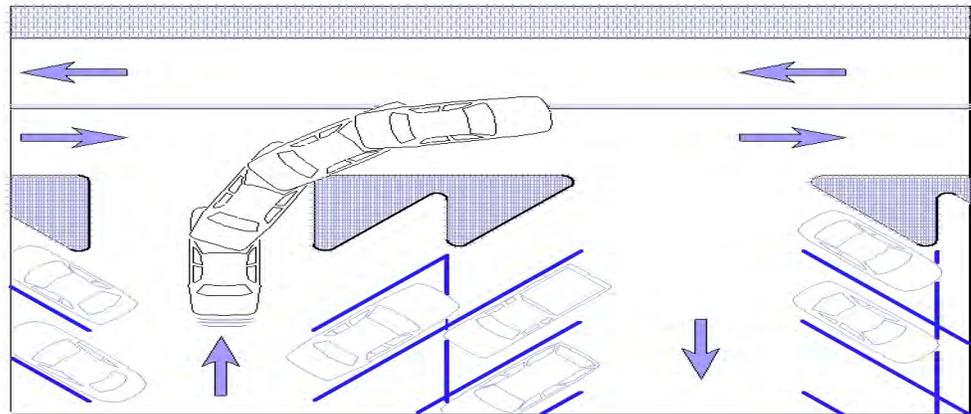
Rear wheel cheat

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 hazard Adjust 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 and/or excessive use of brakes.

Type of Action	Cause	Correction
Brake fade - the loss of braking efficiency	<ul style="list-style-type: none">Improper and/or excessive use of brakes	<ul style="list-style-type: none">Shift to lower gear if speeds allowUse proper braking techniques

Continued on next page

Vehicle Control Techniques, Continued

Speed Judgment

It is necessary to brake sufficiently prior to a turning maneuver in order to maintain rolling friction through the turn (also known as closure rate).

Acceleration skid

Acceleration skid occurs when torque to the drive wheels exceed the traction limits causing the tires to lose adhesion with the roadway surface. This is an inefficient way to accelerate and can result in loss of control.

In vehicles' equipped with properly functioning traction control systems the vehicles computer prevents acceleration skid from occurring.

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 will result in loss of steering control.

Type of Action	Cause	Correction
Locked-wheel skid - the tires have stopped turning and are skidding	<ul style="list-style-type: none">• ABS failure during 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 tires 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 tires 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 while attempting a turn. This results in the rear tires sliding toward the outside of the turn.

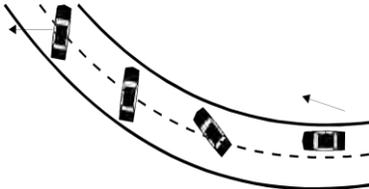
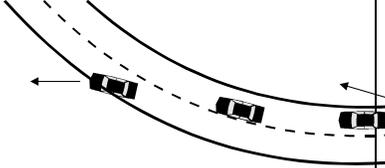
Type of Action	Causes	Correction
Oversteer - Loss of traction to the rear tires causing them to slide to the outside of the turn	<ul style="list-style-type: none"> Excessive weight transfer Excessive acceleration when cornering 	<ul style="list-style-type: none"> Use the caster effect and allow the front wheels to naturally turn in the direction of the skid <p>OR</p> <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 Over braking 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 utilize caster effect Remove braking input <p>Remove the counter steer as the vehicle begins to recover to prevent a secondary skid.</p>	<ul style="list-style-type: none"> Allow vehicle to slow Reduce steering input until rolling friction is regained

Continued on next page

Vehicle Control Techniques, Continued

Centrifugal Skid (four wheel drift)

Centrifugal skid is the loss of traction of all four tires traveling away from the axis of rotation.

Type of Action	Causes	Correction
Centrifugal skid - the loss of traction of all four tires traveling away from the axis of rotation	<ul style="list-style-type: none">Excessive speed during turning maneuver	<ul style="list-style-type: none">Slow down by easing off accelerator or lightly applying the brake

Electronic Stability Control (ESC)

In vehicles equipped with properly functioning Electronic Stability Control (ESC) systems the vehicles computer detects loss of steering control and automatically applies the brakes to help steer the vehicle where the driver intends to go. Braking is automatically applied by the computer to the wheels individually to counter oversteer and/or understeer conditions. Some ESC systems also reduce engine power until control is regained.

Hydroplaning

Hydroplaning occurs when a layer of water builds between the tires of the vehicle and the roadway surface, leading to a loss of traction that prevents the vehicle from responding to control inputs. 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 and oil).

