

# **Basic Course Workbook Series Student Materials**

**Learning Domain 19  
Vehicle Operations  
Version Four**

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Student Materials  
Learning Domain 19  
Vehicle Operations  
Version Four**

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Published 1998  
Revised June 2001  
Revised July 2005  
Revised November 2005

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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 worked with POST to develop this workbook. The Commission extends its heartfelt appreciation to the California law enforcement agencies who freely offered personnel who gave of their time to participate in the development of this training material.

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

The content of each workbook is organized into sequenced learning modules to meet requirements as proscribed 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 book helps you, the student, to successfully complete the academy course, to advance to the Field Training Officer program and to enjoy a safe and rewarding career as a peace officer serving the communities of California.

A handwritten signature in black ink, appearing to read "Hal Snow". The signature is fluid and cursive, with a large initial "H" and "S".

HAL SNOW  
Interim Executive Director



# LD 19: Vehicle Operations

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# Preface

## Introduction

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### **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.

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### **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.

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### **Student workbook elements**

The following elements are included in each workbook:

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

# How to Use the Student Workbook

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## 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.

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## 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., <b><u>term</u></b> ).

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# Chapter 1

## Defensive Driving

### Overview

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

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

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

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## Overview, Continued

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**Learning objectives**  
(continued)

<b>After completing study of this chapter, the student will be able to:</b>	<b>E.O. Code</b>
<ul style="list-style-type: none"><li>• identify physiological and psychological factors that may have an effect on an officer's driving.</li></ul>	19.01.EO14
<ul style="list-style-type: none"><li>• identify hazards of varied road conditions.</li></ul>	19.01.EO16
<ul style="list-style-type: none"><li>• discuss the requirements for a vehicle inspection.</li></ul>	19.01.EO19

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**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.

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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]

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## 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.

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## Definitions

**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.

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## 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, weighing risk of their speed 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, and
  - makes good and safe choices while driving.
- 

## Space cushion

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

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## Components of Defensive Driving, Continued

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### 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**.

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### Vision

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

**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. To calculate the distance covered during 1.5 seconds is:

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

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## Components of Defensive Driving, Continued

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### Computer in the car

Many patrol cars have computers to aid in dispatching calls. Officers can also communicate with others via text messages. Officers distracted by the computer are involved in a large number of collisions. **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.

We have been taught never to assume anything; however, 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"><li>• Look left, then right, then left again before proceeding.</li><li>• When necessary, clear intersections lane by lane.</li><li>• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way.</li></ul>
Fresh green light	<ul style="list-style-type: none"><li>• Pause and look both ways before proceeding into the intersection to allow for cross traffic running the red light.</li><li>• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way.</li></ul>

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*Continued on next page*

## Components of Defensive Driving, Continued

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### Intersections (continued)

Hazard	Response
Stale green light	<ul style="list-style-type: none"><li>• A stale green is one that has been green for awhile. Drivers should anticipate it turning to yellow and slow down.</li><li>• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way.</li></ul>
Right turns	<ul style="list-style-type: none"><li>• Drivers may make a right turn against a red light only after coming to a complete stop.</li><li>• 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.</li><li>• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way.</li></ul>
Left turns	<ul style="list-style-type: none"><li>• When waiting to make a left turn, keep the front wheels straight to avoid being pushed into traffic if hit from the rear.</li><li>• Make eye contact with other drivers or pedestrians who appear to be yielding the right of way.</li></ul>

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## Components of Defensive Driving, Continued

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

---

### 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.

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## Components of Defensive Driving, Continued

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

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### 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.

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*Continued on next page*

## Components of Defensive Driving, Continued

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### Seatbelts

Seatbelts have proven to be the single most effective way of protecting vehicle occupants from serious injury or death in a collision. 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.

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### 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.

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# Physiological and Psychological Factors Affecting Law Enforcement Vehicle Operations

[19.01.EO14]

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**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 judgement and decision-making:

- Excitement
  - Impatience
  - Aggression
  - Overconfidence
- 

*Continued on next page*

# Physiological and Psychological Factors Affecting Law Enforcement Vehicle Operations, Continued

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## Physiological factors (continued)

- Lack of confidence
- Self-righteousness
- Fear
- Peer pressure
- Preoccupation

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:

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

Physiological factors can also be based on:

- Lack of sleep
  - Illness
  - Medication
-

# Factors Affecting Law Enforcement Vehicle Operations

[19.01.EO16, 19.01.EO19]

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## Driving conditions

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

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

Condition	Hazard	Response
Standing Water or rain	<b>Hydroplaning</b> 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 <b>skid</b> 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 <b>throttle</b> 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.

