BASIC COURSE INSTRUCTOR UNIT GUIDE

19

VEHICLE OPERATIONS

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UNIT GUIDE 19

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Learning Domain 19
Vehicle Operations

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The curricula contained in this document is designed as a *guideline* for the delivery of performance-based law enforcement training. It is part of the POST Basic Course guidelines system developed by California law enforcement trainers and criminal justice educators in cooperation with the California Commission on Peace Officer Standards and Training.

The training specifications referenced herein express the required minimum content of this domain.

COMPONENTS OF DEFENSIVE DRIVING

Given a direct question, the student will identify the following factors which will affect impact defensive driving:

A. Driver attitude to include:
   1. Overconfidence
   2. Self-righteousness
   3. Impatience
   4. Preoccupation

B. Driver skill to include:
   1. The level of the driver's psychomotor skills
   2. Understanding and controlling the physical forces acting upon a vehicle (e.g., braking, throttle, steering, etc.)
   3. The level of the driver's experience

C. Driver condition to include:
   1. Decreased visual efficiency as a result of fatigue, illness, etc.
   2. Longer perception, decision/reaction time as a result of fatigue, drugs, or alcohol
   3. Managing physiological and psychological factors (e.g., driver stress, adrenaline flow, peer pressure)

D. Vehicle capability and condition to include:
   1. Level of care provided by driver
   2. Mistreatment of vehicle
   3. Detection of and provision for proper maintenance
   4. Individual characteristics of vehicle (e.g., front wheel drive vs. rear wheel drive)

E. Driving conditions to include:
   1. Weather (e.g., rain, fog, snow)
   2. Road surface
   3. External actions (e.g. other drivers, pedestrians, animals, etc.)

Performance Objective 6.1.1

CURRICULUM

A. Driver attitude: The effects and understanding of emotion and attitude are central themes underlying the positive driving knowledge of the law enforcement officer. The student must understand what driving behavior is desired, and what attitudes present negative influences on that desired behavior.

   1. Overconfidence: The feeling that the person knows everything there is to know about law enforcement vehicles and driving

   2. Self-righteousness: That sure and certain knowledge that the driver is always right and knows it - includes an attitude or assumption that everyone will get out of the way, which can result in faulty judgement.

   3. Impatience: Always in a hurry, which can lead to poor driving habits that include:

a. Driving at excessive speed for conditions

b. Unsafe passing

c. Following too close

d. Unsafe backing or parking

e. Abuse of equipment

4. Pre-occupation: Thinking about other things while driving a vehicle - Being preoccupied with thoughts or actions not related to driving delays perception and increases possibility of an accident. This includes:

a. Allowing boredom to occupy thought processes

b. Distractions of using equipment, such as radio, spotlight, mobile digital terminal, etc.

c. Distractions when performing other law enforcement duties

d. Personal problems or concerns

B. Driver skill

1. Psychomotor skills: These are skills such as steering, braking pressure, eye-hand coordination, timing of turns, and throttle pressure, or any other coordination or physical activity involved in operating a vehicle.

2. Understanding and controlling the physical forces acting upon a vehicle: This is the practical application of the laws of physics covering objects in motion and at rest (momentum and inertia) and changes in states of energy from kinetic to heat through friction (braking and turning). Centrifugal/centripetal forces will also come into play during turning maneuvers.

3. Experience: A valuable tool in learning and growing as a professional law enforcement officer - The exposure to techniques demonstrated in the learning environment must be used and built upon in the field environment.

4. Left foot braking

a. The average driver is no faster (reaction time) with the left foot than with the right when applying pressure to the brake pedal.

b. Most drivers are conditioned to use their right foot on the brake pedal and thus have better braking control.

c. Left foot braking may develop the habit of resting the left foot on the brake pedal while driving.

(1) This causes premature wear of brake lining.

(2) The brake system is slightly activated (dragging), generating heat which can cause premature fade.

(3) Causes the vehicle's brake lights to be illuminated which confuses drivers who are following the vehicle.

d. Develops a tendency to "play" engine power against brake power, causing excessive strain on the power train components, i.e., transmission, U-joints, differential, etc.

e. In a panic stop situation, the left foot braker may apply both the brake and throttle thereby reducing braking efficiency.

C. Driver condition

1. Fatigue reduces visual efficiency. The eyes may acquire sensory inputs but the mind and body require more time to process the information.

a. Routine and emergency driving decision processes are slowed when fatigue exists.

b. Mental and physical fatigue increases risks by lengthening perception and reaction time.

2. Psychological factors which affect motor skills and contribute to law enforcement collisions include:

a. Boredom of spending a full day in a vehicle

b. Dynamic nature of job carries over into driving tasks

c. Overconfidence in one's driving ability or handling capability of vehicle

d. Effects of emotion from law enforcement incident or personal situation

e. Having high-risk attitude, including impatience, self-righteousness, ego, etc.

f. Distractions created as a result of using law enforcement equipment

3. Physiological factors which affect motor skill:

a. Mental and physical fatigue seriously affect a person's ability to operate a vehicle in routine and emergency situations.

b. Physiological factors needed to operate effectively and to maximize response capability in vehicle operations include:

(1) Vision - includes acuity, depth perception, field of vision, color and night vision.

(2) Hearing - includes tuning in and out external interferences.

(3) Sensory - includes equilibrium, touch, and sensations.

(4) Smell - being sensitive to gasoline, overheated brakes, and motor malfunctions.

(5) Timing - includes coordination and reaction skills.

c. Effects of smoking, alcohol, or drugs upon driving.

(1) Smoking reduces night vision and is a distraction to driving

(2) The use of alcohol or other drugs cause serious physiological conditions which directly affect mental ability at both motor skill and reasoning levels

4. Peer pressure

a. The unreasonable expectations of others may prompt driving in an unsafe manner and may cause the driver to exceed their abilities or the vehicle's capabilities.

b. The aggressive nature of law enforcement service may be overly emphasized in the driving tasks because of the need to be accepted by the group.

c. Pride and fear of rejection by the group may inhibit good decision making and judgment.

5. Emotional factors

a. Emotions such as fear, anxiety, or excitement may have an effect upon driving. Emotions affect the part of the brain which controls thought, reason and judgment.

b. Emotions can have a distracting and paralyzing effect upon a person's driving, which may:

(1) Dim or "blind" power of observation.

(2) Delay or distort ability to interpret events or data.

(3) Reduce powers to assess and predict actions of other drivers.

(4) Produce faulty judgments and high-risk decisions.

(5) Reduce ability to perform necessary driving skills.

c. Emotions can be a negative force in determining driving behavior. Reasoned appreciation of collision risks can restrain unsafe actions or tendencies and thereby result in safer driving.

D. Vehicle capability and condition

Vehicle capability is based upon basic vehicle construction, specific requirements developed by law enforcement professionals as specifications incorporated into the competitive bid process, officer use, and vehicle maintenance programs.

1. The officer's responsibility is for vehicle operation and care.

2. Mistreatment of the vehicle during regular or emergency operations places unnecessary risk on the officer and those who drive the vehicle at a later time.

3. Prompt detection of mechanical malfunctions and proper maintenance of the vehicle and related equipment is critical to safe operation. All mechanical malfunctions or worn components (tires, brakes, fan belts, seat belts, etc.) must be reported immediately.

4. Individual characteristics of vehicle (e.g., front wheel drive vs. rear wheel drive (ABS vs. non-ABS)

5. Two types of brake designs on passenger cars - disc and drum

a. Disc brakes consist of a large round flat rotor (disc) mounted vertically inside the wheel. At the top of the rotor is mounted a caliper (clamp). Within the caliper are two "pads" of brake lining material, one on each side of the rotor. These pads are activated hydraulically to squeeze together on the rotor causing a braking action.

b. Drum brakes (internal expanding type) consist of a round "drum" mounted behind the wheel. Within the drum are two brake shoes with lining material attached. These brake shoes are hydraulically activated and forced outward so as to rub against the inner surface of the turning drum, causing a braking action.

c. Disc brakes will not have the tendency to fade as quickly as drum brakes.

(1) The brake pads and rotors are more exposed to the outside air which allows them to dissipate the heat more efficiently.

(2) Disc brakes tend to be more easily affected by water because of their exposure. However, due to the wiping action of the brake pads against the rotor, they will dry more quickly.

d. In a four-wheel, locked-skid situation, one brake system is just as effective as the other, as long as the system is capable of stopping the rotation of the wheels.

(1) The brakes only stop the wheels.

(2) The friction between the tires and the roadway stops the vehicle.

e. The number one mechanical failure during emergency driving is overheated brakes.

(1) Due to the severe brake usage inherent in emergency driving, extreme temperatures are generated in the brake system (up to 1400 degree F.).

(a) This heat can cause brake fade, a condition where there is a loss of friction between the brake lining and the drum or rotor.

(b) This heat can also cause warping of drums or rotors, glazing of lining material and boiling of brake fluid in the wheel cylinders.

(2) Both systems will fade if enough heat is generated in the system.

(a) This failure is usually temporary. As the brakes cool down they regain their effectiveness.

(b) Disc type brakes recover much faster due to the cooling design and less "trapping" of heat, such as occurs inside of a drum system.

E. Driving conditions

Adverse driving conditions demand the absolute in motor skills, experience, mental ability, and vehicle performance.

1. Weather

a. Conditions such as rain, fog, and snow are out of the officer's control. Therefore, driving techniques must adjust to existing conditions.

b. Adverse driving conditions may cause an increase in adrenalin flow, thereby affecting physiological reactions.

c. Adverse driving conditions demand increased defensive driving awareness and vehicle operation that is reasonable and proper for conditions.

d. Adverse driving conditions demand increased awareness to what is ahead, on both sides, and behind the vehicle. A greater space cushion is necessary.

2. Hydroplaning

Hydroplaning is a condition where the tires are lifted off of the pavement and begin to ride on a thin layer of water. This breaks the adhesion (traction) of the tire to the pavement.

Hydroplaning involves numerous elements or criteria which determine when and how quickly a tire will begin to ride up on a film of water. These elements are:

a. Water depth

b. Speed

c. Tread pattern

d. Tread depth

e. Tire width

f. Tire pressure

g. Vehicle weight

The NASA formula for hydroplaning: The square root of the tire pressure (PSI) multiplied by 10.3 equals the speed (MPH) the tire will start to hydroplane. However, that is dependent upon the depth of the tire tread vs. the depth of the water on the roadway. Heavy (good) tread may take 3/8 of an inch of water, where less tire tread will take less water depth to initiate hydroplaning.

3. Vehicle limitations

The combination of the vehicle's capabilities or limitations plus the lack of maintenance can increase the stopping distance.

a. Braking system: Poorly maintained, brake fade, low brake fluid

b. Tires: Tire tread depth, improper tire pressure, alignment

c. Worn suspension components

4. Other conditions which affect law enforcement vehicle operation:

   a. Traffic density

      (1) Very dense traffic conditions mandate slower speeds. The need for attentiveness to movements of other drivers is more critical in dense traffic.

      (2) Dense traffic is especially critical for law enforcement drivers if they are responding to an emergency call. The more traffic, the greater is the potential for other drivers to move into the path of the emergency vehicle

      (3) Light traffic density may permit increased speeds. However, it may also lull drivers into a false sense of safety by not paying attention to cross traffic and other hazards.

   b. Speed of vehicle

      (1) At a given distance, the slower the speed, the more time is available to detect and avoid an impending collision.

      (2) At higher speeds, the available time for perception and reaction is reduced and required space for turning or stopping is increased.

      (3) Law enforcement drivers must be aware of the speeds of other vehicles in order to detect and avoid impending collision situations.

   c. Vehicle types

      (1) The type of vehicle being driven by the officer can affect safe vehicle operation when considering such factors as weight, turning radius, degrees of visibility and other factors

      (2) The types of vehicles in surrounding traffic can also influence safe driving.

         (a) Large vehicles may obstruct the view.

         (b) Heavy vehicles may not be able to stop in time to prevent a collision.

         (c) Motorcycles may weave between vehicles.

         (d) Buses may make sudden stops.

         (e) Vans, trucks and motorhomes may have blind spots to the side and rear.

   d. Pedestrians

(1) Areas with many pedestrians, especially children, require extra attention.

(a) Residential communities

(b) Parks and playgrounds

(c) Schools

(d) Business areas

e. Animals

(1) Rural areas require diligent observance for farm and wild animals potentially entering onto the roadway.

(2) Cities have domestic animals which often present traffic hazards too, especially in residential areas.

(3) It may be the safest decision to not swerve to attempt to avoid small animals rather than swerving into the path of another vehicle, or running off the road.

(4) Collisions with large animals can cause serious injury or death to the vehicle's occupants.

FREQUENT COLLISION FACTORS

Given a direct question, the student will identify the following driving movements or other factors which most frequently contribute to law enforcement collisions:

A. Unsafe speed for conditions
B. Right-of-way violations
C. Left-hand turns
D. Backing
E. Parking
F. Distractions/inattention

Performance Objective 6.1.3

CURRICULUM

A. Driving actions and factors that contribute to law enforcement collisions

1. Driving movements frequently contributing to law enforcement collisions include:

a. Unsafe speed for conditions - Collisions resulting from driving too fast for conditions occur most often in approaching the following locations:

(1) Intersections

(2) Hills

(3) Curves

(4) Passing slower traffic

NOTE: Most of the serious law enforcement accidents (i.e., serious injury, death, high liability cases) involve unsafe speed for conditions.

b. Right of way violation - Often connected with impatience of driver, and a self-righteousness attitude.

c. Left-hand turns - While attempting a left turn, the driver cannot take for granted that on-coming drivers who signal for turns will actually make them, or that vehicles turning right will remain in the right lane during their turn, or that pedestrians will remain in crosswalks, or will be aware of left-turning vehicles.

d. Backing - It is estimated that approximately one-third of all non-emergency law enforcement related collisions occur while the vehicle is in reverse.

(1) Driver must be aware of what is behind vehicle prior to backing.

(2) Reverse driving involves differences in vehicle dynamics and operator skills.

e. Parking - Collisions occur because of insufficient space, improper backing techniques, and driver inattentiveness.

