

Understanding the parts and construction of a vehicle, as simple or as complex as it may sometimes seem, will help in the understanding of automobile repairs for property damage, and often even more important, the evaluation of liability for automobile accidents, and the extent of bodily injury. In this short chapter, we will focus only on the major body parts involved in the construction of a motor vehicle.

## **Body**

The “body” of a vehicle refers to the outer shell. The body is made up of the following components:

**Front End:** Includes the front bumper, grille, radiator, front headlamps, hood, and right and left front fenders, etc.



**Rear Body:** Includes the rear bumper, brake lights, trunk/liftgate, rear edge of the quarter panels, etc.

**Quarter Panels:** Panels on both sides of the vehicle between the rear doors and trunk.

**Doors:** Vehicle doors are mounted on a hinge or a track (as seen in minivans). The door frame consists of the skeleton of the door to which the door skin and trim are attached and the door aperture, or opening within which the door fits.



**Roof:** The portion of a vehicle that sits above the passenger component, protecting the vehicle and occupants from external elements. The roof is connected to the vehicle’s frame by roof braces.

**Bumpers:** Bumpers are structures that are attached to the front and rear portions of a vehicle designed to absorb impact during a collision thereby decreasing damage to the vehicle and injury to the occupants. Today’s bumpers typically consist of a reinforcement bar made of steel, aluminum, fiberglass composite or plastic and a plastic cover.

**Urethane (or Polyurethane):** Polyurethane is a popular material used in body kit parts (such as bumpers). Polyurethane is more flexible than fiberglass and less likely to crack or break apart than plastic.

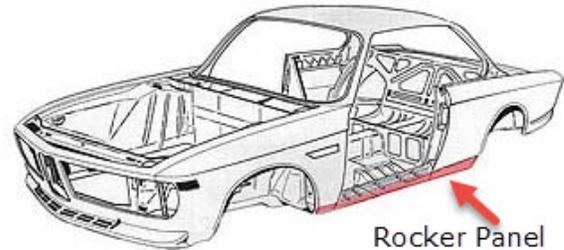
**Lamps:** The four main types of lamps or lights found on an automobile are the headlamps, rear lamps, fog lamps, and interior lights.

- **Headlamps:** The headlamps provide frontal illumination and include the low beams and the high beams (otherwise referred to as “brights”).
- **Rear Lamps:** The rear lamps provide illumination at the rear of the vehicle and also include the brake lights.
- **Fog Lamps:** An auxiliary light located below the headlights, used to improve road visibility during foggy, rainy or snowy conditions
- **Interior Lights:** LED lights providing illumination inside the vehicle

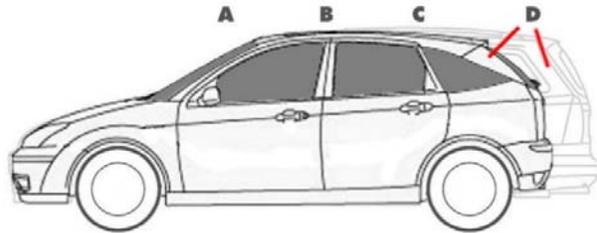
**The Cowl:** The front portion of a vehicle's frame, located between the engine firewall and the front of the dash panel. The cowl supports the rear of the hood, windshield, dashboard, pedals and instrument panel and separates the passenger compartment from the engine.

**The Floorpan:** A large piece of sheet metal that forms the floor of a vehicle and the position of its external and structural panels. The floorpan is the foundation of most of the structural and mechanical components of a unibody vehicle.

**Rocker Panels:** A rocker panel is a stamped steel piece that is located along both sides of the vehicle between the front and rear wheel well openings, just below the doors. Besides the roof supports, they are the only part of the frame connecting the front and rear of the vehicle together.



**Pillars:** The pillars are vertical supports located in the vehicle's window area. They are designated respectively as the A, B, C or (in larger vehicles) D pillars, moving from the front to the rear of the vehicle. The A-pillar supports the windshield. The B-pillar is located behind the front door and near the middle of the side of the roof. The C-pillar supports the rear window.



On longer vehicles, the D-pillar supports the rear window, with the C-pillar providing additional support between the B and D-pillars.

### Substructure

**Frame:** The frame is the main supporting structure or the "skeleton" of a vehicle to which all other components are attached. It supports the engine and body of the vehicle and is supported by the wheels.

**Unibody:** The most common design in today's vehicles, unibody construction consists of a single molded unit that integrates the vehicle's frame and body work.

### Mechanical

**Engine:** The engine or motor is a machine designed to convert one form of energy into mechanical energy. Internal combustion engines burn fuel to create heat, which in turn creates force.