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# Factors Affecting Law Enforcement Vehicle Operations,

Continued

**Driving conditions**  
(continued)

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

*Continued on next page*

# Factors Affecting Law Enforcement Vehicle Operations,

Continued

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## 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 maximum tire pressure indicated on the sidewall.  Maximum tire pressure helps maintain the shape of the tire during cornering, and helps prevent hydroplaning.
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.

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# Factors Affecting Law Enforcement Vehicle Operations,

Continued

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## Vehicle inspection (continued)

Area	Procedure
Lights	Check: Headlights Break 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.

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# Chapter Synopsis

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**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]      The time it takes for the eyes to send the message to brain and the body to receive and process the message then respond.

---

**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]      Seatbelts have proven to be the single most effective way of protecting vehicle occupants from serious injury or death in a collision.

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*Continued on next page*

## Chapter Synopsis, Continued

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

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

---

**Various  
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.

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# Workbook Learning Activities

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## **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.

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## **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?

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*Continued on next page*



## Workbook Learning Activities, Continued

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**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

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Suggested corrections to this workbook can be made by going to the POST website at: [www.post.ca.gov](http://www.post.ca.gov)

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## **Workbook Corrections,** Continued

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**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.

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

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## Overview, Continued

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**Learning need**  
(continued)

<b>After completing study of this chapter, the student will be able to:</b>	<b>E.O. Code</b>
• 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:

<b>Topic</b>	<b>See Page</b>
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]

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## 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 <b>are liable</b> for death, injury, or property damage	Officers: <ul style="list-style-type: none"> <li>• are not acting within the scope of their law enforcement duties</li> <li>• commit a negligent or wrongful act or omission</li> <li>• actions are the cause of death, injury, or property damage.</li> </ul>
17004	Officers <b>are not liable</b> 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"> <li>• responding to an emergency call</li> <li>• in immediate pursuit</li> <li>• responding to but not returning from a fire alarm</li> </ul>

*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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### 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	<p>Officers may do the following if it is accomplished <b>in a safe manner with due regard for the safety of others:</b></p> <ul style="list-style-type: none"> <li>• Proceed through a red light or stop sign</li> <li>• Exceed the maximum speed limit</li> <li>• Violate other rules of the road with respect to turning movements and road position</li> </ul>	<p>Displaying a forward facing solid red light and sounding a siren as reasonably necessary. (Refer to your agency policy)</p> <p>When responding to:</p> <p><b><u>F</u>ire</b>  <b><u>E</u>mergency</b>  <b><u>R</u>escue</b>  <b><u>P</u>ursuit</b></p>
21056	<p>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.</p>	<p>At all times</p>

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*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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### **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 judgement**

Officers must always use sound judgement. 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
- 

*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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### **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 to the extreme left edge of the lane to be better seen by other drivers.

---

### **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:

<b>Device</b>	<b>Description</b>
Light Bar	Contains rotating or flashing red, blue and amber lights
Wig- Wag Lights	Alternately flashing high beam headlights
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.)

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*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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### 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"><li>• Buildings can block or deflect the sound of the siren.</li><li>• Trees and bushes can absorb the sound of the siren.</li><li>• Others may have a difficult time differentiating emergency lights from the array of other lights in the area.</li></ul>
High speed	<ul style="list-style-type: none"><li>• As speed increases, the effectiveness of the siren decreases.</li><li>• By the time they hear the siren, other drivers may not have sufficient time to react.</li></ul>
Other drivers	<ul style="list-style-type: none"><li>• Other drivers may be distracted or prevented from hearing or seeing emergency vehicles by things such as:<ul style="list-style-type: none"><li>- Listening to loud music</li><li>- Talking on cell phone</li><li>- Looking at GPS or DVD</li></ul></li></ul>

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*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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### 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. (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"><li>• Vehicle condition</li><li>• Performance characteristics</li></ul>
The environment	<ul style="list-style-type: none"><li>• Weather</li><li>• Time of day</li><li>• Pedestrians</li></ul>
Route considerations	<ul style="list-style-type: none"><li>• Traffic conditions</li><li>• Road conditions</li><li>• Intersections</li><li>• Location of emergency</li></ul>

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*Continued on next page*

## Operating Emergency Response Vehicles, Continued

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**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
  - Not use the computer while driving
- 

**Siren syndrome**

The increased stress caused by the sound of the siren and the nature of the call the officer is responding to causes 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.