2. Distraction/inattention - Thinking about other things while driving a vehicle or being preoccupied with thought or actions not related to driving delays perception and increases possibility of an accident. This includes:

a. Allowing boredom to occupy thought processes

b. Distractions of using equipment such as radio, spotlight, mobile digital terminal, etc.

c. Distractions when performing other law enforcement duties

d. Personal problems or concerns

ADVANTAGES OF USING SAFETY BELTS

Given a direct question, the student will identify common types of occupant safety devices and their benefits to include:

A. Use of safety belts:
   1. Is the simplest and most effective protection against injury or death in a collision
   2. Lessens the consequences of the human collision and the organ collision
   3. Prevents occupants from striking objects inside the vehicle
   4. Provides "ride-down" effect
   5. Secures the driver behind the wheel for better vehicle control
   6. Complies with law and agency policy (VC 27315.5)
   7. Sets a positive example for the public

B. Air bags:
   1. Can reduce injury or death
   2. Are not a substitute for safety belts (e.g. ejection, secondary impact)
   3. Are only effective in frontal crashes

Performance Objective 6.1.5

CURRICULUM

A. The purpose of safety belts

1. The lap belt is designed to secure the occupant in their seat, i.e., prevent ejection.

2. The shoulder belt is designed to prevent the occupant from striking the interior of the vehicle.

3. Ejection is a major killer in automobile accidents. The driver and passengers are much safer remaining in the vehicle during a crash. The chances of being killed are 25 times greater if the person is ejected.

   A review of accident reports or a visit to a junkyard to inspect the vehicles will reveal that the majority of the cars are damaged directly in the front or slanted to the front. This inspection will reveal that the cars are engineered and designed to absorb damage.

   Car construction provides protection for occupants. Seat belt use is part of safety zone protection.

   NOTE: 65% of all collisions are frontal collisions.

B. Use of safety belts

Officers are even more vulnerable to injury or death from vehicle collisions because of the number of hours spent in vehicle patrol and the driving

conditions they encounter. Developing a habit of using a safety (seat) belt will significantly increase body protection and control of the vehicle.

1. Presently, the simplest and most effective protection against possible injury or death in a motor vehicle accident is a properly fastened safety belt. A vehicle crash is actually made up of three separate collisions:

   a. In the first collision, when the vehicle strikes an object, the vehicle slows down and begins to absorb some of the impact as seen in crushed body panels.

   b. A fraction of a second after the vehicle has stopped, the second (or human) collision begins. This is when an unrestrained driver and/or occupant slams into the dashboard, steering wheel, windshield or other obstructions.

   c. The third collision occurs within the human body as internal organs impact against each other or the skeleton frame.

2. Benefits of safety belt use

   Using safety belts in an automobile accident reduces the potential harm caused by the accident forces. Safety belts reduce the forces of impact, and as a result, lessen the severity of the crash.

   a. Safety belts maximize whatever benefits come from the first collision through "riding down." By making the length of the impact of the collision work on the driver, belts give the benefit of increased stopping distance and dissipation of the forces of impact by the car itself.

   b. The use of safety belts minimizes the harm of the second and third (human and organ) collisions. By absorbing the impact, the belts dissipate collision forces safely, rather than through a dangerous medium, such as glass or steel.

   c. The findings of a study of over 15,000 "towaway" accidents showed:

      (1) Lapbelts are 31% effective.

      (2) Lap-shoulder belts are 57% effective.

3. Developing the habit of using the safety belt will significantly increase body protection and control of the vehicle.

4. Safety belt law/department policies

   a. Law enforcement exemption is covered in California Vehicle Code Section 27315.5.

NOTE: The Vehicle Code specifically states that there is no exemption to wearing safety belts if the department policy mandates use.

b. Most departmental policies mandate safety belt use.

5. Sets a positive example for public

C. Air bags

1. Air bags can reduce the chance of injury or death by acting as a pillow when deployed.

2. Air bags are designed to be a supplement to the three-point seat belt and do not reduce the importance of using seat belts.

3. The air bag should deploy and is only effective in the event of a significant front-end collision.

4. Air bags should not deploy accidentally because of bumps, dips in the roadway, or on minor collisions.

NOTE: Normally, air bags will not deploy below a 12-mile per hour solid wall impact. Proper use of pushbars should not deploy the air bag.

FACTORS WHICH AFFECT STOPPING DISTANCE

Given a direct question, the student will identify factors which affect the stopping distance of a vehicle.

A. Factors relating to the driver
   1. Perception, decision/reaction
   2. Preoccupation (e.g., boredom, distractions, personal problems and concerns)
   3. Mental and physical fatigue

B. Factors relating to the vehicle
   1. Overall maintenance
   2. Condition of braking system (e.g., overheated brakes, fluid level)
   3. Tires (e.g., pressure)

C. Factors relating to the braking system
   1. ABS
   2. Non-ABS

D. Factors relating to road and weather conditions
   1. Presence of materials which will change the coefficient of friction (e.g. sand, mud, gravel, etc.)
   2. Weather which will change the coefficient of friction (e.g., water, snow, ice)
   3. Type of road surface (e.g., asphalt, concrete, dirt, etc.)

E. Speed of the vehicle

Performance Objective 6.2.2

CURRICULUM

A. Stopping distance

   1. The stopping distance is the distance measured from the moment the driver sees a reason to stop to the moment the vehicle stops. Three events must occur:

      a. The driver identifies the reason for stopping. (perception)

      b. The driver physically reacts with pressure on the brake pedal. (decision/reaction)

      c. The vehicle comes to a stop. (braking distance)

B. The following five basic conditions influence the overall stopping distance of a vehicle:

   1. Driver limitations

      a. Preoccupation: Thinking about other things while driving a vehicle; being preoccupied with thoughts or actions not related to driving may delay perception times and increases the possibility of an accident. This includes:

(1) Allowing boredom to occupy thought processes

(2) Distractions of using equipment, such as radio, spotlight, mobile digital terminal, etc.

(3) Distractions when performing other law enforcement duties

(4) Personal problems or concerns

b. Mental and physical fatigue seriously affects a person's ability to operate a vehicle in routine or emergency situations.

c. Peer pressure may cause over-aggressive/unsafe driving.

2. Factors relating to the vehicle

a. The combination of the vehicle's capabilities or limitations plus the lack of maintenance can increase the stopping distance. These include:

(1) Braking system: Poorly maintained, brake fade, low brake fluid.

(2) Tires: Tire tread depth, improper tire pressure, alignment.

3. Factors relating to the braking system

a. With drum brakes, when you apply pressure to the brake pedal, the brake shoes (lined by a material called the brake lining) come into contact with the brake drum, slowing the rotation of the drum.

b. With disc brakes, when you apply pressure to the brake pedal, the brake pads, attached to the inside of a caliper, come into contact with a rotating flat disc, slowing the rotation of the disc.

c. Anti-lock braking systems (ABS) are computer-controlled brakes. The controller prevents the brake from locking up, no matter how hard you press on the brake pedal.

(1) The advantage of ABS is that they automatically create threshold braking.

d. If your engine fails, your power-assisted brakes will work for at least <u>two</u> applications of the brake. After that, your brakes will work, but will be extremely hard to apply.

4. Factors relating to road and weather conditions

a. Road conditions to be aware of:

(1) Water - As little as 1/16th of an inch of water could cause hydroplaning. If the water is concentrated on one portion of the road and only one side of the vehicle goes through the water, the vehicle will tend to pull in that direction. The force of the pull is dependent on the depth of the water and the speed of the vehicle.

(2) Mud: Two basic problems can occur:

(a) The low coefficient of friction of a muddy surface results in poor traction.

(b) Sliding sideways in the mud, the mud can build up against the side of the tire until there is sufficient resistance to cause the vehicle to rollover.

(3) Potholes: Potholes create a great danger to patrol vehicles. It is best to drive around the potholes. If potholes cannot be avoided, hit the pothole squarely, rather than on the side of the tire. The face of the tire can take considerably more impact than the side wall.

b. Weather

Ice, snow, fog, sleet, rain, wind, hot, humid, cold, smoke and haze conditions may reduce visibility as well as alter an officers ability to operate a vehicle safely.

(1) Snow and ice considerations

(a) The edge of the road, land markings, or even traffic signs may not be visible.

(b) The stopping distance on ice and snow increases.

(c) Have snow tires on the vehicle and a shovel and chains available. Make certain that the vehicle heater and defroster are in good working order. Brakes should be properly adjusted so they pull evenly.

(d) Stay aware of the temperature. Wet roads with ice and freezing rain are the most treacherous of all driving conditions.

(e) Remember that bridges and roadway shaded areas freeze first.

NOTE: Discuss "Black Ice"

(f) Do not make any sudden moves with the steering wheel, brakes or accelerator.

(g) Slow down in advance of intersections, curves and down-grades sooner than normal. Keep at least a four-second following distance.

(h) Turning the defroster on may, initially, steam up the windshield. Opening a window or using the air conditioning system will reduce this condition.

(i) If using chains, drive with them until the road surface is appreciably clear of ice or snow.

(j) Straighten the front wheels when starting the car in motion on a snow covered or slippery surface.

(k) When driving through deep snow, shift into lower gear before entering the snow and attempt to keep the car moving through the snow.

(l) When stopped or stuck in deep snow or in a snow drift, be aware that carbon monoxide may seep back into the vehicle.

(2) Rain considerations

(a) During rainy conditions, tires may start hydroplaning, which affects steering and braking.

(b) Driving through large areas of water can affect brake performance and the vehicle's electrical system.

NOTE: Check all tires for proper air pressure.

Precautions:

1) Slow down before hitting water.

2) Turn wipers on before hitting the water.

3) Light application of brakes after exiting the water dries the brake pad, restoring efficiency.

(c) Rain can distort or obliterate images. Use caution in checking outside mirrors.

(d) Turning on headlight during rainy conditions improves other motorist's awareness of other vehicle.

(3) Wind considerations

(a) Be alert where windy conditions prevail. Crosswinds can blow the vehicle off the road or across the center

line, particularly in curves and corners, and especially in rainy and windy conditions.

(b) Be alert when passing building, traveling through an underpass, when the road is wet with water, ice or snow, and when near other vehicles, especially large trucks.

(4) Visibility considerations

(a) Fog, haze, smoke and mist can affect visibility greatly.

1) Turn on low beam headlights and the wipers if needed. Never drive with only parking lights on.

2) Watch for slow moving and stopped vehicles. Also, watch rear view mirror frequently for vehicles approaching rapidly.

3) Be alert for patches of fog in valleys and low lying areas.

4) Drive slowly but keep moving.

5) If conditions are too severe, pull to the right as far as possible, stop, leave the lights on, and activate hazard lights.

c. Road surfaces

(1) Gravel

Because of the irregular shape, size and weight of the stones on an uneven surface, they move about easily. This movement can cause a vehicle to go out of control with only a slight action by the driver. Braking on gravel can cause a vehicle to slide easily. When following another vehicle, especially at high speed, stay back to increase visibility and avoid flying stones.

(2) Blacktop/asphalt

(a) This surface will bleed oil to the surface during hot, humid days causing slick conditions.

(b) It can also roll up into a washboard effect with heavy use during extreme hot days.

NOTE: Generally occurs on truck routes where stops are necessary.

(3) Concrete

(a) This surface may expand at joints during hot weather.

(b) Concrete can develop severe dips as the earth settles under it. Concrete is heavy and settles more than other surfaces.

(c) Concrete can glaze over very quickly in freezing conditions.

5. Speed of the vehicle

a. Perception of danger

(1) When driving, potential dangers are usually sensed using sight, rather than another of the senses. The driver may need .5 second to 3 seconds to see a dangerous condition (average perception time is .75 seconds). Factors that may delay perception include: visual acuity, lighting, fatigue, age, use of drugs or alcohol, and distractions.

(2) Perception time is the length of time it takes you to identify the hazard. Time to perceive will vary depending on your physical and emotional condition.

(3) Perception distance is the distance your vehicle travels during your perception time.

b. Decision/reaction

(1) Decision: Once danger is perceived, the driver must decide what action is most appropriate and how to perform the action. Choices for the driver's action include steering, braking, or accelerating

(2) Reaction: Reaction time is the time after you have perceived the danger until the action is initiated. Reaction time is usually between .5 to 1.5 seconds (average reaction time is .75 seconds). Reaction time may be affected by fatigue and use of drugs or alcohol.

(3) Decision/reaction distance is the distance your vehicle travels during your reaction time

c. Braking

(1) Braking is the normal reaction to a hazardous situation. Once the brakes are applied, the stopping distance will determine whether the driver has successfully avoided the danger

(2) The distance your vehicle travels from the time you apply the brakes until your vehicle stops is the braking distance

(3) Perception Distance
+ Decision/Reaction Distance
+ Braking Distance
= Total Stopping Distance

d. Perception time + Decision/reaction time

(1) To calculate our stopping distance examples, we have used the average perception time, .75 seconds, and the average decision/reaction time, .75 seconds.

.75 seconds + .75 seconds
= 1.5 seconds

e. Distance travelled in Perception time + Decision/reaction time

(1) In order to calculate the distance travelled in .75 seconds, we must know the relationship between speed and distance. As the chart below shows, in .75 seconds, your vehicle travels 11 feet for every 10 mph.

Formula:

speed (MPH) x 1.1 feet = # of feet
in .75 seconds
speed (MPH) x 2.2 feet = # of feet
in 1.5 seconds

MPH	Distance .75 seconds	Distance 1.5 seconds
10	About 11 feet	About 22 feet
20	About 22 feet	About 44 feet
40	About 44 feet	About 88 feet
60	About 66 feet	About 132 feet
80	About 88 feet	About 176 feet

f. Braking distance

(1) On a normal, dry, well-maintained road (with a coefficient of friction of 0.70), a vehicle travelling 20 miles per hour will require approximately 20 feet of braking (skidding) distance.

(2) Braking distance is increased by the square of the rate of the increase in speed (V_2) of the vehicle. For example, if you are travelling 3 times as fast (60 mph is 3 times 20 mph), the increase in the braking distance is 3 times 3, or 9 times greater (180 feet is 9 times 20 feet).

MPH	Braking Distance
20	20 feet
40	80 feet
60	180 feet
80	320 feet

NOTE: See Reference Section for Total Stopping Distance Chart.

EFFECT OF SPEED UPON A TURNING VEHICLE

Given a direct question, the student will identify the effects of speed upon a turning vehicle.

A. Turning radius increases as speed increases and decreases as speed is reduced
B. Traction limits may be exceeded as speed increases
C. Weight transfer occurs in opposite direction of turn
D. Weight transfer increases as speed increases.

Performance Objective 6.2.3

CURRICULUM

A. The effect of speed on turning

Speed greatly effects the ability of a vehicle in a turning movement. Among the factors influenced by speed during a turn are the following:

1. Turning radius

The turning radius will increase as the speed increases and will decrease as the speed decreases.

