SECTION II

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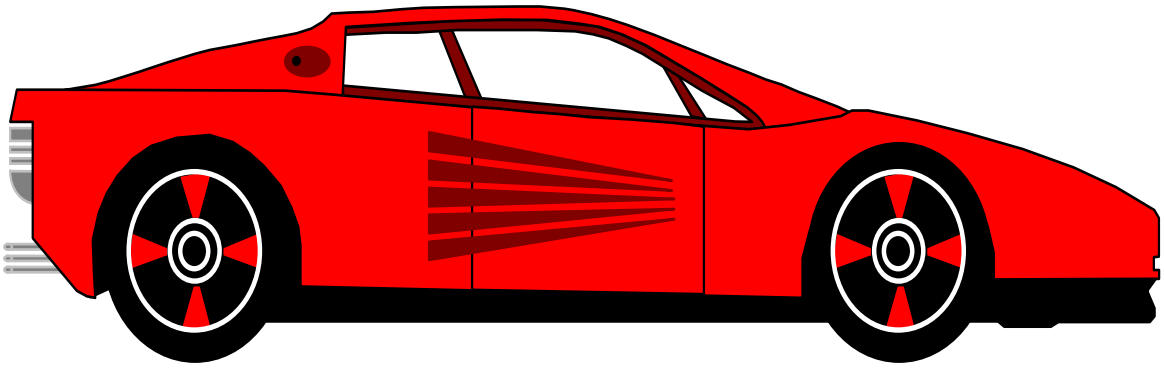
AUTOMOTIVE TECHNOLOGY



AUTOMOBILE MECHANIC
AUTOMOBILE TECHNICIAN

Safety is one aspect of the automotive repair industry that cannot be overemphasized. A good mechanic is a safe mechanic. If there is fast way or a safe way to do the job, take the safe way. Otherwise, you may not get the job done at all.

Listed below are some of the potential exposures and safety precautions that you will be confronted with.

GENERAL PRECAUTIONS

1. Oil or adjust moving parts only if authorized.
2. Use caution when working near the fan and belt.
3. Whenever possible, work with the engine switch in the “OFF” position.
4. The fan belt should be tightened only when the engine is stopped.
5. Always consider the engine and exhaust system to be “HOT.”
6. Do not pour gasoline from an open container into the carburetor.
7. Use extreme care when welding on vehicles—provide fire protection.
8. Do not work directly above another student.
9. Wait for the radiator to cool before removing the cap.
10. Make sure that hoods are secured in an open position when working on the engine.
11. WHEN “PULLING ENGINES” BE SURE THAT ROPES OR SLINGS ARE PROPERLY FASTENED. DON’T STAND OR LIE UNDER AN ENGINE OR TRANSMISSION FASTENED TO A CHAIN OR LIFTING STRAP. THE CHAIN/STRAP COULD FAIL AND YOU COULD BE CRUSHED.

PERSONAL HEALTH HAZARDS

1. Wear appropriate personal protecting equipment while spray painting. THIS INCLUDES SPRAY PAINT CANS.
2. Do not clean hands in solvent or gasoline. These materials are explosive and also can cause a skin rash.
3. Avoid back strain when it is necessary to lift parts from the engine. Crouch down and let your legs/thighs do the work.
4. Never place hands in front of a high-pressure grease gun.
5. Keep open wounds properly dressed and covered.
6. Eliminate loose clothing and confine long hair. (This includes chains and long earrings.)
7. Never spray compressed air into the skin or eyes. A FATAL INJURY COULD RESULT.
8. Wear safety glasses when under a vehicle. This will protect your eyes from falling debris—dirt, and, glass, metal, etc.
9. Wash hands and clothing frequently—this prevents skin problems and prevents tools from slipping out of your hands.