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

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### 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."

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

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# Chapter Synopsis

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

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**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.

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**Importance of agency specific policies [19.02.EO20]** Agency policies and guidelines regarding emergency response driving operations can be more restrictive than state law.

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**Non-law enforcement responses [19.02.EO21]** *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.

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**Emergency warning devices [19.02.EO22]** Emergency devices that may be available on law enforcement vehicles may include emergency lights and sirens.

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## Chapter Synopsis, Continued

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**Limitations of effectiveness of emergency devices**  
[19.02.EO23]

Warning devices do not guarantee the right-of-way. 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 condition caused by the excitement of the moment while operating a law enforcement vehicle during emergency response or pursuit driving conditions. Negative effects may include increased adrenalin flow, tunnel vision and loss of speed reference.

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**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.

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# Workbook Learning Activities

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## **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.

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## **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.

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*Continued on next page*

## Workbook Learning Activities, Continued

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**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?

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*Continued on next page*

## **Workbook Learning Activities, Continued**

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**Student notes**

# Chapter 3

## Vehicle Pursuits

### Overview

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#### 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:

<b>After completing study of this chapter, the student will be able to:</b>	<b>E.O. Code</b>
• 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

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*Continued on next page*

## Overview, Continued

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

<b>Topic</b>	<b>See Page</b>
Components of Vehicle Pursuits	3-3
Chapter Synopsis	3-9
Workbook Learning Activities	3-10

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# Components of Vehicle Pursuits

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

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**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.

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**Definition** A vehicle pursuit is a response to apprehend a suspect(s):

- in a vehicle.
- avoiding arrest or detention.
- evading capture.

---

**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*. Each officer is responsible for knowing 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

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*Continued on next page*

## Components of Vehicle Pursuits, Continued

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### 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, or
  - The suspect has committed or attempted to commit a violation of the law, and
  - The necessity of immediate apprehension outweighs the level of danger created by the pursuit.
- 

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## Components of Vehicle Pursuits, Continued

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### 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.

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
- 

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## Components of Vehicle Pursuits, Continued

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### **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

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

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*Continued on next page*

## Components of Vehicle Pursuits, Continued

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### **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
  - Duration of the pursuit
  - 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.

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*Continued on next page*

## Components of Vehicle Pursuits, Continued

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### Termination of 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
- 

### 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*.

---

### 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.

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### 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.

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# Chapter Synopsis

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**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.

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

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## Workbook Learning Activities, Continued

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**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.

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## **Workbook Learning Activities, Continued**

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**Student notes**

# 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.

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

<b>After completing study of this chapter, the student will be able to:</b>	<b>E.O. Code</b>
<ul style="list-style-type: none"><li>distinguish between longitudinal and lateral weight transfer.</li></ul>	19.04.EO26
<ul style="list-style-type: none"><li>describe spring loading.</li></ul>	19.04.EO27
<ul style="list-style-type: none"><li>demonstrate proper techniques for two-handed shuffle steering.</li></ul>	19.04.EO28
<ul style="list-style-type: none"><li>demonstrate proper throttle control</li></ul>	19.04.EO29
<ul style="list-style-type: none"><li>demonstrate proper roadway position and the three essential reference points of a turning maneuver.</li></ul>	19.04.EO30
<ul style="list-style-type: none"><li>explain the primary effects speed has on a vehicle in a turning maneuver.</li></ul>	19.04.EO31
<ul style="list-style-type: none"><li>demonstrate proper braking methods.</li></ul>	19.04.EO32

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*Continued on next page*

## Overview, Continued

**Learning objectives**  
(continued)

<b>After completing study of this chapter, the student will be able to:</b>	<b>E.O. Code</b>
<ul style="list-style-type: none"> <li>• distinguish between and describe the causes of the following types of vehicle skids:               <ul style="list-style-type: none"> <li>- understeer skid,</li> <li>- oversteer skid,</li> <li>- locked-wheel skid, and</li> <li>- acceleration skid.</li> </ul> </li> </ul>	19.04.EO33 19.04.EO34 19.04.EO35 19.04.EO36
<ul style="list-style-type: none"> <li>• identify the causes and contributing factors of vehicle hydroplaning.</li> </ul>	19.04.EO37

**In this chapter**

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

<b>Topic</b>	<b>See Page</b>
Vehicle Dynamics	4-3
Vehicle Control Techniques	4-5
Chapter Synopsis	4-15
Workbook Learning Activities	4-17

# Vehicle Dynamics

[19.04.EO25, 19.04.EO26]

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## 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 loss of control.