The prevalent physical forces which cause this are:

a. Centrifugal force

A force tending to make a rotating body move away from the center of rotation. (Center-fleeing force, inertia)

Example: Spin a ball around on a string. Centrifugal force tends to make the ball want to go straight, instead of in the circle. If the ball were disconnected from the string, the ball would go in a straight line in the direction it was traveling when the string was disconnected.

In a vehicle turn, the centrifugal force of the automobile tends to make it want to travel in a straight line, instead of making the turn.

b. Centripetal force

A force tending to make a rotating body move toward the center of rotation (center-seeking force).

Example: In the ball spinning over head, the forces (muscles) in the arm required to keep the arm bent instead of being pulled out straight by the weight and pull of the ball.

For a vehicle during a turn, the force of the tires against the roadway keeping the vehicle turning are examples of centripetal forces.

Therefore, the faster a vehicle is traveling through a turn, the more centrifugal force it will possess and consequently the radius of the turning movement will increase proportionately.

2. Control potential

Not only does speed impact the control potential of a vehicle in a turning movement, but other influencing factors include:

a. Type of vehicle (i.e., center of gravity and weight distribution)

b. Weight transfer

c. Friction

3. Traction limits

The traction of a vehicle making a turn is determined by the existing coefficient of friction between the tires and the roadway.

The speed of a vehicle making a turn will significantly impact the ability to maintain traction. Too much speed will result in going beyond traction limits which may cause a loss of control.

4. Weight transfer

When the velocity or speed of a vehicle is being varied, or the direction of travel is changed, the amount of weight being supported by each individual wheel will also change.

a. Longitudinal weight transfer:

(1) When a vehicle is being driven in a straight line and the speed is either increased or decreased, some weight transfer will occur.

(2) Increases of speed, weight transfer to rear, decrease of speed, weight transfers to the front.

b. Lateral weight transfer:

(1) When the direction of travel is changed, some weight transfer will occur opposite to the direction of change.

(2) When the vehicle is turned to the right, the weight transfer will be to the left side of that vehicle.

RELATIONSHIP BETWEEN MPH AND DISTANCE TRAVELED

Given a vehicle's speed in miles per hour, the student will identify the distance it travels in.

A. 3/4 of a second
B. One second

Performance Objective 6.2.5

CURRICULUM

A. Distance traveled

Many times law enforcement driving requires quick and efficient judgments by an officer. The student will be better able to identify and deal with the unique challenges presented by law enforcement driving with the recognition that it is different from normal driving. There are other considerations drivers should be aware of while operating a vehicle.

1. Speed and its effect upon vehicle capabilities:

a. Feet per 3/4 of a second that a vehicle travels at various miles per hour:

mph	Distance in 3/4 of a second
10	Approximately 11 feet
20	Approximately 22 feet
40	Approximately 44 feet
60	Approximately 66 feet
80	Approximately 88 feet

NOTE: Formula - FP (3/4S) 1.1 x mph

b. Feet per second that a vehicle travels at various miles per hour: (mph x 1.5 = fps)

mph	Approximate feet per second
10	15
20	30
40	60

60 90

80 120 .

NOTE: Formula - FPS = 1.467 X mph (approximately)
Conversion factor $\frac{5280 \text{ ft/mile}}{3600 \text{ sec/hr}} = \frac{22}{15}$
= 1.467 = 1.5

2. The hazard of following too closely

   a. There is a fallacy in the safe following distance "rule of thumb" of one car length for every 10 mph from the vehicle ahead.

      (1) This fallacy is in the failure to allow for perception and reaction time as follows:

         (a) Two vehicles are traveling at 60 mph with the rear vehicle following six car length (108 feet) to the rear of the lead vehicle. The lead vehicle starts (goes into) a four-wheel locked skid.

         (b) The first indications of an emergency to the driver of the rear vehicle are the brake lights and skidding of the lead vehicle.

         (c) At this point, the lead vehicle has already completed perception time and reaction time and has traveled the distances involved.

         (d) Using the average perception time and reaction time of 1 and 1/2 seconds total, the rear vehicle will travel 132 feet - 24 feet past the point at which the lead vehicle started sliding, before the brakes are applied. This will leave the second vehicle 24 feet short of making a safe stop.

            NOTE: Example based on 18' car length

   b. Explain the two-second rule.

      (1) After the vehicle ahead passes a fixed point, count off one-thousand-and-one, one-thousand-and-two. The second vehicle should not pass that fixed point within two seconds. The two second gap provided will allow time to react if the car ahead suddenly brakes.

         NOTE: The two-second rule is a minimum; increasing that to 3 or even 4 seconds will increase the safety cushion.

EMERGENCY DRIVING POLICIES

Given a direct question, the student will identify the following provisions which are usually included in a law enforcement agency's emergency driving policy:

A. That, if available, there be supervisory control of the pursuit (VC 17004.7(c)(1))
B. That procedures are identified for designating the primary pursuit vehicles and for determining the total number of vehicles to be permitted to participate at one time in the pursuit (VC 17004.7(c)(2))
C. That procedures be identified for coordinating operations with other jurisdictions (VC 17004.7(c)(3))
D. That guidelines be identified for determining when the interests of public safety and effective law enforcement justify a law enforcement pursuit and when a vehicular pursuit should not be initiated or should be terminated (VC 17004.7(c)(4))
E. That guidelines be identified for the proper use of emergency lighting and siren (VC 21806)

Performance Objective 6.3.1

CURRICULUM

A. Introduction

Operating a law enforcement vehicle in an emergency response or pursuit situation is a highly stressful and demanding experience that has unique responsibilities and critical decision making requirements.

1. The seriousness of the law enforcement incident.

2. Pursuits are difficult and potentially dangerous.

   a. They increase danger of collisions and injuries.

   b. Violators attempt to evade arrest with no regard for consequences.

3. Emergency vehicle - All motor vehicles provided for city and county police work are "authorized emergency vehicles" within the meaning of this term as used in Section 165 of the Vehicle Code. This fact alone does not relieve the driver of the duty of complying with all the "rules of the road."

4. Emergency call - The term "emergency call," as it applies to police work, cannot be defined with exactness. However, usually it means that a situation exists which requires immediate police attention for the protection of persons or property.

NOTE: The driver's evaluation of the traffic conditions may preclude a Code 3 operation.

a. An act or an event may reasonably be an emergency under a given set of circumstances and not an emergency under different but similar circumstances.

b. With few exceptions, emergency calls received by officers are dispatched via radio communication.

c. The officer to whom the call is directed may be protected in accepting the radio dispatcher's evaluation that the facts justify emergency action.

d. When emergency response calls are based upon information received from any other source by the officer, the officer must have sufficient information to justify a conclusion that a situation exists which requires immediate police attention for the protection of persons or property.

e. The officer has the right to believe the information received is true and to act accordingly.

B. Considerations that should be made during pursuit/emergency responses (Code 3)

1. Legal and department policy

a. California Vehicle Code Section 21055 - Code 3 authorization
b. California Vehicle Code Section 21056 - Due regard for safety
c. California Vehicle Code Section 21806 - Mandated use of emergency equipment
d. California Vehicle Code Section 17004.7 - Pursuit policy mandates
e. Other department policy restrictions, if appropriate.

2. Environmental factors

a. Weather conditions

b. Traffic conditions

c. Pedestrians

d. Time of day and day of week

e. Road design and surface conditions

f. Visibility

3. Vehicular factors

   a. Emergency warning devices

   b. Markings of vehicles

   c. Mechanical items (brakes, tires, suspension, windows, radio, etc.)

4. Human factors - psychological and physiological

   a. Stress endured during a pursuit may greatly affect an officer's judgement.

   b. Overconfidence and impatience

   c. Preoccupation

   d. Injuries

   e. Necessity for emergency response or pursuit - type of call increases tension

   f. Vision, hearing, and touch

C. Caution and thoughtful driving considerations are important

1. The most important factor in any Code 3 driving situation is the individual driver's use of common sense in the application of proper driving techniques.

   a. The tension of the moment will increase adrenalin flow.

   b. Driver must be aware of the increased tension/adrenalin impacts, and resist being caught up in the tension of the moment. Driver must remain calm despite the situation and drive with caution.

   c. Thought processes can slow down as other bodily functions (respiration, heart rate, and adrenalin) increase.

2. The following tactics are recommended for Code 3 response driving:

   NOTE: Refer to local agency policies regarding examples of Code 3 response operation.

   a. Enter intersections at a safe speed:

      (1) Look in all directions prior to entering intersection, clear lane by lane, and be prepared to stop. Other motorists approaching intersections will not always see or hear the emergency vehicle.

(2) Better control of vehicle results in appropriate reaction to other motorists or pedestrians failing to yield.

b. Observation of cross streets should start before entering intersection.

c. Anticipate unpredictable actions and reactions of other drivers:

(1) Panic stop in a lane of traffic

(2) Sudden movement, left or right

(3) Maintain an adequate space cushion

d. Pass on the left, not on the right. Other vehicles in the area are required to pull over to the right when they can hear or see emergency vehicles.

e. When responding to emergency location, plan route of travel for quickest and safest approach.

f. Don't drive beyond capabilities of vehicle or driving skills.

g. Use radio to obtain additional information or inform communication of location, changing circumstances.

D. Understanding the psychology of the situation relative to Code 3 pursuit driving

When driving Code 3 pursuit, officers are required to exercise due caution with due regard for the safety of all individuals using the roadway. Officers are not relieved or protected from the consequences of an arbitrary exercise of the privileges granted and duties required under Califoria Vehicle Code Sections 21055 and 21056.

1. There is no evidence to support the opinion that all people who flee from the police are felons.

a. It is a reality, however, that in some pursuits:

(1) Lives are lost

(2) Injuries, both serious and minor, are sustained.

(3) Thousands of dollars worth of equipment is damaged or destroyed while attempting to apprehend fleeing violators.

2. All departments desire that law violators be apprehended. It is not expected for a person or vehicle to be pursued to the point where the life of the officer, or other persons, are placed at unreasonable risk.

3. The first consideration during any pursuit must be the necessity for it and the present dangers involved. For example, a situation involving a fleeing homicide or armed robbery suspect present different considerations then pursuing a minor traffic violator.

E. Tactics

1. Vehicle operational considerations.

a. During the pursuit, the radio should be used to its fullest, informing the communication center (dispatcher) and other units:

NOTE: Emphasizing safe driving is first, radio contact is second. Emphasize utilization of radio on straightaways.

(1) Initial Broadcast Information

(a) Unit identification number

(b) Location and direction of travel

(c) Reason for pursuit

(2) Supplemental Broadcast Information

(a) Description of vehicle being pursued

(b) License number of vehicle

(c) Number of suspects

(d) Location and direction of travel

(e) Other pertinent information

NOTE: Emphasis should be placed on broadcasting location and direction of travel of the suspect's vehicle, not police unit.

b. Once the vehicle and suspects are identified, and they no longer present an unreasonable risk to the public, the pursuit may be discontinued with the possibility of apprehension and prosecution being instituted through the making of reports and the obtaining of a warrant.

2. The most important factor in any Code 3 driving, be it response to an emergency or a pursuit, is the officer's use of common sense, based upon:

a. Legal and agency policy provisions

b. Nature of event necessitating pursuit

c. Traffic and environmental concerns

3. Pursuit driving tactics

NOTE: Refer students to their agency pursuit driving policies/guidelines.

a. A minimum number of units should be involved in any pursuit and, if available, there should be supervisory control. Agency policy/procedure may determine specific number of units to be involved.

b. When in a pursuit, officers shall exercise due caution, with regard for the safety of all persons using the highway. Officers are not relieved or protected from the consequences of an arbitrary exercise of the privileges granted and duties required under Vehicle Code Sections 21055 and 21056.

c. No unit involved in a pursuit should attempt to pass any other involved unit unless circumstances dictate such action subject to local policy. Assisting units can take positions at strategic points along the pursuit to assist in stopping the suspect's vehicle or taking over in the event the original pursuing unit loses the vehicle or drops out.

d. Barricading a roadway to stop a pursuit should be considered a potential use of deadly force and may be governed by agency policy. Students should be referred to the policy of their hiring agency.

NOTE: Instructors may wish to cover Brower vs. County of Inyo 1989 which discusses a barricaded roadway as a seizure issue.

e. Forcible stops (legal intervention) should be dictated by agency policy.

(1) It must be remembered that a vehicle, used to force another vehicle from the roadway, may be considered use of deadly force.

f. Awareness of vehicle condition is essential in pursuit driving.

(1) Brakes often overheat and become less effective - brake fade.

(2) Vehicle overheating may occur - turn air conditioning off.

g. Stay cool and calm during the pursuit. As vehicle speed increases, the chances of having a collision increases and time for decision making decreases.

h. Use radio correctly with brief concise transmissions.

LIMITATIONS OF EMERGENCY WARNING DEVICES

Given a direct question, the student will identify the following limitations of law enforcement emergency warning devices:

A. During daylight hours, traditional red or blue overhead lights are difficult to see and should be augmented by the patrol vehicle's headlights
B. Steady burning high beam lamps tend to mask emergency lights and should not be used
C. High speeds reduce the effectiveness of the siren as a warning device
D. The audio and visual effects of warning devices can be impaired by physical barriers or other mechanical and/or environmental conditions.

Performance Objective 6.3.2

CURRICULUM

A. Emergency vehicle warning devices

Caution and good driving ability are better than emergency lights and siren, but one must consider the limits as well as the advantages of the vehicle and its equipment.

1. During daytime, low-beam headlights or wig wags should be used in conjunction with the emergency lights.

   a. Headlights are more discernable than the emergency lights during day light hours.

      (1) Red lights have reduced visibility during the daytime.

      (2) An emergency vehicle must have at least one solid burning red light facing forward, and visible for 1,000 feet.

      (3) Blue lights are even more difficult to see during daytime.

   b. Most people will see the headlights before they hear the siren.

   c. If the vehicle is equipped with emergency hazard flasher lights, they may also be utilized.

2. Steady high beam lights will have a tendency to obliterate (blot out) the emergency lights during daytime and nighttime and blind oncoming drivers during nighttime hours.

3. Spot lights may also be utilized by passenger officer if available, but not directed into the eyes of other motorists. A sweeping back and forth horizontal motion is recommended. (Nighttime)

4. The use of auxiliary blue or amber lights in conjunction with an emergency red light is permissible under Vehicle Code Sections 25258(b) and 25259.