**Cooling System:** The cooling system controls the temperature of the engine to prevent overheating by transferring heat to the air. Another function of the cooling system is to allow the engine to heat up as quickly as possible as a cold engine wears out components faster and is less efficient. The cooling system then maintains the engine's temperature at the optimum temperature for vehicle performance. The cooling system is comprised of the following components:

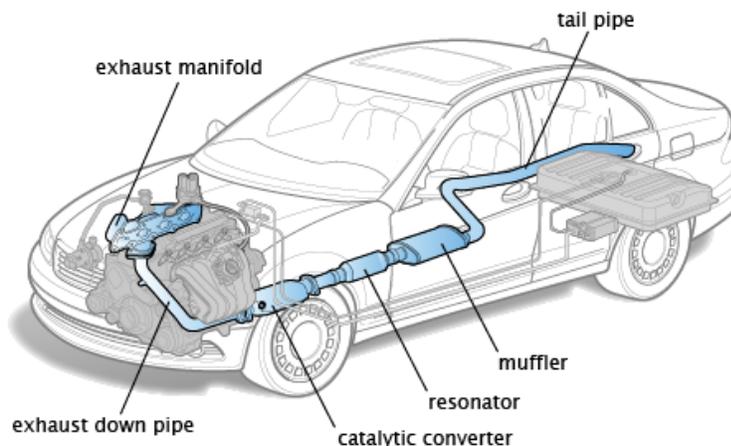
- **Radiator:** The main part of the cooling system. It is a flattened sheet of aluminum and its function is to lower the temperature of the hot coolant that passes from the engine and send it back to the engine through hoses, the thermostat and water pump.

- **Radiator Fan:** Designed to cool the engine system and draw air into the radiator to prevent the engine from overheating.
- **Water Pump:** Draws cooled water or coolant from the radiator through the thermostat, passing it to the engine with a constant velocity to prevent the engine from overheating.
- **Thermostat:** A critical component in cooling the engine and maintaining a minimum operating temperature. It closes when the engine is cold, allowing it to warm up and opens to pass the coolant when the minimum operating temperature is reached.
- **Pressure Cap:** Also known as the radiator cap. It is designed to maintain the pressure in the cooling system and helps avoid unnecessary boiling of the coolant.

**Fuel System:** The fuel system stores fuel for current use and delivers it as needed to the cylinder chamber for combustion. The fuel system includes the fuel tank which stores the gasoline or diesel fuel, the fuel pump which draws the fuel from the tank and delivers it through the fuel line to the cylinder chamber. A fuel filter is placed before and/or after the fuel pump to keep the fuel injector or carburetor from clogging as it runs through the fuel line.

**Electrical System/ Computers:** The battery and all wires and electrically operated components of the vehicle. The electrical system is necessary to provide the electricity to start the engine and ignite the fuel and also operates components including, but not limited to, the lights, radio and air conditioner.

**Exhaust System:** The main purpose of the exhaust system is to guide the burned exhaust gasses away from the engine through a series of pipes and expels them into the atmosphere. An integral part of the exhaust system is the catalytic converter which takes these harmful emissions and converts them into less harmful ones, thereby decreasing pollution. The muffler reduces the sound of the engine.



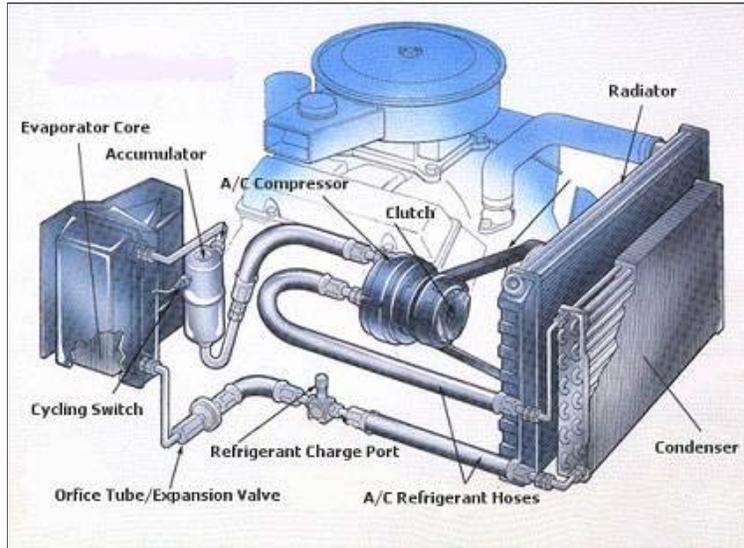
### Heating and Air Conditioning Systems:

**Heating System:** The heater core is a small radiator located in the dashboard of the vehicle. It receives heated coolant from the engine and blows warm air into the passenger compartment.