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

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*Continued on next page*

## Vehicle Dynamics, Continued

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### 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.

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### Contact patch

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

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### 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.

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# 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]

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## 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. 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.

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 **spring loading** and oversteer.

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*Continued on next page*

## Vehicle Control Techniques, Continued

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### 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.

---

### 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"><li>• Too much acceleration</li></ul>	<ul style="list-style-type: none"><li>• Ease off the throttle until the tires stop spinning</li></ul>

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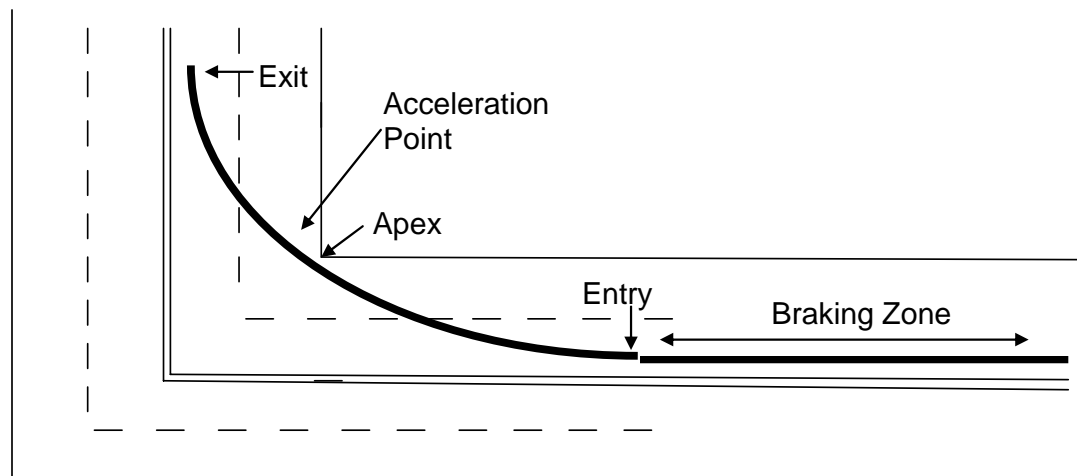
## Vehicle Control Techniques, Continued

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### 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

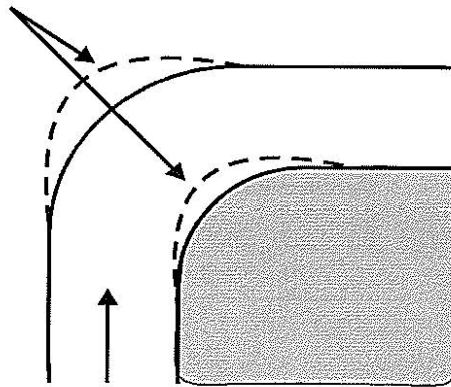
**Front end swing** occurs when the driver turns the steering wheel while driving in reverse. When the steering wheel is turned, the front end of the vehicle will swing out in a direction opposite the direction the steering wheel was turned. The more the steering wheel is turned, the farther out the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

Type of Action	Cause	Correction
Front-end swing - front end swings out from center	<ul style="list-style-type: none"> <li>Steering input while backing</li> </ul>	<ul style="list-style-type: none"> <li>Minimize steering input</li> </ul>

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.

Path of front tires



Direction of travel backing

*Continued on next page*

## Vehicle Control Techniques, Continued

### Rear wheel cheat

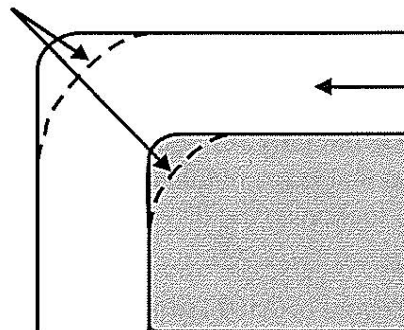
When driving forward, the rear wheels will take a path inside that of the front wheels when the vehicle is turning. The sharper the turn, the greater the **rear wheel cheat**.