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">SpeedWater depthTire condition	<ul style="list-style-type: none">Slow down by easing off accelerator or lightly applying the brakeMake 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 [19.04.26] Weight transfer is the shifting of the vehicles' weight.

Spring loading [19.04.27] When the vehicle experiences weight transfer, spring loading takes place as energy builds in a vehicle's springs.

Proper shuffle steering [19.04.28] Allows for greater steering control, weight transfer control, and minimizes the potential for air bag injury in the event of collision.

Throttle control [19.04.29] 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 [19.03.30] Proper roadway position will allow peace officers in high-speed driving situations to take the most efficient driving line by using the least amount of steering input necessary through corners. 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
[19.03.31]

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
[19.04.32]

Emergency response driving and normal driving situations require the use of different braking methods. Braking during emergency response driving situations requiring braking in the shortest practical time and distance necessary.

Understeer skid
[19.03.33]

The loss of traction to the front tires while attempting a turn. This results in the vehicle continuing in a straighter line than intended. An understeer skid is also known as a front-wheel skid.

Oversteer skid
[19.03.34]

The loss of traction to the rear tires while attempting a turn. This results in the rear tires sliding toward the outside of the turn.

Locked-wheel skid
[19.03.35]

A locked-wheel skid occurs when one or more of the vehicle's tires stop rotating and are skidding over the roadway surface.

Acceleration skid
[19.03.36]

Occurs when torque to the drive wheel exceeds the traction limits of the tires and they lose adhesion to the roadway surface.

Vehicle hydroplaning
[19.03.37]

Occurs when a layer of water builds between the tires of the vehicle and the roadway surface, leading to a loss of traction that prevents the vehicle from responding to control inputs.

Centrifugal Skid
[19.04.38]

Centrifugal skid is the loss of traction of all four tires traveling away from the axis of rotation

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

Continued on next page

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 Excessive acceleration that causes the torque to the drive wheels to exceed the traction limits of the tires and they lose adhesion to the roadway surface

Antilock Braking System (ABS) 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 non-reflective and resembles bare pavement

blind spots 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 keep the vehicle travelling in a straight line, also helps to straighten out the front tires after a turning movement

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Glossary, Continued

central vision	That part of a driver's field of view that measures about 15 degrees around the focal point
centrifugal skid (four wheel drift)	Is the loss of traction of all four tires traveling away from the axis of rotation.
"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	Is one that requires an immediate law enforcement response for the protection of life or property
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	The outside edge of the available roadway where turning begins

Continued on next page

Glossary, Continued

exit	The outside edge of the available roadway where the turn is concluded
focal point	The specific point at which a driver is looking at any given moment
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, causing the front wheels to travel outside the path of the rear wheels
high visual horizon	Looking as far down the road as possible while observing the total driving environment
hydroplaning	Loss of contact between the tires and the roadway due to a layer of water between the tires of the vehicle and the roadway surface
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
Law Enforcement Driving Simulator (LEDS)	A computer based driving simulator that is used to introduce defensive driving concepts and decision making processes
locked-wheel skid	When one or more of the vehicle's tires stop rotating and are skidding over the roadway surface

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Glossary, Continued

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 toward the outside of the turn (also known as a rear-wheel skid)

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

That part of a driver's field of view that lies outside central vision

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)

Continued on next page

Glossary, Continued

**rear
wheel
cheat**

Tracking of the rear tires of a vehicle inside the path of the front tires during a forward turn

**rolling
friction**

Maintaining tire rotation without skidding

secondary unit

Back up unit(s) in a vehicle pursuit

**shuffle
steering**

Both hands move up and down the wheel parallel to each other until touching at 12 o'clock position or the 6 o'clock position at which time the transfer of control from one hand to the other occurs

**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 reaction time plus the actual braking distance

Continued on next page

Glossary, Continued

**Tactical
Seatbelt
Removal (TSR)**

The disengaging and retraction of the seatbelt as the patrol vehicle is coming to a stop

**threshold
braking**

Maximum brake application prior to wheel lockup

throttle

Vehicle gas pedal accelerator

**tire
pressure**

Amount of air in the tire measured in pounds per square inch

traction

The adhesive friction of a tire on the roadway surface

**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 while the suspect is attempting to avoid arrest by using high speed driving or other evasive tactics, such as driving off a highway, turning suddenly, or driving in a legal manner but willfully failing to yield to the officers signal to stop

**weight
transfer**

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