JACKING AND HOISTING

1. Do not jack up the vehicle if anyone is under it.
2. Jack stands must be used when working under vehicles. When using a hoist, it must have air/hydraulic backup controls and/or locks.
3. Avoid excessive shaking of the vehicle when on jack stands.
4. Have the instructor inspect the jack stand supports before students work under any vehicle.
5. Long jack handles are a serious tripping hazard and they should be barricaded or raised out of position.
6. Do not use bumper jacks.
7. Do not run an engine when the car is on the hoist or on jack stands.
8. Caution should be observed when lowering a vehicle.
9. Follow rules 1–8 when at home or on parking lots—not all jacking and hoisting accidents happen in the shop.

DRIVING AND LOCATING THE VEHICLE FOR WORK

1. Do not wear eye protection with restricted vision when driving a vehicle in the shop.
2. Only students with valid driver licenses and with the instructor's permission should drive vehicles.
3. Work should not be performed on vehicles parked in heavily traveled areas or on public thoroughfares.
4. Towing or pushing should be done only with instructor approval.
5. Have a fellow student guide you when parking a vehicle in a congested area.
6. Someone must be in the driver's seat of a vehicle when the engine is being started.
7. Reckless driving or "peeling-out" in the work area is forbidden and constitutes a major safety violation that could cause termination of your participation in the auto mechanic program.

GREASES, OILS, FUELS, AND SOLVENTS

1. Clean up all spills immediately and ventilate the area.
2. Use only approved solvents for cleaning parts. Do not use gasoline. Wear gloves when cleaning parts with solvents.
3. Be sure that there is proper ventilation before an engine is started.
4. Keep oil-soaked rags in approved rag waste containers.
5. Check fuel connections for leaks before starting an engine.
6. Keep flammable liquids in closed, approved containers.
7. Clean up all oil/fuel/solvent spots and/or spills before a "test" drive. Don't expect someone else to secure your mess.
8. Use drip pan for all vehicles stored overnight.

AIR PRESSURE

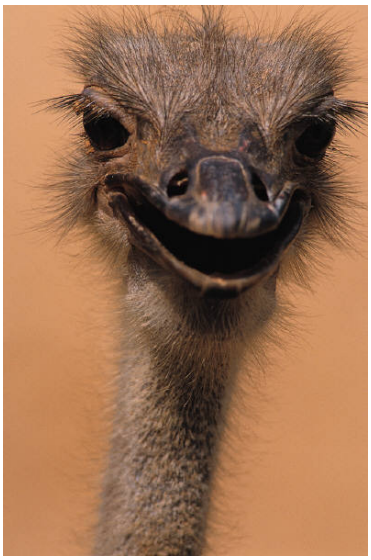
1. Use an air gauge when inflating tires. Do not over inflate tires.
2. When inflating truck tires that have a snap ring, the tire should be confined within an approved cage.
3. Never aim an air hose at another student or at yourself.

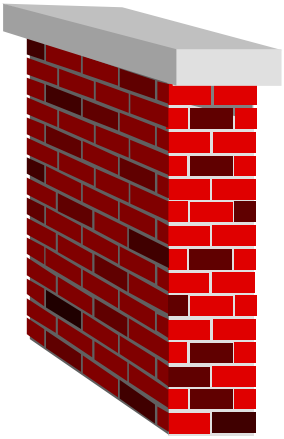
WRENCHES AND TOOLS

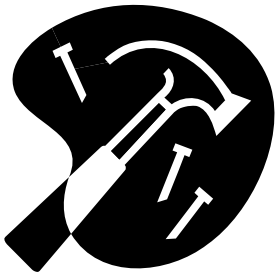
1. Keep all tools clean and free of oil and grease.
2. Keep tools picked up from the floor.
3. Make certain that wrenches fit properly
4. Hammers with loose handles should not be used.
5. Use tools only for the purpose for which they are designed—never use a file as a pry bar.
6. Creepers should be stood on end or stored in a rack when not in use.
7. Do not use chisels or punches with “mushroom” heads.
8. The palm of your hand is not a tool. Install wheel covers with a rubber mallet.