Type of Action	Cause	Correction
Rear Wheel Cheat - rear wheel track inside the front wheels while turning	<ul style="list-style-type: none"> <li>Steering input while driving forward</li> </ul>	<ul style="list-style-type: none"> <li>Turn wide enough to allow enough space for the rear wheels to clear the hazard</li> </ul>

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.

Path of rear tires



Direction of travel

### 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.

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## Vehicle Control Techniques, Continued

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### Braking method

Braking during performance driving situations is different from normal driving circumstances. Braking in the shortest practical time and distance necessary to reduce speed or stop is called **threshold braking**. It is called this because the vehicle is on the threshold of engaging the **ABS** system or entering a locked wheel skid. This type of braking is used to control speed prior to cornering

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### 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
<b>Brake fade</b> - the loss of braking efficiency	<ul style="list-style-type: none"><li>• Overuse of brakes</li></ul>	<ul style="list-style-type: none"><li>• Shift to lower gear if speeds allow</li><li>• Use proper braking techniques</li></ul>

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### Antilock brakes (ABS)

The **Antilock Braking System**, or ABS, is a computerized emergency backup system that helps maintain rolling friction during hard braking. ABS prevents wheel lockup so the driver can maintain steering capability.

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### 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.

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## Vehicle Control Techniques, Continued

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### 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
<b>Locked-wheel skid</b> - the wheels have stopped turning and are skidding	<ul style="list-style-type: none"><li>• ABS failure</li><li>• Hard braking</li></ul>	<ul style="list-style-type: none"><li>• Ease of the brakes until rolling friction is regained</li></ul>

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### Understeer skid

**Understeer skid** is the loss of traction to the front wheels causing a vehicle to continue to travel in a straight line. This typically happens to a vehicle entering a corner too fast.

Type of Action	Cause	Correction
<b>Understeer</b> - the loss of traction to the front wheels causing a vehicle to continue to travel in a straight line.	<ul style="list-style-type: none"><li>• Excessive speed while entering a corner</li><li>• Aggressive steering input</li></ul>	<ul style="list-style-type: none"><li>• Allow vehicle to slow without hard braking</li><li>• Remove some steering input to lessen the severity of the skid</li></ul>

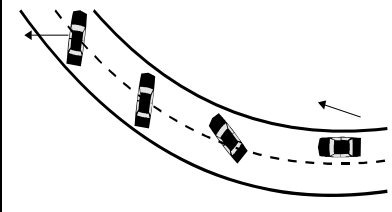
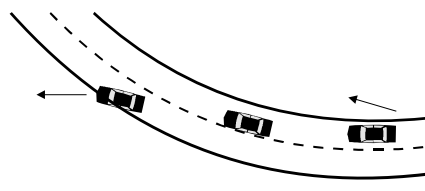
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## Vehicle Control Techniques, Continued

### Oversteer 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. The following shows examples of oversteer and understeer, recover and causes.

	Vehicle Oversteer	Vehicle Understeer
<b>Description</b>	<ul style="list-style-type: none"> <li>• Loss of traction to the <i>rear</i> tires of vehicle</li> <li>• Rear of car skids toward outside of the turn</li> <li>• Turning radius tends to tighten</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of traction to the <i>front</i> tires of vehicle</li> <li>• Vehicle forced to continue in a straight line</li> </ul>
<b>Cause</b>	<ul style="list-style-type: none"> <li>• Excessive speed in a turn</li> <li>• Sudden and/or excessive steering input</li> <li>• Overbraking in a turn</li> </ul> 	<ul style="list-style-type: none"> <li>• Excessive acceleration while turning</li> <li>• Entering a curve at too high a speed</li> </ul> 

*Continued on next page*

## Vehicle Control Techniques, Continued

**Oversteer skid**  
(continued)

	<b>Vehicle Oversteer</b>	<b>Vehicle Understeer</b>
<b>Recovery</b>	<ul style="list-style-type: none"> <li>• Reduce throttle</li> <li>• Counter steer</li> <li>• Do not brake</li> </ul> <p>Remove the counter steer when the vehicle begins to recover to prevent a secondary skid.</p>	<ul style="list-style-type: none"> <li>• Allow vehicle to slow</li> </ul> <p>Traction will be restored and steering regained.</p>

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

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## Vehicle Control Techniques, Continued

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### 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. A tire can hydroplane on anything that separates it from the roadway (i.e., ice, snow, fuel, oil, gravel, and its own tire rubber).

