


**Automotive Engines Theory and Servicing**  
Ninth Edition

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Theory and Servicing  
Ninth Edition  
James D. Halderman

**Chapter 1**  
Shop Safety



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**OBJECTIVES**

**1.1** Describe the personal protective equipment used by technicians.

**1.2** Explain the safety tips for technicians and the cleaning methods and processes used in vehicle service.

**1.3** Discuss shop safety procedures.

**1.4** Describe the purpose of fire extinguishers, fire blankets, and fire aid and eye washing stations.

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**PERSONAL PROTECTIVE EQUIPMENT (1 OF 2)**

- Safe work habits can reduce accidents and injuries, ease the workload, and keep employees pain free.
  - Safety Glasses
  - Steel-toed Shoes

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## PERSONAL PROTECTIVE EQUIPMENT (2 OF 2)

- Gloves
  - Latex surgical gloves; Vinyl gloves; Polyurethane gloves; Nitrile gloves; Mechanic's gloves
- Bump Cap
- Hands, Jewelry, and Clothing

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**FIGURE 1-1** Safety glasses should be worn at all times when working on or around any vehicle or servicing any component.



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**FIGURE 1-2** Steel-toed shoes are a worthwhile investment to help prevent foot injury due to falling objects. Even these well-worn shoes can protect the feet of this service technician.



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**FIGURE 1-3** Protective gloves such as these vinyl gloves are available in several sizes. Select the size that allows the gloves to fit snugly. Vinyl gloves last a long time and often can be worn all day to help protect your hands from dirt and possible hazardous materials.



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**FIGURE 1-4** One version of a bump cap is this padded plastic insert that is worn inside a regular cloth cap.



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**FIGURE 1-5** Remove all jewelry before performing service work on any vehicle.



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### SAFETY TIPS FOR TECHNICIANS (1 of 3)

- When lifting any object, get a secure grip with solid footing.
  - Keep the load close to your body to minimize the strain. Lift with your legs and arms, not your back.
- Do not twist your body when carrying a load. Instead, pivot your feet to help prevent strain on the spine.

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### SAFETY TIPS FOR TECHNICIANS (2 OF 3)

- Ask for help when moving or lifting heavy objects.
- Push a heavy object rather than pull it.
- Always connect an exhaust hose to the tailpipe of any running vehicle to help prevent the buildup of carbon monoxide inside a closed garage space.

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### SAFETY TIPS FOR TECHNICIANS (3 OF 3)

- When standing, keep objects, parts, and tools with which you are working between chest height and waist height.
  - If seated, work at tasks that are at elbow height.
- Ask for help when pushing or vehicle or use a motorized pusher.

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**FIGURE 1-6** Always connect an exhaust hose to the tailpipe of the engine of a vehicle to be run inside a building.



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**FIGURE 1-7** A magnetic tray is a helpful item to keep tools needed up where they can be easily reached without having to bend over saving time and energy over the course of a long day in the shop.



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**FIGURE 1-8** An electric pusher used to push vehicles into or around the shop.



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## CLEANING METHODS AND PROCESSES

- There are four basic types of cleaning methods and processes used in vehicle service.
  - Power Washing
  - Chemical/Microbe Cleaning
  - Abrasive Cleaning
  - Thermal Ovens

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## ELECTRICAL CORD SAFETY (1 OF 2)

- Use correctly grounded three-prong sockets and extension cords to operate power tools.
  - Some tools use only two-prong plugs.
  - Make sure these are double insulated and repair or replace any electrical cords that are cut or damaged to prevent the possibility of an electrical shock.

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## ELECTRICAL CORD SAFETY (2 OF 2)

- When not in use, keep electrical cords off the floor to prevent tripping over them.
- Tape the cords down if they are placed in high foot traffic areas.

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## JUMP-STARTING AND BATTERY SAFETY

- To jump-start another vehicle with a dead battery, connect good-quality copper jumper cables or use a jump box.
- The last connection made should always be on the engine block or an engine bracket as far from the battery as possible.

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FIGURE 1-11 The air pressure going to the nozzle should be reduced to 30 PSI or less.



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## FIRE EXTINGUISHERS (1 OF 3)

- There are four classes of fire extinguishers.
  - Class A is designed for use on general combustibles, such as cloth, paper, and wood.
  - Class B is designed for use on flammable liquids and greases, including gasoline, oil, thinners, and solvents.
  - Class C is used only on electrical fires.

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## FIRE EXTINGUISHERS (2 OF 3)

- Class D is effective only on combustible metals such as powdered aluminum, sodium, or magnesium.
- The class rating is clearly marked on the side of every fire extinguisher.
- Many extinguishers are good for multiple types of fires.

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## FIRE EXTINGUISHERS (3 OF 3)

- Remember the word "PASS."
  - P Pull the safety pin.
  - A Aim the nozzle of the extinguisher at the base of the fire.
  - S Squeeze the lever to actuate the extinguisher.
  - S Sweep the nozzle from side to side.

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FIGURE 1–12 A typical fire extinguisher designed to be used on type class A, B, or C fires.



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## FIRE BLANKETS

- Fire blankets are required to be available in the shop areas.
- If a person is on fire, a fire blanket should be removed from its storage bag and thrown over and around the victim to smother the fire.



**FIGURE 1-14** A treated wool blanket is kept in this easy-to-open wall-mounted holder and should be placed in a centralized location in the shop.

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## FIRST AID AND EYE WASH STATIONS

- All shop areas must be equipped with a first aid kit and an eye wash station centrally located and kept stocked with emergency supplies.
  - First Aid Kit
  - Eye Wash Station



**FIGURE 1-15** A first aid box should be centrally located in the shop and kept stocked with the recommended supplies.

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## SUMMARY (1 OF 2)

- All service technicians should wear safety glasses that meet standard ANSI Z87.1.
- Ear protection should be worn anytime the noise level is at 90 decibels (dB) or higher.
- Safety should be exercised when working with electrical cords or when jump-starting another vehicle.

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## SUMMARY (2 OF 2)

- If a fire extinguisher is needed, remember: Pull the safety pin, aim the nozzle, squeeze the lever, and sweep the nozzle from side-to-side.

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