5. Emergency lights (and sirens) are no substitute for caution and sensible driving habits.

6. Sirens are required to be used according to Califoria Vehicle Code Section 21055 and 21806. Although Section 21055 allows for the use of the siren as reasonably necessary, the conditions set forth in California Vehicle Code Section 21806 require the use of the siren. The high/low tone and air horn functions do not meet California requirements for sirens.

   NOTE: The European-sounding high/low siren and air horn are unauthorized as sirens as of January 1, 1982, Title 13, Section 1020-1029, California Code of Regulations.

7. Factors affecting the siren's audibility include:

   a. Weather conditions:

      (1) Siren may be more audible or heard sooner on overcast or cloudy day.

      (2) Siren audibility tends to dissipate on clear days when no inversion layer localizes the sound.

   b. Traffic conditions:

      (1) Siren becomes less audible with increases in traffic noises; i.e., honking, engine and exhaust noises, etc.

      (2) Heavy truck or bus traffic will decrease effectiveness of the siren.

   c. Environmental conditions:

      (1) Siren will be less audible in a residential area due to trees and shrubbery tendency to absorb sound.

      (2) Tall buildings may block, deflect or funnel siren sound waves.

      (3) In flat, open areas (rural open spaces) the sound of a siren can usually be heard for greater distances.

8. Other drivers may not always hear the siren due to distractions:

   a. Radio, stereo, headphones, cellular phones, etc.

   b. Air conditioning, heater fan, etc.

c. Windows rolled up

d. Passengers talking to driver

e. Children in vehicle

f. Preoccupation with other items or matters.

9. Speed has an effect upon siren audibility.

a. As speed increases, the effectiveness of the siren decreases.

(1) Due to increase of speed and resultant increase of feet per second traveled by the emergency vehicle, other motorists and pedestrians may not have sufficient time to react to siren warning.

(2) When an emergency vehicle is about to overtake and pass another vehicle traveling at 60 mph or faster, the driver of that vehicle MAY NOT hear the siren until the emergency vehicle is usually within two (2) car lengths of passing

10. Siren also affects the officer

a. Tunnel vision develops at high speeds.

b. Speed reference is lost due to the elimination of the sounds of speed (wind, engine noise).

G. Demonstration

It is recommended that each student be given a demonstration of the topics discussed in the lecture. A video tape may be used in lieu of a demonstration.

NOTE: Demonstration will be more graphic at speeds above 40 mph.

1. Several demonstrations may be given of both types (electronic and mechanical) of sirens currently in use. All emergency lights and headlights will be activated during the demonstration.

a. On the first demonstration the lead vehicle will be traveling at legal speeds, with the front windows open. This vehicle will be overtaken and passed by the emergency vehicle, with the siren operating.

b. The second demonstration will be exactly like the first one with the exception of the lead car having the windows closed.

c. The student should participate in the demonstrations as follows:

(1) As a passenger in the emergency vehicle.

(2) As a passenger in the vehicle being overtaken and passed.

(3) As a standing pedestrian.

d. When riding as a passenger in the vehicle that is being overtaken, the student(s) will be encouraged to engage in a conversation with the instructor who is driving the vehicle. When the student(s) hears the siren, he will say so and observe the location of the emergency vehicle.

e. During the demonstrations, the emergency vehicle will have the headlights "on", so that the student can observe the relative ineffectiveness of the emergency lights during daytime hours compared to the headlights.

(1) This demonstration also illustrates that the use of the headlights may allow the emergency vehicle to be seen before the siren is heard.

NOTE: The electronic siren may be demonstrated using both "wail" and "yelp" functions.

NOTE: Operate to the extreme left edge of your traffic lane to improve visibility for both oncoming and overtaking vehicles to see your emergency equipment.

2. At the conclusion of the demonstrations, the student is again cautioned not to rely on the siren and emergency lights.

a. The use of the siren and emergency lights merely fulfills a requirement of the law and does not guarantee nor give the "right-of-way."

b. Don't pass on the right during a Code 3 operation. Motorists are required per Vehicle Code Section 21806 to yield to the right and may do this unexpectedly if the unit is passing on the right.

c. No emergency response is so important that your life or any other life is put at unreasonable risk.

EMERGENCY DRIVING: EXEMPTIONS FROM VC

Given a word picture depicting an officer operating a patrol vehicle, the student will identify if the officer is exempt from the rules of the road under the requirements of Vehicle Code Section 21055. Vehicle Code Section 21055 exempts authorized emergency vehicles from the rules of the road when the emergency vehicle is displaying a lighted red lamp visible from the front, is sounding a siren as may be reasonably necessary, and when the officer is involved in any one of the following:

A. Responding to an emergency call
B. Engaged in a rescue operation
C. In pursuit of an actual or suspected violator
D. Responding to a fire alarm

Performance Objective 6.4.1

CURRICULUM

A. Exemption from civil liability

1. Exemption from civil liability, as defined in Section California Vehicle Code Section 17004, relieves an officer from civil liability for personal injury to or death of any person, or damage to property resulting from the operation, in the line of duty, of an authorized emergency vehicle:

   a. While responding to an emergency call.

   b. When in the immediate pursuit of an actual or suspected law violator.

   c. When responding to, but not returning from, a fire alarm.

   d. This section does NOT, however, relieve an officer from possible criminal liability, such as manslaughter.

   e. Neither does it relieve the city or county from civil liability.

   f. The employee is protected only when the red light is displayed and the siren is sounded as reasonably necessary and the vehicle is operated under conditions and in the manner prescribed by Section 21055 of the Vehicle Code.

B. Exemption of authorized emergency vehicles

1. Section California Vehicle Code Section 21055(a)(b) states that "the driver of an authorized emergency vehicle is exempt from various sections of the California Vehicle Code (i.e., Rules of the Road) under the following conditions:

a. If the vehicle is being driven in response to an emergency call, or
b. Where engaged in rescue operations, or
c. Is being used in the immediate pursuit of an actual or suspected violator of the law, or
d. Is responding to, but not returning from, a fire alarm.

2. If the driver of the vehicle sounds a siren as may be reasonably necessary and the vehicle displays a lighted red lamp visible from the front as a warning to other drivers and pedestrians

A siren shall not be sounded by an authorized emergency vehicle except when required under this section."

NONEMERGENCY OPERATING CONDITIONS

Given a word picture depicting an officer operating a patrol vehicle under nonemergency conditions, the student will identify if the vehicle is being operated lawfully. An officer operating a patrol vehicle under nonemergency conditions must comply with the same rules of the road as any other driver. (Vehicle Code Section 21052)

Performance Objective 6.4.3

CURRICULUM

A. Application of the Vehicle Code to public officers and employees (California Vehicle Code Section 21052)

1. California Vehicle Code Section 21052 makes the provisions of the Vehicle Code applicable to:

a. Drivers of all vehicles engaged in the course of employment by the State of California
b. Drivers of all vehicles belonging to political subdivisions, municipal corporations, or any district within the State
c. Drivers of any authorized emergency vehicles, **except when specifically exempted by another provision of the Vehicle Code**

B. Only those situations stated in Vehicle Code Section 21055 exempt the driver of an authorized emergency vehicle from the rules of the road.

1. Vehicle Code Section 21055 exempts authorized emergency vehicles from the rules of the road when the emergency vehicle is displaying a lighted red lamp visible from the front, is sounding a siren as may be reasonably necessary, and when the officer is involved in any one of the following:

a. Responding to an emergency call

b. Engaged in a rescue operation

c. In pursuit of an actual or suspected violator

d. Responding to a fire alarm

2. Absent an exemption identified in Vehicle Code Section 21055, an officer is not permitted to violate any rule of the road during **non-emergency** operation.

C. Peace officers have a moral responsibility to safeguard the lives and property of the citizens of their community. As a result, no emergency justifies a response showing total disregard for the safety of the public.

FACTORS AFFECTING LIABILITY UNDER CODE 3

Given a direct question, the student will identify the following conditions under which an officer or law enforcement agency may be held liable for death, injury, or property damage which occur while an emergency vehicle is being operated with red lights and siren (Code 3).

A. An officer may be civilly liable if the officer was not in immediate pursuit of a suspect or responding to a bona fide emergency as described in Vehicle Code Section 17004
B. An officer may be criminally liable if the officer fails to drive with due regard for the safety of others as described in Vehicle Code Sections 21056 and 21807
C. A law enforcement agency may be civilly liable for death or injury or property damage caused by an employee who negligently or wrongfully operates a motor vehicle as described in Vehicle Code Section 17001
D. A law enforcement agency may be civilly liable for death or injury or property damage caused by a vehicle being operated by a suspect being pursued by a peace officer unless the agency has adopted a written procedure on vehicle pursuits in accordance with Vehicle Code Section 17004.7

Performance Objective 6.4.4

CURRICULUM

A. Terms and definitions - an introduction

1. Due care and arbitrary exercise of privilege

a. An arbitrary exercise of privilege exists when the officer does an act or fails to do an act which, but for the existence of facts which brings the officer within the exemption of Section 21055 of the Vehicle Code, would constitute negligence.

2. Emergency call - The term "emergency call" as it applies to police work, cannot be defined with exactness.

a. An act or an event may reasonably be an emergency under a given set of circumstances and not be an emergency under different, though similar circumstances.

b. With few exceptions, emergency calls received by officers are dispatched by radio or digital terminals.

c. The officer to whom the call is directed may be protected in accepting the radio dispatcher's conclusion that the facts justify emergency action.

d. When emergency calls are based upon information received from any other source by the officer, he must have sufficient information to justify this conclusion that a situation exists which

requires immediate police attention for the protection of persons or property.

3. Emergency vehicle - All motor vehicles provided for city and county police work are "authorized emergency vehicles" within the meaning of this term as used in Section 165 of the Vehicle Code.

   Even though it is an authorized emergency vehicle, it must still be operated in compliance with all the rules of the road unless it is being driven under a condition of Vehicle Code Section 21055.

4. Fire alarm and fire calls - Normally, a fire alarm will be dispatched from the radio dispatcher and a Code 3 may NOT be assigned, unless there are circumstances warranting immediate police action. Individual department policies will dictate if responses to fire alarms or fire calls are Code 3 responses.

   NOTE: The driver's evaluation of the traffic conditions may preclude Code 3 operation. However, if not Code 3, all traffic laws must be obeyed.

5. Motorist's duty to yield right-of-way - A motorist's duty to yield the right-of-way to an authorized emergency vehicle (Vehicle Code Section 21806) is based upon the motorist's knowledge of its approach. Without the knowledge, the motorist is under no obligation to anticipate its approach.

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

POLICE ESCORTS

Given a word picture depicting an officer operating a patrol vehicle, the student will identify if the officer is exempt from the rules of the road under the provisions of Section 21057 of the Vehicle Code which exempts authorized emergency vehicles from the rules of the road under the following conditions:

A. When serving as an escort for preserving life
B. When escorting supply movements in cases of emergency or war

Performance Objective 6.4.5

CURRICULUM

A. Sirens and illegal speed of escorts (Vehicle Code Section 21057)

1. Vehicle Code Section 21057 expressly prohibits every police and traffic officer from using a siren or driving at an illegal speed when serving as an escort of any vehicle, except when

a. the escort or conveyance is furnished for the preservation of life, or

b. when expediting movements of supplies and personnel for any federal, state, or local governmental agency during

(1) a national emergency, or

(2) state of war emergency, or

(3) state of emergency, or

(4) local emergency

as defined in Section 8558 of the Government Code.

2. Vehicle Code Section 21057 only addresses the use of the siren and the issue of speed and does **not** provide an exemption to any other rules of the road.

B. A police escort of another vehicle for preservation of life may result in an increased hazard to public safety due to the following:

1. The escorted driver is likely to be upset and consequently may not drive safely.

2. The escorted driver's skill is unknown.

3. The escorted vehicle is not equipped with emergency warning devices.

4. The public is more likely to yield to the emergency vehicle than to the escorted vehicle and may pull back into the track in front of the escorted vehicle.

5. Agency liability is affected.

EXERCISES

PRE-SHIFT VEHICLE INSPECTION

The student will conduct a preshift vehicle inspection. The inspection will include:

A. Mechanical check
B. Interior check
C. Exterior check

Performance Objective 6.5.2

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Exercise description:

The student will be required to conduct a vehicle inspection. The inspection must include a:

1. Mechanical check
2. Interior check
3. Exterior check
4. Required inventory

NOTE: Academies may wish to have the student complete an vehicle inventory

B. Reasons for conducting a pre-shift vehicle inspection

1. Some law enforcement collisions are a direct result of mechanical failure.
2. A properly inspected vehicle will ensure a greater degree of confidence, reliability and performance.
3. When the driver actively tries to detect mechanical needs of the vehicle, the chances of mechanical malfunction are lessened.
4. When officers fail to report vehicle maintenance needs, or ignore them completely, increased vehicle maintenance costs result and the safety of personnel using the vehicle is jeopardized.
5. Properly operating police vehicles reduce/prevent traffic collisions because the driver is better able to control the vehicle.

6. A pre-shift inspection will help to maintain operational efficiency of the vehicle.

7. A properly maintained vehicle will provide an added sense of confidence in the vehicle.

8. A pre-shift inspection will help to establish responsibility for:

   a. Any damage to the vehicle

   b. Article left in the vehicle

   NOTE: Individual organizational policy or programs may dictate a particular course of action.

C. How to conduct a vehicle inspection

A vehicle inspection sequence should be developed to eliminate the need for the officer retracing the inspection path, while ensuring that all items are inspected.

1. Approaching the vehicle

   a. Vehicle's "attitude"

      (1) Defective suspension

      (2) Broken springs

      (3) Accident damage

   b. Leaks under vehicle

      (1) Oil, possible motor or transmission problem

      (2) Water, cooling system

      (3) Brake fluid

2. Trunk area

   a. Spare tire, jack

   b. Other departmental equipment (secured)

   c. Store personal equipment

3. Visual inspection - inside the vehicle

NOTE: It is recommended that the instructor use blowup pictures of police vehicles, transparencies and/or conduct this lecture outside with a police vehicle. Emphasis is on why a certain area needs to be inspected.

a. Check front seatbelt upon entry

(1) Worn or frayed

(2) Proper operation

b. Windows, cracked or dirty

c. Adjust seat, mirrors

d. Check all instruments with ignition on "only"

(1) Oil light

(2) Alternator light

(3) Water temperature

(4) Fuel gauge

e. Start engine and recheck gauges

4. Turn on all lights

a. Headlights

b. Hazard lights

c. Emergency lights

5. Check operation of:

a. Air conditioner/heater/defroster

b. Windshield wipers

6. With parking brake set, exit vehicle for walk around inspection.

a. Starting at the left front fender in a counter-clockwise direction check:

(1) Tires/wheels

(a) Worn tires may blow out

(b) Worn tires hydroplane quicker

(c) More susceptible to punctures

b. Check for correct pressure

(1) Low front tires will understeer or plough.