Shows and oversteer/understeer skid and suggested methods for correction in a rear wheel drive vehicle:

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

Factor	Example
Road conditions	<ul style="list-style-type: none"><li>• Ice or snow</li><li>• Wet or dry</li><li>• Loose gravel or hard surface</li></ul>
Road characteristics	<ul style="list-style-type: none"><li>• Curve or straight</li><li>• Radius of the turn</li><li>• Uphill or downhill</li><li>• Open highway or city</li></ul>

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## Chapter Synopsis

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**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.

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**Weight transfer**  
[19.04.EO26] Weight transfer is the shifting of the vehicles' weight.

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**Spring loading**  
[19.04.EO27] When the vehicle experiences weight transfer, spring loading takes place as energy builds in a vehicle's springs.

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**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.

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**Throttle control**  
[19.04.EO29] 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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**Roadway positioning reference points**  
[19.03.EO30] Roadway position, also referred to as the *driving line* 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

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**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.

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**Braking methods**  
[19.04.EO32]

Performance driving and normal driving situations require the use of different braking methods. Short distance and practical time may require braking until just prior to the ABS system engaging.

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**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.

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**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.

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**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.

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**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.

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**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.

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# Workbook Learning Activities

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## **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.

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## **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.

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## Workbook Learning Activities, Continued

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**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

# Glossary

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**Introduction**      **The following glossary terms apply only to Learning Domain 19: Vehicle Operations.**

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**acceleration**      An increase in the speed of a vehicle

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**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)**      A computerized emergency secondary system that prevents lockups

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**apex**      Point in a turn where the vehicle comes closest to the innermost part of the available roadway

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**black ice**      An invisible, thin sheet of extremely slick ice that is nonreflective and resembles bare pavement

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**blind spot**      Area which cannot be seen by a driver when using a vehicle's mirrors

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**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

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**Code 3  
response**

See emergency response driving

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**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

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**contact  
patch**

Area of the tire in contact with the roadway surface

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**defensive  
driving**

Operating a vehicle in such a manner as to be able to avoid involvement in a collision, no matter what the conditions

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**emergency  
response  
call**

A situation which requires immediate law enforcement attention for the protection of persons or property (also known as Code-3 response)

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**emergency  
response  
driving**

Operation of an emergency vehicle with red lights and siren in compliance with *Vehicle Code Sections 21055 and 21056* (also known as Code-3 driving)

---

**entry**

Point of a curve where the driver begins to input steering to maneuver a turn

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**exit**

Point of a curve where a vehicle comes out of a curve and is pointed in a straight path

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**focal  
point**

The specific point at which a driver is looking at a given moment in time.

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## Glossary, Continued

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**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, spike stops, heading off, channeling and road blocks)

---

**oversteer 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

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**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 second)

---

**peripheral vision** Lateral degree of perception present when the eyes are focused straight ahead

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**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 can make a decision and initiate an action (for the average driver, the decision/reaction time is .75 second)

---

**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** Directional friction caused by a tire rolling along a stationary surface such as a roadway

---

**secondary unit(s)** Back up unit(s) in a vehicle pursuit

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## Glossary, Continued

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**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

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**siren syndrome** 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** Sum of the total reaction time lapses plus the actual breaking distance

---

**threshold braking** Application of braking force to the point just prior to wheel lockup, bringing the tires to the threshold of a locked wheel skid

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**throttle** Vehicle gas pedal, accelerator and choke

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**tire pressure** Maximum pressure as recommended on the side of the tire

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## **Glossary, Continued**

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**tunnel  
vision**

Reduction of peripheral vision

---

**understeer  
skid**

Loss of traction of the front tires forcing the vehicle to continue in a straight line (also known as a front-wheel skid)

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**vehicle  
dynamic**

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

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**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 detainment

---

**visual  
horizon**

Everything the driver can see a good distance down the road

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**weight  
transfer**

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

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