

OBJECTIVE 2.7 Identify vehicle defects that contribute to law enforcement collisions.

## **INTRODUCTION**

Some collisions are the direct result of mechanical failure. There is a disagreement as to the extent of information the driver must acquire in order to deal with the mechanical function. Some drivers will be required to accept almost a total maintenance responsibility, while others will be instructed to direct all maintenance problems, concerns, and responsibilities to appropriate maintenance personnel.

Regardless of the level of responsibility, the student should acquire the knowledge, skills, and behaviors necessary to prevent mechanical malfunctions, detect changes in the mechanical operation and performance of the vehicle, and react correctly to sudden mechanical failure.

## **CONTENT**

### **MECHANICAL SUB-SYSTEMS NECESSARY FOR VEHICLE OPERATION:**

1. Power train: engine, transmission, differential/front/rear wheel drive
2. Electrical: lighting, ignition, emergency warning devices, radio communications
3. Fuel and exhaust
4. Steering: suspension and tires
5. Lubrication: moving parts and engine cooling
6. Visibility: windows, defrosting system
7. Safety: safety belts, locks, air bags

Each of these sub-systems requires periodic maintenance checks to maintain the efficient, economical, and reliable vehicle performance expected. This will be elaborated upon in Objective 2.8, Law Enforcement Vehicle Inspections.

To detect changes in the mechanical sub-systems the driver must have:

1. knowledge of the mechanical sub-systems
2. receptiveness to sensory stimuli such as visual, sound, smell and feeling
3. knowledge of vehicle performance and data
4. history of vehicle maintenance (both preventative and reactive)

A driver who fails to prevent or detect change increases the possibility of having to react to a failure. Some of the more likely situations and the appropriate reactions are as follows:

1. Stalled Engine - Avoid braking, shift to neutral, restart engine, shift to drive.
2. Stuck Accelerator - Try dislodging accelerator pedal, shift to neutral, brake, move to a safe location. If necessary turn off ignition, but only after coming to a complete stop.
3. Wet Engine - Using vehicle momentum, try to coast to a safe location. Attempt to restart engine after it dries.
4. Flooded Engine - Depress accelerator fully for 5-10 seconds. Release accelerator and restart engine.
5. Dead Battery - Consult owner's manual or textbook for correct procedure for "jump-starting" a battery.
6. Headlight Failure - Try to make the vehicle visible to others. Use directional signals and exit to safest location.
7. Faulty, Leaking Exhaust - Repair it! Do not drive the vehicle due to the potential for carbon monoxide poisoning.
8. Flat Tire or Blowout - Avoid braking, steer the vehicle in the direction you want the front end to go. Coast to a safe location. If changing a tire, consult the owner's manual or a textbook for the correct procedure.
9. Improper Tire Tread or Alignment - Replace tire or re-align wheels prior to driving the vehicle.

10. Improper Speed Rated Tires - Replace tires with the proper speed rating.
11. Brake Failure - Pump brake pedal. Downshift into lowest gear. Activate parking brake. Use the left foot on the parking brake to gradually stop the vehicle.
12. Anti-lock Brake System Failure - System shifts to conventional brake system.
13. Wet Brakes - Use left foot and depress the brake pedal to "heat-up" the brakes and evaporate water or to allow less water to enter the brake system; accelerate slowly until clear of water. Check brakes when out of water and before proceeding further.
14. Overheating Engine - Consider where to exit roadway. Turning on the heater may buy additional time.
15. Oil Indicator Warning - If problems occur involving oil, it's best to exit the roadway, stop the engine and check the engine oil level system
16. Hood Flies Up - Try looking out of the side windows. Check to the rear and exit to a safe location.

## **SUMMARY**

When the driver has an understanding of the mechanical sub-systems of a vehicle, the chances of mechanical malfunction are reduced. When the driver actively tries to prevent or detect changes in the mechanical operation of the vehicle, the chances of mechanical malfunction are almost completely eliminated. When the driver demonstrates how to react correctly if a mechanical malfunction does occur, the chances of collision are greatly reduced, if not eliminated. The lack of prevention or detection skills increases the chances of mechanical malfunctions and places the driver in the "low percentage" position of trying to react correctly.

## **SUGGESTED INSTRUCTIONAL METHODOLOGY**

### **LECTURE AND CLASS DISCUSSION**

Collect collision reports or media accounts in which a mechanical failure contributed to the cause of the collision. These examples can lead to discussions and demonstrations on prevention techniques, detection awareness, and reaction skills.

**SMALL GROUPS**

Using chalkboard, overhead projector, or similar aid, list the various sub-systems of the vehicle. Then have the group identify the possible sub-system failures. The group should then identify or predict what the effect of the sub-system failure would be on the vehicle.

**RANGE**

Offer a demonstration using imaginary steering wheel and pedals as to the correct reaction to such a failure. The students could demonstrate the correct reaction, practicing until correct. The transfer of learning will be most complete if the training course can allow the students to demonstrate and practice these correct reactions while driving the training vehicles or their agency vehicles on the practice driving range or in a secure driving area.

**CLASSROOM DEMONSTRATION METHOD**

With the students located at their desks, have them simulate driving by using imaginary pedals and an improvised steering wheel using paper, large envelope or paper plate. Identify the driving conditions such as mph and type of roadway and then call out the mechanical malfunction.\* The students should demonstrate correct reaction to each simulated malfunction.

\*Malfunctions could include:

1. brake failure
2. sticking accelerator
3. stalled engine or power failure
4. hood fly-up
5. headlight failure

**RESOURCES AND AIDS**

1. Owner's vehicle maintenance manual
2. Automobile magazines such as *Car & Driver*, *Motor Trend*, *Consumer's Digest Road and Track*
3. Acceptable driver education textbooks. See Appendix C at the back of this Guide.

**SUGGESTED EVALUATION METHODOLOGY**

**STUDENTS**

1. Written or verbal responses to question concentrating on the mechanical sub-systems of a vehicle and common vehicle malfunctions
2. Demonstration by the students of recommended solutions to vehicle malfunctions

**COURSE**

1. Review collision reports to determine if a vehicle defect contributed to the collisions
2. Review major vehicle repair order to determine if they could have been eliminated or minimized by timely inspections



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# Physiological Factors

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- Vision
- Hearing
- Sensory
- Smell
- Timing
- Physical Stature
- Medical Condition