(2) Low rear tires will oversteer or spin out.

(3) Vehicle will have a tendency to swerve or pull during moderate to hard braking.

(4) Under-inflated tires will hydroplane at slower speed.

c. Sidewall damage

(1) May indicate possible unseen damage.

(2) May indicate damage to tire.

d. Check lug nuts periodically for proper torque (tightness).

e. Check wheels for small cracks.

(1) Might fracture under stress causing possible loss of a wheel.

f. Check body for accident damage.

g. Front of vehicle.

(1) Headlights

(a) operational - both high; low beams

(b) proper alignment

(2) Directional lights; hazard flashers

(3) Emergency lights

h. Right side of vehicles

(1) Tires and wheels

(2) Body damage

i. Rear of vehicle

(1) Tail lights

(a) proper operation including stop lights

(b) broken lenses

(2) Emergency lights

j. Left side of vehicle

(1) Body damage

(2) Left rear tire

7. Interior inspection

a. Contraband check in rear of vehicle.

b. Seat belts - secured to floor.

c. Check for dirt; trash on the floor and under the seats.

8. Proper operation of emergency equipment

a. Radio, outside speaker, public address system, etc.

b. Siren and horn.

c. Spotlights

9. Place vehicle in motion

a. Check for smooth operation of transmission gear selector -- especially into "PARK" position.

b. Check steering for excessive play.

(1) Vehicle wandering or pulling to one side.

c. Check brakes

(1) Brake pedal travel should be no more than one and one-half inches before resistance is felt.

(2) If pedal goes down slowly under constant pressure, vehicle should not be driven.

(3) Check for grabbing or uneven application (lock-up on one wheel only).

(4) Stop vehicle and check emergency brake for proper operation and holding capability.

d. Engine

(1) With engine running, check for any unusual noises (fan belt squeal, valve lifter noise, engine knock, etc.).

D. Mechanical reporting responsibility

1. Driver's responsibility to report defective, damaged or malfunctioning equipment.

a. Do not rely on verbal communications, always **document**.

UNDERSTEER AND OVERSTEER

The student will regain control of a vehicle experiencing:

A. A front wheel skid (understeer)
B. A rear wheel skid (oversteer)

Performance Objective 6.6.1

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Course demonstration

1. Front wheel skid (understeer)

a. Front wheel skid is induced by quickly turning the steering wheel when the vehicle is traveling at a designated speed. This causes loss of traction of the front tires and results in the vehicle skidding straight.

b. To recover:

(1) Straighten steering wheel or

(2) Reduce speed

2. Rear wheel skid (oversteer)

a. Induced by:

(1) Turning the steering wheel and accelerating

(2) Excessive weight transfer caused by sudden movement

(3) Loss of traction to the rear tires in a turn

b. To recover:

(1) Off throttle

(2) No brakes

(3) Counter steer in the direction of the skid

B. Vehicle control

1. Point out the basic principles of precision driving and explain how these principles can be applied.

2. Front wheel drive vehicles will exhibit different handling characteristics.

C. Understeer/oversteer

1. Understeer - tendency of a vehicle to continue in a straight line, due to a loss of traction by the front wheels, and resist turning regardless of steering input by the driver.

   NOTE: Additional steering will not help correct the understeer condition.

   a. An understeer condition is usually induced while attempting a turn at excessive speeds.

   b. Deceleration reduces centrifugal force and allows weight to transfer to the front of the vehicle assisting the tires to regain traction. When sufficient traction is regained, the vehicle will gain directional control.

2. Oversteer

   Tendency of vehicle's rear end to slip toward the outside of a curve due to a loss of traction by the rear end.

   a. An oversteer condition may be induced while negotiating a turn and applying an excessive amount of throttle causing the rear tires to lose traction, or excessive speed, or by braking too deeply into a curve causing the lightened rear end to be pulled sideways by centrifugal force.

   b. This condition will cause the rear of the vehicle to slide out, forcing the front end toward the inside of the turn.

   c. To recover from an oversteer condition, eliminate throttle pressure and steer in the direction of the skid.

ALL WHEEL BRAKING SKID

While driving, the student will experience a vehicle in an "all wheel" locked braking skid to understand:

A. Loss of steering control while skidding
B. Regaining steering control when brakes are released

Performance Objective 6.6.2

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Course demonstration

1. Experience an all-wheel vehicle skid

2. Experience a spinout

B. Four-wheel locked-skid technique (panic stop).

1. When a vehicle is slowed or stopped by applying a sufficient amount of pressure to the brake pedal to cause all four wheels to "lock up" and stop rotating.

   a. In this type of brake application, the friction between the brake shoe and the brake drum or disc pad and rotor ceases to exist; the only friction will be between the tires and the road surface.

   b. Technically, this is <u>not</u> the quickest way to stop a vehicle.

   c. This technique will cause loss of steering control.

   d. The four-wheel locked skid will actually lengthen the skidding distance due to "ball bearing effect."

      (1) Ball bearing effect: The formation of tiny balls of rubber developed by the sliding tire. This reduces the traction between the tire and roadway.

VEHICLE CONTROL TECHNIQUES

The student will demonstrate proper road position, weight transfer, throttle control, braking and steering accuracy both forward and backward while performing a series of driving exercises.

Performance Objective 6.6.4

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Course demonstration

1. Given a series of pre-established courses, the student will be required to safely demonstrate:

   a. Proper road position

   b. Weight transfer

   c. Throttle control

   d. Braking accuracy

   e. Steering accuracy (forward/backward)

B. Road position

1. Proper road position:

   a. The proper position that a vehicle occupies on a roadway, preparing for a turn, while in a turn and when exiting a turn, for maximum speed.

2. Explain why road position is important and point out how it applies.

   a. Allows for a smooth transfer of weight and spring loading.

   b. Is used to reduce or minimize the physical forces exerted upon the vehicle. Physical forces include:

      (1) Inertia

      (2) Centrifugal force

      (3) Centripetal force

(4) Friction

C. Common definitions for terms used in classical mechanics (physics) are:

(1) **Inertia** - Objects in motion tend to remain in uniform straight line motion, and objects at rest tend to remain at rest until acted on by an outside force. (Newton's First Law of Motion)

(2) **Centrifugal force** - A component of the force tending to make a rotating body move away from the center of rotation (center fleeing force inertia).

(3) **Centripetal force** - A component of the force tending to make a rotating body move toward the center of rotation (center seeking force).

(4) **Friction** - The resistance to motion of moving objects or of surfaces that touch.

3. Explain the driving apex of a turn.

a. That point in a turn where a vehicle comes closest to the innermost part of the available roadway.

b. This can vary from a single point or portion of a turn, to many hundreds of feet along the inside portion of the turn.

C. Weight transfer

1. Explain what weight transfer is and how it occurs.

a. When a vehicle is stationary, the weight of this vehicle is distributed between the front wheels and the rear wheels. This distribution is very seldom equal. Usually the front wheels will support more of the total weight than the rear wheels (55 - 58% on the front) - when the engine is over front end.

b. When the velocity or speed of a vehicle is varied, or the direction of travel is changed, the amount of weight being supported by each individual wheel will also change.

(1) When a vehicle is being driven in a straight line and the speed is either increased or decreased, some weight transfer will occur. Increase of speed, weight transfers to rear; decrease of speed, weight transfers to the front.

(2) When the direction of travel is changed, some weight transfer will occur opposite to the direction of change.

When the vehicle is turned to the right, the weight transfer will be to the left side of that vehicle.

2. Spring loading

   a. 90-95% or more of the total weight of the vehicle is supported by the springs of that vehicle.

   b. While the vehicle is stationary, the weight supported by these springs is divided equally between the two springs on the left side with the two springs on the right side, but not necessarily between the front and rear springs.

   c. When weight transfer occurs, either due to a change of velocity or the direction of travel, one or more of the vehicle's springs must support this additional weight. This will cause these springs to compress or "load up", thus the term "spring loading."

3. Explain that steering, throttle, and brake control must be coordinated so that weight transfer/spring loading is accomplished with maximum smoothness to utilize weight transfer to advantage.

   a. Longitudinal weight transfer (front to back).

      (1) To transfer weight to the front apply the brakes or decelerate.

         (a) Just prior to curve entry this may help front wheel adhesion and can increase curve entry speed.

      (2) Accelerate to transfer weight to the rear.

   b. Lateral weight transfer (side to side).

      (1) In a series of turns, smooth steering, braking, and throttle must be used to control lateral weight transfer or a spinout may occur.

      (2) If properly controlled, a certain amount of lateral weight transfer can be utilized to assist steering ability.

D. Throttle control

1. Explain the difference between maximum usable throttle, full throttle, and maximum acceleration and the effects of each.

   a. Maximum usable throttle is that exact amount of throttle necessary to obtain, or maintain the desired speed under various conditions. (Road surfaces, weather conditions, radius of turn, etc.).

(1) Any change in throttle control should be made as smoothly as possible.

(2) Quick acceleration can be obtained by firm and smooth throttle application without jamming pedal to floor.

(3) A change in throttle control may affect steering control.

b. Full throttle is depressing the gas pedal all the way to the floor which could result in the drive tires losing traction with the road surface and possible loss of vehicle control.

c. Maximum acceleration is accelerating to full throttle as quickly as possible without losing traction.

E. Speed judgment

1. When approaching a turn, the ability to determine at what point deceleration must be initiated to slow the vehicle to a speed that the turn can be made.

2. Factors that determine speed:

a. Coefficient of friction (wet pavement, dry pavement, etc.)

b. Sharpness of turn and width of roadway

c. Camber of turn (positive, negative)

d. Capability of vehicle

e. Capability of driver

COLLISION AVOIDANCE

Given a marked course, the student will upon command, demonstrate the ability to rapidly displace the vehicle, left or right, or stop.

Performance Objective 6.6.5

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Course demonstration

1. Lane change

a. A single approach lane to accelerate to a proper speed

b. Single lane splits into multiple lanes

c. Verbal or visual command to require the driver to change lanes rapidly

B. Rapid lane changes require total use of vehicle dynamics.

1. The lane change is designed to demonstrate that a vehicle can be maneuvered quickly without losing control.

2. The result of learning this maneuver is that if during the course of police driving, the driver does not have time to stop to avoid a particular object, the driver will know and have confidence that it is possible to swerve the vehicle around the object.

C. Threshold braking:

1. The maximum amount of brake pressure while still maintaining rolling friction

NOTE: Additional information regarding threshold braking is available under performance objective 6.6.6.

THRESHOLD BRAKING

The student will demonstrate the ability to threshold brake:

A. When coming to a complete stop
B. Prior to a turning movement

Performance Objective 6.6.6

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in this exercise, the instructor should review pertinent safety rules and procedures.

A. Course demonstration

1. From a designated speed, the student will bring the car to a stop using the threshold braking technique.

2. In a straight line at a designated speed, the student will slow the car to a prescribed speed using the threshold braking technique prior to making a turn.

B. Brake application

1. The following are basic techniques to stop a moving vehicle under emergency conditions:

   NOTE: These basic principles are to be re-emphasized several times during the course.

   a. Threshold braking.

      (1) Threshold braking is the maximum amount of brake pressure while still maintaining rolling friction.

         (a) Uses the friction between the brake shoes and the rotating brake drums/discs as well as the friction between the tires and the road surface.

         (b) Kinetic energy of the moving vehicle is converted into thermal or heat energy.

      (2) Threshold braking is the most efficient and quickest method to stop a vehicle.

(3) The most decided advantage of this method is that it allows the driver to retain steering control through "rolling friction."

NOTE: Anti-lock brakes (ABS) provide the driver with automatic threshold braking.

CODE 3 OPERATION

The student will demonstrate an ability to safely operate and control a law enforcement-equipped vehicle operating under emergency conditions (Code 3) applying proper driving techniques and avoiding potentially hazardous situations such as road obstacles, cross traffic, pedestrians, road dips, passing on the right, and other hazards.

Performance Objective 6.7.1

CONTROLLED SPEED PURSUIT

During a controlled speed pursuit of an instructor-driven vehicle, the student will demonstrate the ability to safely operate and control a law enforcement-equipped vehicle applying proper driving and communication techniques while avoiding potentially hazardous situations such as road obstacles, cross traffic, pedestrians, road dips, passing on the right, and other hazards during a controlled speed pursuit of an instructor driven vehicle.

Performance Objective 6.7.2

CURRICULUM

NOTE: SAFETY MANAGEMENT

Prior to engaging in these exercises, the instructor should review pertinent safety rules and procedures.

A. Course demonstration for emergency response

1. In a controlled environment, the student will engage in a simulated emergency response, properly using the following control techniques:

   a. Steering

   b. Throttle

   c. Braking

   d. Road position

2. The student will demonstrate the ability to

   a. deal with vehicle weight transfer;

   b. remain on designated roadway;

   c. properly use emergency equipment.

3. The student may be required to

a. safely avoid road obstacles or hazards;

b. contend with cross traffic;

c. demonstrate a knowledge of potential hazards of passing other vehicles on the right.

B. Course demonstration for vehicle pursuit

1. In a controlled environment, the student will engage in a simulated pursuit, properly using the following control techniques:

a. Steering

b. Throttle

c. Braking

d. Road position

2. The student will demonstrate the ability to

a. deal with vehicle weight transfer;

b. remain on designated roadway;

c. operate the radio;

d. maintain the proper following distance;

e. properly use emergency equipment.

3. The student may be required to

a. safely avoid road obstacles or hazards;

b. contend with cross traffic;

c. demonstrate a knowledge of potential hazards of passing other vehicles on the right.

C. The driving techniques and hazards of emergency response and pursuit driving require an even greater application of knowledge, skills and attitudes.

NOTE: Instructor should review basic driving principles, radio procedures, facility safety rules, and areas to be evaluated during training exercises.

1. Factors to be considered are:

a. Traffic density

(1) School/commercial zones

(2) High volume - vehicles/pedestrians

(3) Time of day/special events

b. Road conditions

(1) Line of sight - hills, curves

(2) Type and condition of surface

(3) Obstructions - construction, parked vehicles

c. Driving requirements

(1) California Vehicle Code Section 21055 defines the required conditions under which emergency driving may occur.