CARBON MONOXIDE

Carbon monoxide is a poisonous gas caused by incomplete burning of gasoline or other fuels. It is present in gaseous form when the engine is running. Even a small amount of carbon monoxide in your body can be fatal. That is why it is imperative that you never run an engine in a poorly ventilated area.







Don’t beat your ..... head against a brick wall—pick up tools when not in use.

COMPRESSED GAS—The most commonly used gases for cutting and welding are oxygen and acetylene. However, you may also be using hydrogen, nitrogen, Maap gas, argon, helium, Freon, ammonia, propane (liquefied petroleum gas), carbon dioxide, or sulphur dioxide in some of your projects.

To use them safely you need to know their characteristics and be sure you are using the right bottle. There is no standard color code for compressed gas bottles! **Read the labels.**

Treat compressed gas cylinders with the greatest respect. There is an immense amount of power in each cylinder. Careless handling resulting in valve or cylinder damage can produce instant death for you or your friends. Use a cart or hand truck for moving cylinders.

FLAMMABLE GASES—Acetylene, hydrogen, propane, and Maap gas are highly flammable. They are normally handled in compressed gas cylinders or tanks. Acetylene is dissolved in acetone (Maap gas and propane are liquefied by pressure), so it is especially important that these cylinders be kept upright when in use.

They will all form violently explosive mixtures with air or oxygen, so valves, regulators, hoses and other equipment must be tight and in good repair. **Shut off valves and regulators when they are not in use!**

Store spare flammable gas cylinders in a well-ventilated location, separated by a fire resistant barrier—preferably outside.

All gas cylinders must be secured and stored erect at all times. When storing or moving, **cylinder caps must be in place.** Students should not move cylinders unless secured to carts.

OXYGEN—For shop use, this gas is in a class by itself. It will combine with many common materials and under the right conditions will cause these materials to burn violently or to explode. Oxygen under high pressure can cause oils to explode. **NEVER USE OIL ON ANY OXYGEN VALVE OR REGULATOR EQUIPMENT!**

NONFLAMMABLE GASES—these include nitrogen, argon, helium, Freon, sulphur dioxide, and to some extent ammonia, which is flammable only in high concentrations. Some are odorless, and others (sulphur dioxide, ammonia) have extremely strong odors. None will support life, so adequate ventilation of the use is essential. Read up on the specific characteristics and detailed safety precautions for the gas you will use and discuss them with your instructor before proceeding.

Auto Shop Safety—Privately Owned Vehicle Repairs

Many school districts have auto shop classes in which students make repairs to vehicles owned by students, community members, and/or the district. These activities can create liability exposures for school districts. The following information can help reduce the frequency and/or severity of losses associated with auto shops.

Security

If the school district auto shop class agrees to repair another person's vehicle, then the district must take reasonable steps to ensure that the automobile is stored safely. The district has *care, custody,* and *control* of the vehicle. To prevent vandalism or theft of the vehicle, the following steps are recommended:

- Lock all the vehicle doors.
- Secure the vehicle within a locked garage or locked fenced area.
- Ensure that the owner has removed all personal property from the vehicle.

Key Control

The teacher is responsible for collecting all vehicle ignition keys and securing them. Students should not have access to vehicle ignition keys. Auto shop teachers should:

- Keep the keys to all vehicles in a locked area under their control
- Keep a log of the keys checked out to students for vehicle repair during class, and ensure all keys are collected at the end of class.

Customer Repair Authorization Forms

Vehicle repairs in auto shop class expose the school district to product liability claims. If a customer suffers an accident and can prove the cause of the accident was mechanical failure due to negligent repair, the district may be liable. For this reason, it is strongly recommended that auto shop classes do not perform brake repairs.

To limit exposure, include the following in all customer repair authorization forms:

- Before any vehicle repair work ensues, *inform* the customer that high school students will make repairs.
- *Require* the customer to provide written authorization for auto shop class repairs.
- *Ensure* that **NO EXPRESS OR IMPLIED WARRANTY** is given. *Require* that the customer accepts vehicle repair **AS IS.**
- *Include* a statement that the district does not assume liability for loss or theft of personal property.