

SANTA ANA POLICE DEPARTMENT

DAVID VALENTIN · CHIEF OF POLICE

TRAINING BULLETIN

"Education promotes professional and responsive law enforcement"

Electric Vehicle Safety and Enforcement

Purpose

The purpose of this Training Bulletin is to educate Department personnel concerning the safety hazards and available enforcement options relating to electric vehicles.

Introduction

Several of the major automakers, including Ford, General Motors, Dodge, Honda and Toyota, are currently developing and/or producing vehicles that use electrical power for use on our highways. Certain characteristics of these vehicles may pose a danger to first responders during emergency situations. Furthermore, there are laws that apply specifically to the use of these vehicles on public roadways which officers should be familiar with prior to taking enforcement action.

I. Electric Vehicle Classification

Vehicles powered either partially or exclusively by electric power can generally be categorized into one of these groups:

1. **Motor Vehicle** – A motor vehicle is a vehicle that is self-propelled (CVC 415).
2. **Low-Speed Vehicle** – A low-speed vehicle is motor vehicle, other than a motor truck, having four wheels on the ground and an unladen weight of 1,800 pounds or less, that is capable of propelling itself at a minimum speed of 20 miles per hour and a maximum speed of 25 miles per hour, on a paved level surface. (CVC 385.5).
3. **Golf Cart** – A motor vehicle having not less than three wheels in contact with the ground, having an unladen weight less than 1,300 pounds, which is designed to be and is operated at not more than 15 miles per hour and designed to carry golf equipment and not more than two persons, including the driver. (CVC 345).
4. **Gasoline-Electric Hybrid Vehicle** – Although not yet defined in the vehicle code, a gasoline electric hybrid vehicle is any motor vehicle powered using a combination of an internal combustion gasoline engine, an electric motor and a high voltage battery system.

II. Characteristics of Gasoline-Electric Hybrid Vehicles

1. A small gasoline powered engine and an electric motor powered by a high voltage battery system. During most driving situations, the gasoline engine supplies the vehicle's power with supplemental power provided by the electric system. This configuration allows the gasoline engine to shut off automatically when power needs are low and restart as the demand increases.
2. A high-voltage battery pack consisting of several nickel-metal hydride (Ni-MH) batteries wired together and housed in a protective metal case. The high voltage battery pack is usually mounted in the trunk of the vehicle over the rear axle, providing the best protection during a collision. The battery box is mounted in a manner that separates it from the chassis of the vehicle to minimize the risk of electrocution. The amount of power supplied by the high voltage system varies but is sufficient to inflict serious injuries. First responders should never tamper with the battery box.
3. The Ni-MH batteries contain a high alkaline liquid potassium hydroxide (KOH) solution. Extreme caution should be exercised if this solution is spilled from the batteries. Fortunately, the KOH solution is almost completely absorbed into a special thin membrane paper inside the battery cells, making a substantial spill highly unlikely.
4. Power to and from the battery pack is accomplished using high voltage wires and cables. These cables typically run below the floorboard and along the left side of the vehicle. All of the high voltage cables and connectors are bright orange in color, making them easily identifiable to the first responder. Caution should be exercised when working in areas where these cables would normally be found. Every effort should be made to locate these components before performing any work since modifications could conceal the colored cables, such as an aftermarket undercoating of the vehicle carriage.
5. A 12-volt battery system used to power "auxiliary" systems within the vehicle, such as the radio, lights and the fan for the air conditioner. The 12-volt battery system does not present a hazard beyond what would be expected from the battery system of a standard gasoline powered vehicle.

III. How to Recognize Gasoline-Electric Hybrid Vehicles

1. Become familiar with the current hybrid vehicles in production and stay abreast of new models released by vehicle manufacturers.
2. Recognition of the model name on the back of the vehicle is the most efficient and effective method of identifying hybrid vehicles.
3. A vented "C" pillar. The "C" pillar is the third pillar from the front connecting the body of the vehicle to the roof. The vent allows heat from inside the battery pack to escape.

IV. Safety Considerations of Gasoline-Electric Hybrid Vehicles

The normal operation of a hybrid vehicle allows the gasoline engine to turn on and off based on the demand for power. For instance, when the vehicle is stopped at a red light, the gasoline engine will typically shut off to conserve energy. This is referred to as "sleep mode". The gasoline engine will then restart as the vehicle accelerates. The "sleep mode" is a departure

from the operation of traditional gasoline powered engines. The activation of the gasoline engine and the subsequent boost in power could be instantaneous. Therefore, a small depression on the accelerator pedal could easily start the gasoline engine and move the vehicle forward. In short, the lack of engine noise coming from the engine compartment is no guarantee that the vehicle is safe.