(2) California Vehicle Code Section 21056 defines law enforcement driver's obligation to exercise due regard for others.

(3) California Vehicle Code Section 21806 defines the obligations of other motorists to yield to the right and stop for an emergency vehicle upon hearing a siren.

(a) Passing on the right while driving Code 3 creates additional liability.

(b) An arbitrary decision by law enforcement driver to turn off emergency warning devices and pass on the right, resulting in a collision, removes the officer's personal exemption from civil liability under California Vehicle Code Section 17004.

(4) Other considerations:

(a) Drive near or on center line of roadway to improve visibility (see and be seen).

(b) Least interference to emergency warning devices (e.g., buildings, foliage, weather conditions)

(c) Slow to ensure safe travel through all intersections

(d) Use siren to provide maximum warning

(e) When an officer practices route selection during non-emergency driving, the chances improve that the best route decision for an emergency response will be made.

NOTE: Route selection is controlled by the violator but may be affected by additional units being positioned at approaching intersections to discourage the violator from turning (not a roadblock).

(f) The emphasis should be on a safe conclusion and emotional control, with speed as a secondary consideration. (In a pursuit situation, apprehension of the suspect is secondary)

D. Vehicle control methods

1. Throttle

a. Proper acceleration methods will assist in maintaining vehicle control during Code 3 activities.

b. Code 3 activities may demand acceleration to the limits of the vehicle's performance potential.

c. Improper acceleration techniques will limit vehicle performance and driver control by creating an unwanted loss of traction.

d. Avoid loss of traction by smooth application and release of throttle.

e. Throttle techniques to attain desired speeds:

(1) Maximum acceleration

(2) Maximum throttle

(3) Full throttle

f. Factors which affect acceleration:

(1) Traction conditions

(2) Roadway characteristics

(3) Path of intended travel

2. Braking methods

a. Proper braking methods will assist in maintaining vehicle control during emergency responses.

b. Braking needs should be anticipated as speeds increase.

(1) The type of braking necessary is usually determined by the available stopping/deceleration distance.

(a) Controlled braking - an early consistent pressure to smoothly reduce speed.

(b) Sudden stops - Threshold brake application to obtain maximum deceleration without wheel "lock-up".

(2) Optimum braking efficiency is maintained through use of threshold braking techniques.

(3) Emergency response/pursuit conditions often create overheating of the brakes.

(a) Riding the brakes (left foot braking) can hasten overheating the brakes.

(b) Maintain speed as long as safely possible to minimize braking distance (threshold technique).

c. Emergency use of transmission during brake failure.

(1) Downshift transmission to decelerate vehicle.

(2) Transmission braking offers limited effectiveness for deceleration. It is also abusive to the transmission.

3. Steering

Use of proper steering methods will increase the ability to maintain vehicle control during an emergency response.

a. Steering accuracy becomes more critical as vehicle speed increases.

(1) Accuracy demands smooth and precise manipulation of the controls.

(2) Anticipation of steering needs increases smoothness.

b. Acceptable forward hand positions are:

(1) 8-4

(2) 9-3

(3) 10-2

c. Acceptable hand movements are:

(1) Shuffle (push-pull, feeding)

(2) Hand-over-hand

(3) One-hand pressure (palming) - backing only

d. Hand-eye coordination

(1) Drivers tend to steer where they are looking.

(2) Maintaining a high visual horizon improves steering smoothness and accuracy.

E. Cornering methods

1. Evaluate turn

a. 90 degree square corner

b. Increasing radius

c. Decreasing radius

d. Greater or less than 90 degrees

2. Proper road position

a. High entry/restricted exit

b. Constant radius

c. Outside/inside/outside

NOTE: Road position depends on visibility, traffic and available roadway.

3. Speed

a. Reduce speed to a safe level prior to turn.

b. Accelerate when exiting turn with clear visibility.

F. Radio procedures during emergency driving

1. Effective communication between the dispatcher and fellow officers is critical because

a. it reduces response time;

b. it increases the likelihood of obtaining help.

2. Radio transmission accuracy is important because inaccurate or misunderstood information may result in inappropriate responses or delays by fellow officers.

3. Voice control is important to insure transmission:

   a. Clear and audible

   b. Free from emotional involvement, i.e., yelling, talking to rapidly

4. Environmental conditions which may detract from quality broadcast are siren, heavy traffic, acceleration, and cornering noise.

5. Broadcasts should be planned to occur on straight roadways.

6. Agency policy is the best source for determining information to be transmitted. It usually includes unit identification, description of situation, location and direction of travel.

SUPPORTING MATERIAL

AND

REFERENCES

This section is set up as reference information for use by training institutions. These materials can be used for instruction, remediation, additional reading, viewing, or for planning local blocks of instruction. This list is not an endorsement of any author, publisher, producer, or presentation. Each training institution should establish its own list of reference materials.

TOPICAL LIST OF SUPPORTING MATERIALS AND REFERENCES INCLUDED IN THIS SECTION

Accident Causes and Statistics

Iadlest Driver Training Guidelines

Vehicle Operation Iliustrations

Total Stopping Distance Graph

ACCIDENT CAUSES AND STATISTICS

STATISTICAL DATA

POST Accident Survey

During 1986, a survey was conducted by POST staff of the accidents involving law enforcement emergency vehicles. This study used the accident statistics for 1984 of ten agencies employing 24,433 of the 59,576 sworn personnel in the State. These agencies were:

	Sworn Personnel
Los Angeles Police Department	7,024
Los Angeles Sheriff's Department	6,333
California Highway Patrol	15,553
San Francisco Police Department	1,865
San Diego Police Department	1,396
San Diego Sheriff's Department	1,020
San Bernardino Sheriff's Department	914
Stockton Police Department	247
Lodi Police Department	54
Martinez Police Department	33

The statistics gathered from these agencies for the calendar year 1984 were extrapolated to reflect the statewide statistics shown below.

	Statewide
Total Number of Sworn Personnel	59,576
Emergency Police Vehicles	23,242
Accidents During 1984	7,907
Preventable Accidents	3,951
Non-preventable Accidents	3,956
Officers Injured in Accidents	1,408
Citizens Injured in Accidents	1,699
Accidents Resulting in Suits	2,394
Average Payment per Suit	7,306
Approximate Payments for all Suits	$17,500,000
Cost of Police Vehicle Repairs	$ 2,844,000

According to the 1986 POST survey, of the 7,907 law enforcement involved traffic accidents occurring during 1984, nearly half (3,951) were categorized as "preventable." An analysis of these preventable accidents indicates that the following are the primary causes:

Unsafe Backing	19.0 %
Unsafe Speed	16.5 %

Following Too Closely	4.3 %
Unsafe Lane Change	2.5 %
Violated Signal	2.5 %
Unsafe Passing	1.8 %
Others (Inattention)	36.5 %

Of the 3,951 preventable accidents, approximately 604 (15.3 %) occurred while the vehicle was operating with the emergency lighting activated. Of these 604 accidents, the percentages for these causal factors are somewhat different, as indicated below:

Unsafe Speed	40 %
Violated Signal	8 %
Following Too Closely	4 %
Unsafe Passing	4 %
Unsafe Turn	4 %
Failure To Yield	4 %
Unsafe Lane Change	2 %
Unsafe Backing	2 %
Others (Inattention)	32 %

Causal factors of law enforcement traffic accidents identified by the Advisory Committee of driver training experts are often less discernable than the above categories. They are however, significant to trainers and their objectives. These factors include the following driving traits which are the probable causes of both preventable and non-preventable accidents:

- Excessive speed for traffic/road/weather conditions
- Inattention to traffic and driving
- Driving with law visual horizon (not looking ahead)
- Poor closure rate judgment (not enough stopping area)
- Tunnel Vision
- Panic reflex responses (lack of impulse control)
- Slow response/reaction time
- Lack of defensive attitude in driving

California Statistics

From Statistics in the Statewide Integrated Traffic Records System (SWITRS) annual report of fatal and injury accidents, the table below shows the involvement rate of emergency vehicles:

	FATAL ACCIDENTS			INJURY ACCIDENTS		
	# of Drivers	# at Fault	% at Fault	# of Drivers	# at Fault	% at Fault
1986						
Emergency Vehicles	14	1	7.1	1,728	397	23.0
Total	6,971	3,379	48.5	406,416	166,596	41.0
1985						
Emergency Vehicles	28	5	17.9	1,591	321	20.2
Total	6,575	3,133	47.7	373,972	148,051	39.6
1984						
Emergency Vehicles	19	4	21.1	1,550	344	22.2
Total	6,675	3,133	46.9	358,254	142,3431	39.7

IADLEST Driver Training Guidelines

Systems of Driving

There are several different systems of driving. The selection of a system of driving is an agency, academy, and instructor choice based upon POST and local needs. The following three systems of driving are excerpted from the IADLEST Driver Training Guidelines.

Popular systems of driving include:

- **The Smith System**: developed by Harold L. Smith. This system was the first to recognize that drivers need to learn perceptual skills as well as manipulative skills.
- **The Identify, Predict, Decide, and Execute (IPDE) or Search, Identify, Predict, Decide and Execute (SIPDE)**: was developed by a committee of traffic safety educators. The system is used to describe the decision making process of a driver involved in the driving task.
- **The Zone Control System**: developed by Professor Frederik R. Mottola. This system structures the way a driver can recognize changes in the space management of the vehicle. It also describes what type of actions would be desirable to maintain the best control of a situation.

A. The Smith System

The Smith System features five steps. The driver must practice all the steps until they become routine. The five steps include:

1. "Aim High in Steering"

   Set your sights high. Look ahead to where your vehicle will be at least 15 seconds from now. See and react to future problems before they become unavoidable hazards.

2. "Get the Big Picture"

   Use your eyes to establish a 360-degree circle of constant awareness. Check mirrors every 5-8 seconds, sift out objects that are not potentially hazardous and maintain a 4-second following distance whenever possible.

3. "Keep Your Eyes Moving"

   Getting and keeping the Big Picture requires constant eye movement. Moving your eyes at least every two seconds keeps peripheral vision effective.

4. "Leave Yourself an Out"

Using your eyes properly gives you time to make decisions. In addition to time, you need space. Space is your out. Having a "space cushion" all around your vehicle creates an escape route, from the seen and the unforeseen.

5. "Make Sure They See You"

Involves the use of timely, effective warnings to people in your Big Picture who may not be aware of your presence.

B. S.I.P.D.E.

S.I.P.D.E. is a method used to gather sensory information to process and perceive a clear, complete, and accurate mental and sensory picture of a driving situation.

1. Search

The driver should perform a systematic searching for information and cues within and about the driving environment to perceive possible situations ahead, behind, and on both sides of the vehicle.

a. Fixating on the center or travel path

(1) Driver maintains road position by using reference point as far ahead on the road as possible and steering toward it

(2) Driver periodically scans traffic scene and vehicle instruments

b. Searching and scanning the traffic scene

(1) Driver searches out things that could affect vehicle operation

(2) Driver scans roadway weather, vehicle and foot traffic, and fixed objects

(3) Driver avoids fixating on individual objects or distractions by using rapid eye movements

c. Checking mirrors and instruments

(1) Driver uses interior and exterior mirrors

(2) Driver glances at instrument panel for speed control

d. Anticipating visual lead time

(1) Driver listens for audible clues when sight picture is limited

2. "Identify"

The driver should be conditioned to identify situations which may become hazardous. This is extremely difficult due to the fact that hazards come in many different forms and develop rapidly from combinations of varying circumstances. Thus, distinguishing from among all the data supplied through the sensory process is important to the driving task.

a. Identifying individual factor(s) or event(s)

b. Determining what the factor or event is and how it might develop

c. Calculating how the event or factor might affect the vehicle as well as other traffic

3. "Predict"

   After identifying a potentially hazardous situation, the driver must predict what could happen if conditions continue to develop. The driver must anticipate future activity in the total scene which may be important to the safe operation of the emergency vehicle.

   a. Relating data, events, and factors identified in the present situation with past experiences and knowledge

   b. Recognizing immediate and potential hazards and evaluating risks

4. "Decide"

   The driver should direct and control the vehicle's involvement in the traffic environment. In other words, now that the driver has predicted what might happen, a course of action to follow has to be decided.

5. "Execute"

   Simply stated, this means avoiding collisions. The driver should carry forth the decision, utilize driving skills, and maintain person and vehicle safety.

C. The Zone Control System

The Zone Control System is a three-step process used while driving which gives guidelines for how and where a driver should search, what should be searched for, and what to do when a deteriorating situation is identified. The Zone Control System is structured into a three-step decision making process so that when the system is practiced properly, it can lead to good driving habits. There are three steps to the command the driver establishes over a situation:

Step A: see the zone change to the path of travel or to the line of sight

Step B: evaluate the other zones to determine what the options are

Step C: get the best speed control, lane positioning, and communications that are available

1. Step A: See the zone change to the path of travel or the line of sight

   a. Search 12 seconds ahead of the vehicle to check the front zone

   b. Re-check the immediate 4-second driving range after searching ahead

   c. Look for line-of-sight and path-of-travel (LOS-POT)

   d. Scan intersections to the left zone, front zone, right zone

   e. Check mirrors after seeing any zone changes and before making any changes in speed or positioning

   f. Check blind spots before moving the vehicle to the side

2. Step B: Check other zones

If the driver sees something that changes the potential or actual LOS-POT, then an evaluation of alternative zones should be made to determine what the options are.

3. Step C: Get the best control

For any situation, for any given moment, having the best control means to have the proper speed, lane positioning, and means of communication.

If the driver is traveling at a reasonable speed in accordance with the general ongoing conditions and in accordance with speed limits, then the Zone Control System tells the driver to evaluate what the best speed selection should be if there is a change in the control of the one-of-sight or path of travel.

a. to maintain speed

b. to decelerate

c. off acceleration-cover brake

d. off acceleration-apply brake

e. to increase speed

4. Lane Positioning

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IADLEST Driver Training Guidelines

Driving Condition Tips

The following tips on driving during different types of environmental conditions has been excerpted from the IADLEST Driver Training Guidelines and may be used to highlight specific driving situations.

- Weather Conditions

  Ice, snow, fog, sleet, rain, wind, hot, humid, cold, smoke, and hazy conditions may reduce visibility as well as alter an officer's ability to accelerate.

  1. Snow and Ice Considerations

     a. The edge of the road, lane markings, or even traffic signs may not be visible.

     b. The stopping distance on ice and snow increases exponentially with increased speed.

     c. Have snow tires on the vehicle and a shovel and chains available. Make certain that the vehicle heater and defroster are in good working order. Brakes should be properly adjusted so they pull evenly.

     d. Stay aware of the temperature. We roads with ice and freezing rain are the most treacherous of all driving conditions.

     e. Remember that bridges and roadway shaded areas freeze first.

     f. Do not make any sudden moves with the steering wheel, brakes, or accelerator.

     g. Slow down in advance of intersections, curves, and down-grades sooner than normal. Keep at least a four-second following distance.

     h. Do not turn on the heater or defrosters in hot or cold weather. They could steam up the windshield. This fact is particularly important when driving in emergency conditions.

     i. If using chains on rear wheels, drive with them until the road surface is appreciably clear of ice and snow.

     j. Straighten the front wheels when starting the car in motion on a snow covered or slippery surface.

     k. When driving through deep snow, shift into lower gear before entering the snow and attempt to keep the car moving through the snow.

  1. When stopped or stuck in deep snow or in a snow drift, be aware that carbon monoxide may seep back into the vehicle.

  2. Rain Considerations

     a. During rainy conditions, tires may start hydroplaning. Hydroplaning affects steering and braking.

b. Driving through large areas of water can affect brake performance and the vehicle's electrical system.

Precautions:

(1) Slow down before hitting water.

(2) Turn wipers on before hitting water.

(3) Tap brakes as you exit.

c. Use caution in checking outside mirrors. Rain can distort or obliterate images.

d. Turn headlights on during the daytime.

3. Wind Considerations

a. Be alert where windy conditions prevail. Crosswinds can blow the vehicle off the road or across the center line, particularly in curves and corners, and especially in rainy and windy conditions. Adjust when entering or exiting curves.

b. Be alert when passing buildings, traveling through an underpass, when the road is wet with water, ice or snow, and when near other vehicles, especially large trucks.

4. Visibility Considerations

Fog, haze, smoke, and mist can affect visibility greatly.

a. Turn on low beam headlights and the wipers if needed. Never drive with only parking lights on.

b. Watch for slow moving and stopped vehicles. Also, watch rear view mirrors frequently for vehicles approaching quickly from the rear.

c. Be alert for patches of fog in valleys and low lying areas.

d. Drive slowly but keep moving.

e. If conditions are too bad, pull over as far as possible, stop, leave lights on, and activate hazard lights.

o Night Driving

1. Aside from reducing detail, darkness conceals hazards: pedestrians, two-wheeled vehicles, stalled cars, curves, and other objects or conditions. The driver makes a decision on the basis of a sketchy and incomplete picture.

2. It is more difficult to judge the speed and position of another vehicle.

3. Drivers must depend largely on their headlights which illuminate only a relatively short and narrow path ahead. It does not bend around corners.

4. Adequate highway lighting is limited.

5. Glare from roadside lighting and the headlights of oncoming vehicles impair visibility.

6. Keep panel lights dim for better vision, but always have enough panel light to read the speedometer.

7. Reduce speed so that you can stop within the visible distance.

8. Increase sight distance by keeping the headlights clean and properly aimed, and the windshield clean.

9. Watch beyond the headlights on or near the roadway for slow-moving or unlighted vehicles, curves, T-intersections, road obstructions or defects, trains, pedestrians, and animals.

10. Avoid looking directly into glaring headlights of oncoming vehicles.

11. Keep at least a four-second following distance.

12. Allow a greater margin of safety when over-taking and passing.

13. Do not wear sunglasses or motorcycle tinted face shields at night.

14. Avoid staring at bright lights. Headlight glare is a particular hazard. The human eye takes about seven seconds to fully recover from being blinded by a bright light. At 60 mph the car would travel 616 feet in seven seconds.

o Traffic Density

1. Rural Areas

Be alert for loose livestock, pets, bicyclists, school buses, children waiting for buses, and slow-moving vehicles such as tractors, farm implements, trucks, horses and buggies.

2. Urban Areas

Be alert for traffic entering the roadway from alleys, parking lots, driveways, and intersections; children playing in the streets, people exiting delivery vehicles, drivers opening doors to exit parked vehicles, pedestrians at school crossings and crosswalks.

3. Drive with the flow of traffic

Don't "lane hop." An officer is justified to drive differently than the flow of traffic only if on an emergency run and is not driving in such a manner as to endanger other drivers.

o Road Conditions

Officers need to learn how to read the road since so much time is spent on various roadways.

1. From time to time the driver will notice a clear path in the center of the roadway followed by a dark spot. This particular pattern is caused by a bump in the road surface.

a. As vehicles travel over the bump, oil is knocked off that might not otherwise land on the road surface for several miles.

b. A concentration of various fluids causes the darker area.

c. The bump itself is in the clear area since the bump is hit before the droplet is knocked loose.

d. If a bump is in a turn, cross the bump and allow for a slight drift toward the outside of the corner.

2. Another indicator of changes in the elevation of the road surface is seen when the sun is low in the sky. Note that:

a. In the early morning or late afternoon, a greater portion of the roadway can be seen as a shadow.

b. The density and size of shadow will give an indication as to the amount of change up or down in the road surface.

3. At night, there are a number of signs that can help tell if the road is changing.

a. Light travels in a straight line.

b. Drivers can learn a lesson at night about the road from the headlights: if the roadway in front appears dark with headlights on, the road is dropping or curving out of the line of the headlights. If the road appears brighter as you approach an area, the road is rising.

4. Basic rules for reading the road:

a. Drive according to what you can see. If you cannot see over a crest of the hill, slow down. If you are rounding a bend and cannot see in front of you, slow down.

b. Do not travel any faster than your ability to stop in the distance you can see.

5. Road conditions to be aware of:

a. Water

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(2) If the water is concentrated on one portion of the road and only one side of the vehicle goes through the water, the vehicle will tend to pull in that direction. The force of the pull is dependent on the depth of the water and the speed of the vehicle.

b. Mud

Two basic problems can occur:

(1) The mud can fill in the tread pattern of the tire, making the reaction ability of the tire very slow.

(2) Sliding sideways in the mud, the mud can build up against the side of the tire until there is sufficient resistance to cause the vehicle to roll.

c. Potholes

Potholes create a great danger to patrol vehicles. It is best to drive around the pothole. Use the following procedure if you cannot avoid hitting a pothole:

(1) Just as you get to the pothole, release your brakes. If you fail to do so, your front tire can actually stop as you cross the leading edge of the pothole. By the time you get to the other side, the wheel is no longer turning and the impact can tear the tire apart.

(2) Hit the pothole squarely, rather than on the side of the tire. The face of the tire can take considerably more impact than the side wall.

d. Animals, tree limbs and miscellaneous objects

The size of the object will determine the correct action.

(1) If it is a small object and you don't have time to check for other traffic, do not cause a larger collision by swerving into another lane or on coming traffic. Hit the object head on.

(2) If it is a large animal or object hit it with a glancing blow. Hitting an object squarely with the front of the vehicle increases the collision impact; it may increase the amount of damage and the potential loss of vehicle control.

6. Road Surfaces

a. Gravel

Because of the irregular shape, size, and weight of the stones on an uneven surface they move about easily. This movement can cause a vehicle to go out of control with only a slight action by the driver. Braking on gravel can cause a vehicle to slide easily. When following another vehicle, especially at high speed, stay back to increase visibility and avoid flying stones.

b. Blacktop

(1) This surface will bleed oil to the surface during hot, humid days causing slick conditions.

(2) It can also roll up into a washboard effect with heavy use during extremely hot days.

c. Concrete

(1) This surface may explode at joints during hot weather.

(2) It can develop severe dips as earth settles under it. Concrete is heavy and settles more than other surfaces.

(3) Concrete can glaze over very quickly in freezing conditions.

IADLEST Driver Training Guidelines

Vehicle Occupant Protection Devices

Officers are exposed to a great amount of risk while driving a patrol vehicle. One of the easiest ways to minimize that risk is to take advantage of the protection equipment in the vehicle.

A variety of occupant protection devices exist. Some of these devices are:

A. Head Restraints

1. Adjusted to the middle of the head, level with the ears; it protects the neck from whiplash

B. Door Locks

1. Lock all doors

2. Can provide better protection in a collision, preventing occupants from being ejected

C. Collapsible Steering Columns

1. Collapse in a collision so that a driver's chest is protected from injury.

D. Padded Dashboards

1. Designed to cushion the occupant if the occupant comes in contact with the dashboard

E. Recessed Knobs on the Panel

1. Newer vehicle designs try to eliminate any sharp or protruding knobs such as heater control, radio knobs, windshield wiper switches.

F. Recessed Door Handles

1. Designed to be somewhat recessed and smooth to prevent injury if contact is made to handles by occupants.

G. Padded Door Panels

1. Extra padding added to help cushion an occupant coming in contact with the door.

H. Securiflex Windshield

1. Designed to maintain its shape during a collision

I. Air Bags

1. Act as a pillow when activated

2. Protect driver by absorbing a significantly greater amount of the crash forces than the driver could withstand.

DRIVING SYSTEMS

Driver Behavior Institute
390 Maple Avenue
Cheshire, CT 06410

National Safety Council
444 North Michigan Avenue
Chicago, IL 60611

Safety Enterprises
1010 South Summit
Bloomington, IL 61701

Safe Performance Associates
3250 U.S. Highway 19 North
P. O. Box 6399
Clearwater, FL 34618

Smith System
P. O. Box 81224
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     b. Driving through large areas of water can affect brake performance and the vehicle's

of alternative zones should be made to determine what the options are.

3. Step C: Get the best control

   For any situation, for any given moment, having the best control means to have the proper speed, lane positioning, and means of communication.

   If the driver is traveling at a reasonable speed in accordance with the general ongoing conditions and in accordance with speed limits, then the Zone Control System tells the driver to evaluate what the best speed selection should be if there is a change in the control of the one-of-sight or path of travel.

   a. to maintain speed

   b. to decelerate

   c. off acceleration-cover brake

   d. off acceleration-apply brake

   e. to increase speed

4. Lane Positioning

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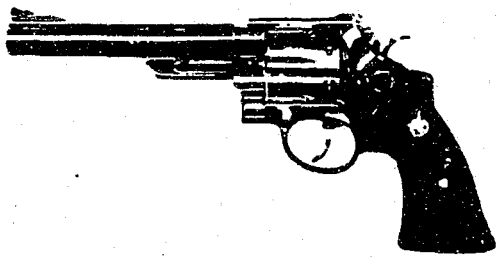
.44 Magnum Revolver



Weight of Bullet 240 grains

Muzzle Velocity 1600 fps. (1090 mph)

Foot pounds of energy at muzzle 1400

People it could kill - maybe 4 with an average of 325 fp per person.

Car

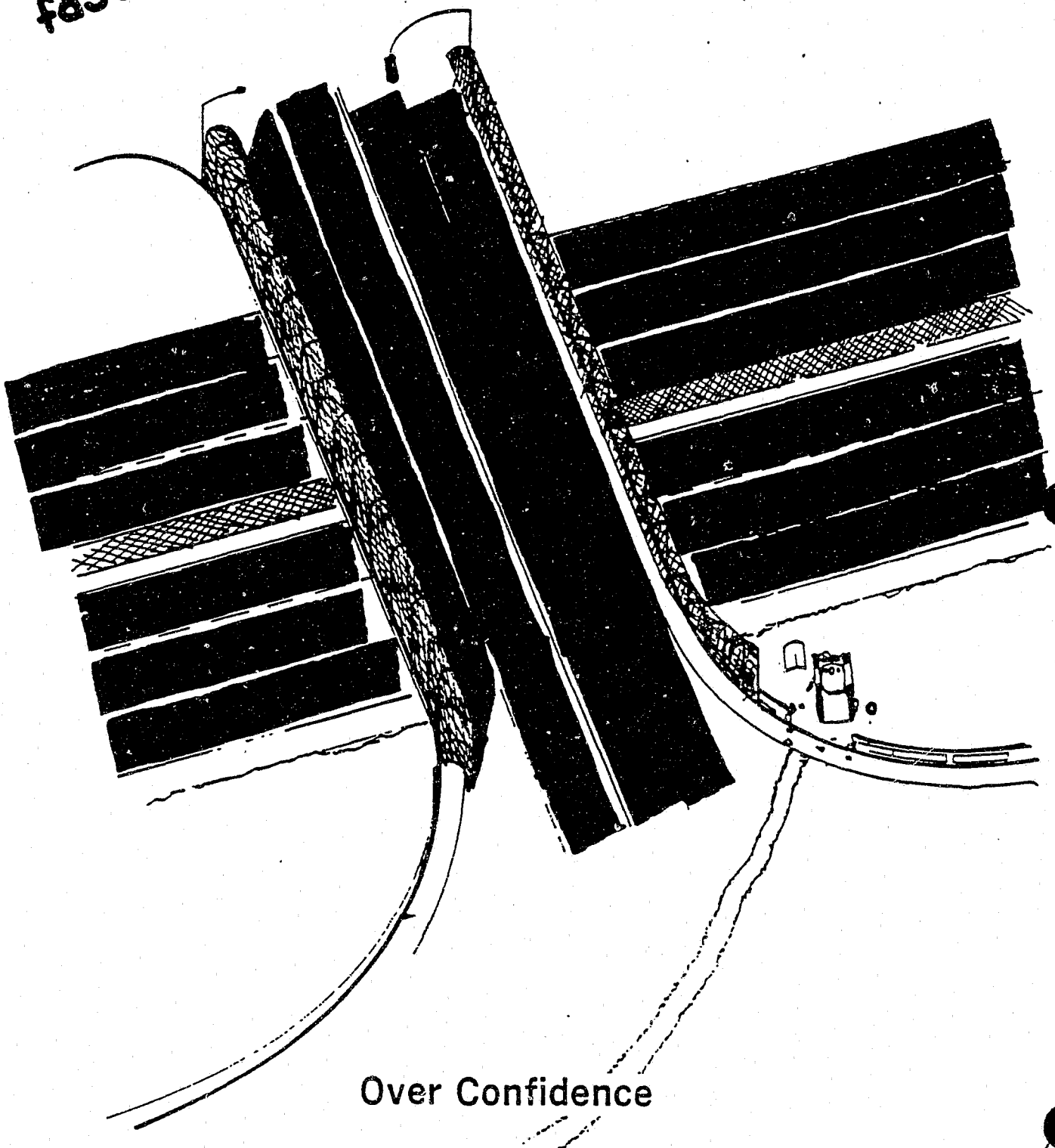
Weight of Vehicle 4000 pounds

Velocity 88.02 fps. (60 mph)