When a hybrid vehicle has been identified at the scene of an emergency, the next step for the first responder is to recognize the potential safety hazards. This may include an occupant in the driver's seat who could depress the gas pedal while the vehicle is in "sleep mode". Check for the illumination of a green light mounted on the vehicle's instrument panel. The light should be titled "ready" (Toyota), "auto stop" (Honda) or something similar. There is no standard that automakers must follow so the title of the light may change by manufacturer. If the light is illuminated it is an indication that the vehicle is operational and could move at any moment, despite the lack of engine noise.

A first responder should treat a vehicle in the above noted configuration with extreme caution and follow these steps:

1. Safely access the passenger compartment
2. Set the parking brake.
3. Ensure the vehicle's gear selector is in the "park" or "neutral" position.
4. Turn the vehicle's ignition key to the "OFF" position.

Following this procedure should turn the "ready" light off. If the light remains illuminated, the first responder should stop working around the vehicle since the potential for danger is still very high. Police officers should try to stabilize the vehicle if possible by using wheel chocks or some other device that will prevent the vehicle from moving. If circumstances permit, officers should wait for the fire department to respond and allow them to disable the vehicle before attempting to extricate any of the passengers or perform other work in close proximity to the vehicle. If it is imperative for a police officer to disable the vehicle by pulling a fuse, officers should try to locate the main or supplemental fuse box in the passenger compartment, engine compartment or trunk and remove the fuse titled "HV" for high voltage or some other title to that effect.

Another concern regarding hybrid vehicles is the potential for electrocution. The high voltage battery system and the high voltage cables are mounted in a manner that separates them from direct contact with the frame of the vehicle. A first responder would have to touch the high voltage system while being grounded to another source before they could be electrocuted. This holds true even when the hybrid vehicle is wet or completely submerged in water. Although the risk of electrocution is extremely low, first responders should always be cautious to avoid the high voltage system whenever it becomes necessary to rescue an occupant or perform other work in and around a hybrid vehicle.

V. Low-Speed Vehicle and Golf Cart Safety

Golf carts and Low-speed electric vehicles, such as the "GEM" produced by Global Electric Motor Cars, are usually equipped with standard battery systems that can be recharged in eight

to ten hours using a 110-volt outlet. As such, these vehicles pose no additional danger of electrocution beyond that of a traditional gasoline powered vehicle.

VI. Electric Vehicle Enforcement

Hybrid vehicles are subject to the same laws and regulations as any other motor vehicle. One exception is the use of designated high-occupancy vehicle lanes. Pursuant to CVC 21655.9(a) and CVC 5205.5(a)&(b), a vehicle may be issued a sticker allowing that vehicle to be driven in a high-occupancy vehicle lane if it meets the federal standards for an “inherently low-emission vehicle” (ILEV). The sticker is issued by the California Highway Patrol and the number affixed to the sticker shall be placed on the vehicle’s registration. Any person who owns or operates a vehicle displaying the above noted sticker that was not issued to that vehicle is in violation of CVC 21655.9(c), a misdemeanor.

The following is a list of abbreviated laws that apply specifically to low-speed vehicles:

1. **CVC 21251** – A low-speed vehicle is required to abide by all of the provisions applicable to a motor vehicle and the driver of a low-speed vehicle is also subject to all the applicable laws as the driver of a motor vehicle.
2. **CVC 21253** – A low-speed vehicle operated or parked on the roadway shall meet the federal Motor Vehicle Safety Standards for low-speed vehicles in accordance with Section 571.500 of Title 49 of the Code of Federal Regulations. This section requires low-speed vehicles to be equipped basic lighting equipment, an exterior driver’s side mirror and either an exterior passenger’s side mirror or an interior mirror, a parking brake, a windshield, a Vehicle Identification Number, and a seatbelt installed at each designated seating position.
3. **CVC 21254** – Any vehicle originally designed as a low-speed vehicle that has been altered or modified to exceed 25 miles per hour shall not longer be eligible for the relaxed federal Motor Vehicle Safety Standards and shall meet the federal standards for a passenger vehicle.
4. **CVC 21260(a)** – No person shall operate a low-speed vehicle on any roadway with a speed limit in excess of 35 miles per hour. Subsection (b)(1) does allow a low-speed vehicle to cross a roadway with a posted speed limit in excess of 35 miles per hour as long as it is done on a roadway with a speed limit of not more than 35 miles per hour.

Summary

The use of electric and hybrid vehicles has steadily increased; consequently, there is a greater likelihood that field personnel will respond to a major collision or other emergency situation involving these vehicles. Therefore, it is imperative that first responders are able to recognize these vehicles and the potential hazards they present. In doing so, first responders can minimize the risk of injury to themselves and others.

Acknowledgment:

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