Foot pounds of energy at impact with stationary object: Approximately 480,000

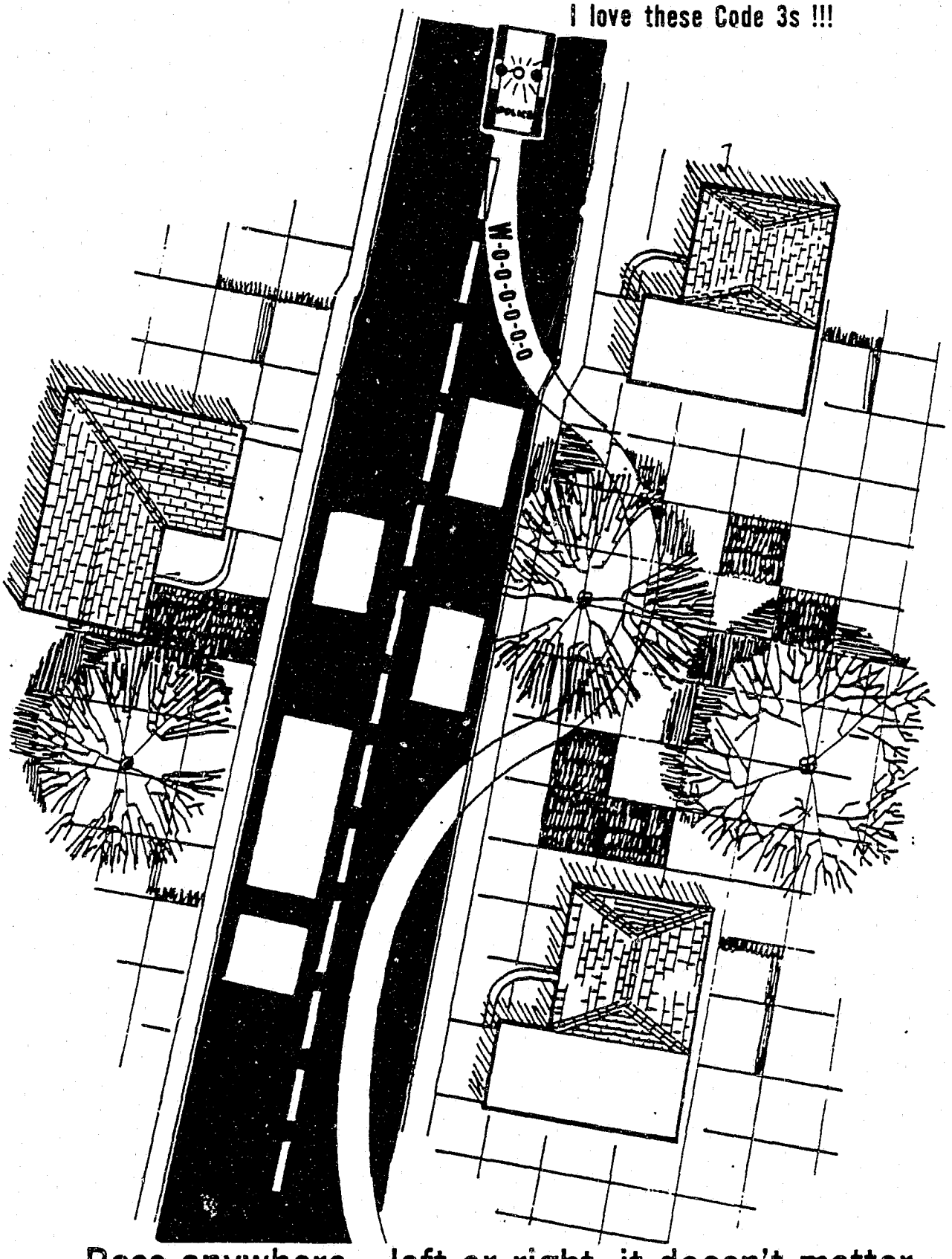
People it could kill about 1477 with an average of 325 fp per person.

"After all you can take that Hairpin turn at the corner by the bridge faster than anyone."



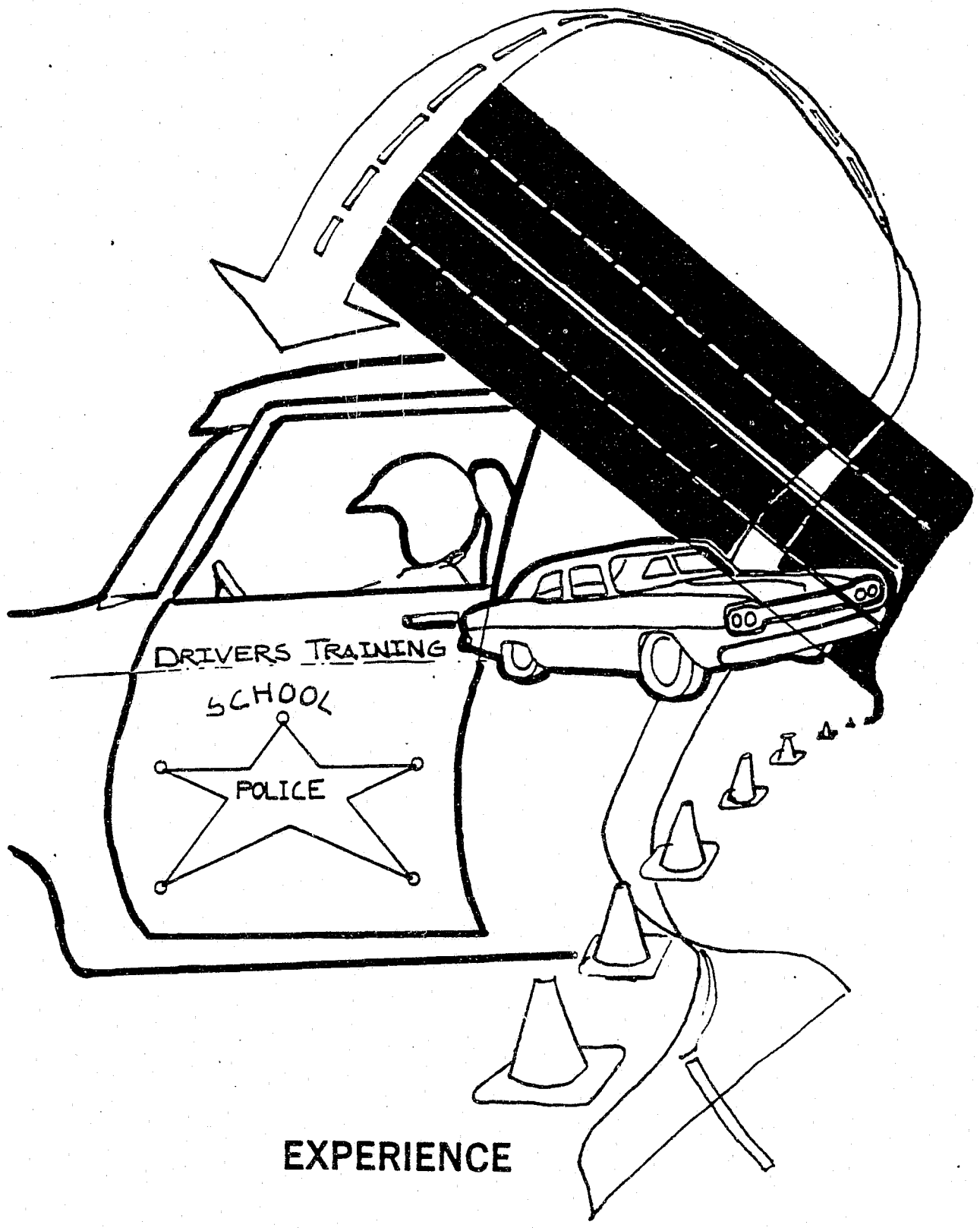
Over Confidence

Self-Righteousness



Pass anywhere - left or right, it doesn't matter.

Preoccupation



EXPERIENCE

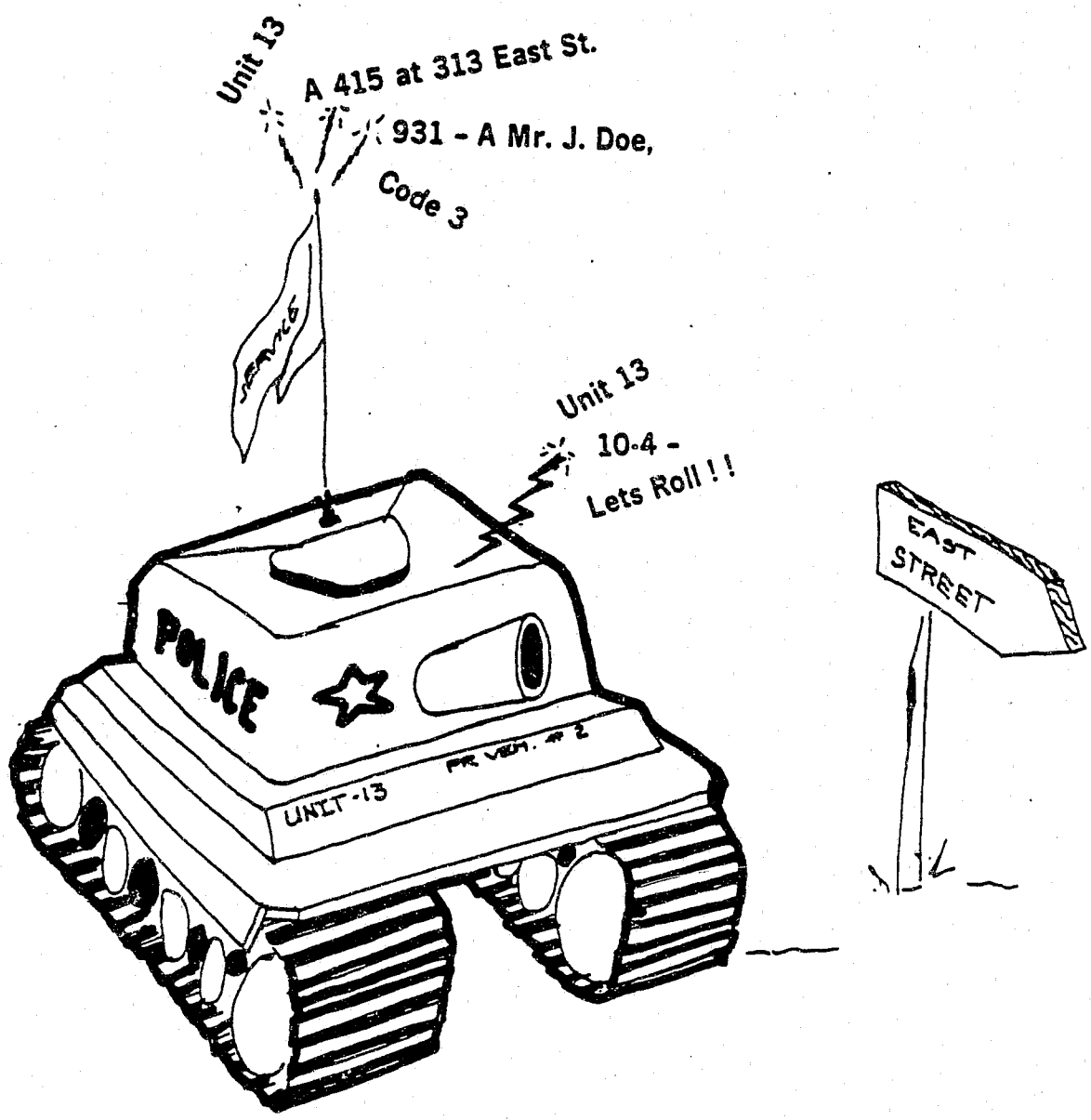
FATIGUE +

PREOCCUPATION = BAD NEWS!

WHY FATIGUE POSES A GREAT THREAT TO SAFE DRIVING:

1. FATIGUE LOWERS VISUAL EFFICIENCY

2. FATIGUE CAUSES LONGER REACTION TIME



You generally cannot dictate to your employer what vehicle they buy.

High Speed Driving Considerations

1. Crime or violation
2. Driving skill
3. Vehicle capability
4. Weather and road
5. Area familiarity
6. Population density
7. Time of day
8. Geographic location
9. Later apprehension
10. Apprehension unlikely

Restraint Devices

Lap Belt

- Position across hips
- Do not twist belt
- Lock securely
- Belt fits snugly

Shoulder Belt

- Position over left shoulder
- Do not twist belt
- Allow belt to retract normally
- Do not lock in loose position

Effectiveness

- Reduce possibility of second collision
- "Second Collision" causes injury or death
- Keeps driver behind wheel
- Helps maintain vehicle control

Braking

Threshold Braking

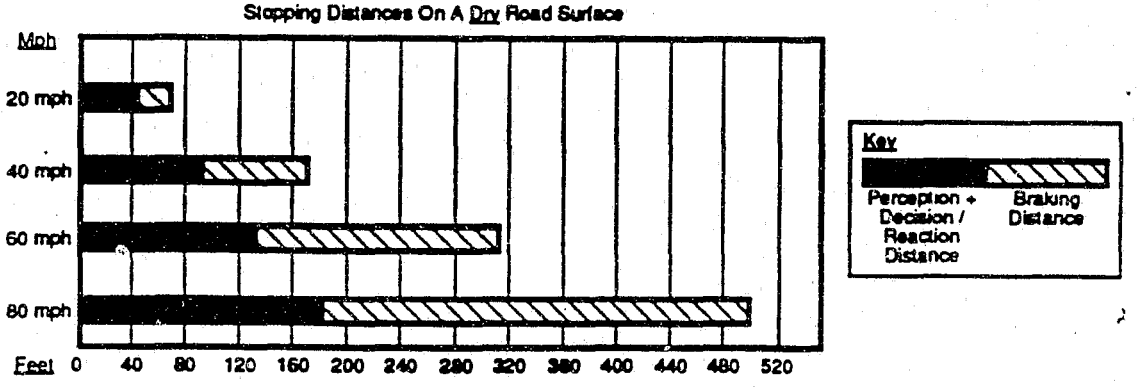
- Maximum vehicle braking capability
- Pressure on brake pedal to point before lock-up
- Permits steering of vehicle

Adverse Driving Conditions and Responses

Adverse Condition	Resultant Problem	Appropriate Driving Response
Rain		
Ice or Snow		
Fog		
Darkness		
Sand or Gravel		
Pothole		

TOTAL STOPPING DISTANCE

= Perception Distance + Decision/Reaction Distance + Braking Distance



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