**Air Conditioning:** In addition to cooling the vehicle's cabin the air conditioner also cleans and dehumidifies the air entering the vehicle. The compressor sends refrigerant vapor under high pressure and high heat to the condenser. The condenser changes this high-pressure refrigerant vapor into a liquid. The condenser is located

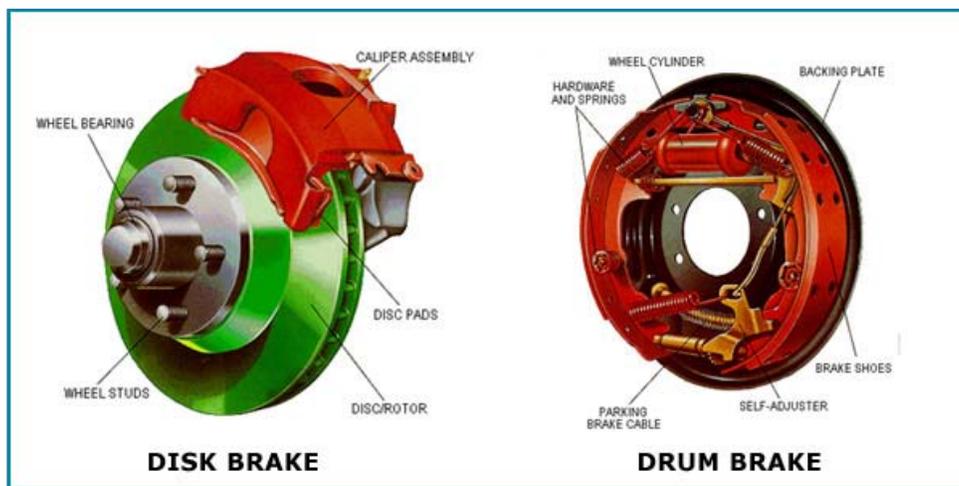
ahead of the vehicle's radiator and when the vehicle moves, air flowing through the condenser removes heat from the refrigerant, changing it to its liquid state.

Liquid refrigerant circulates to the expansion valve. This valve removes the pressure so that the refrigerant can expand and return to a vapor in the evaporator. The evaporator then cools the low-pressure vapor and sends cool air into the passenger compartment via a blower fan.



**Brakes/ABS:**

**Hydraulic Brakes:** A hydraulic brake circuit has fluid-filled cylinders that are connected by pipes. When the brake pedal is depressed, it pushes on a piston in the master cylinder which forces brake fluid along the pipe. That fluid travels to cylinders at each wheel and fills them, forcing pistons out to apply the brakes.



**Anti-lock Brake System (ABS):** A safety system designed to prevent the wheels from locking up and losing traction to uncontrolled skidding.

**Steering System:** The steering system converts the rotation of the steering wheel into a swiveling motion of the road wheels, allowing the driver to use light forces to steer a heavy vehicle. The two most common types of steering systems are “rack and pinion” and the “steering box” systems. Power steering may be used by either type to reduce the effort required of the driver.

**Suspension System:** A system of springs or shock absorbers that connect the wheels and axles to the vehicle’s frame. This system is designed to absorb shock and maintain friction between the wheels and the road.

**Transmission:** The purpose of a vehicle’s transmission is to ensure that the appropriate amount of power is delivered to the wheels to drive at a given speed. A manual transmission is operated manually with a gear lever and a clutch pedal and works similarly to a bicycle’s gear shifter. When the clutch is depressed, it disconnects the engine and the transmission. The gear lever is then used to adjust to the desired gear. Once the vehicle is in the new gear, the clutch is released. An automatic transmission completes this action without the assistance of the driver. The automatic transmission has a torque converter that senses changes in speed and automatically shifts the vehicle into the appropriate gear.

**Airbags/SRS/Seatbelts:** Seatbelts are the primary safety restraint system in a vehicle. Seatbelts are designed to stop your body from hitting or going through the windshield in a collision. Airbags are considered a “supplemental restraint system” or SRS. Airbags deploy when there is a collision force equal to hitting a brick wall at 10-15 miles per hour. The airbags inflate instantly to protect the driver or passengers (for vehicles that have passenger side airbags) from hitting the steering wheel, dashboard or windshield.

**Glass:** The two types of glass used on vehicles are Laminated Safety Glass and Tempered Safety Glass. Laminated Safety glass consists of a double layer of glass with a thin sheet of vinyl in between, making the glass “shatterproof”. This is the type of glass used for windshields. Tempered safety glass is used on the side and rear windows. Upon impact, this glass disintegrates into small, dull-edged pieces as opposed to sharp, jagged pieces that may injure occupants.

**Interior:** A vehicle’s interior includes the seats, door/trim panels, instrument panel, airbags, window encapsulation and more.

**Paint:** A vehicle’s paint not only makes the vehicle visually attractive but also serves to protect the metal body of the vehicle.

Here are a few practice questions on issues you will want to remember:

**IDENTITY THEFT – QUIZ**

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1.
  - a)
  - b)
  - c)
  - d)

2.

- a)
- b)
- c)
- d)

3.

- a)
- b)
- c)
- d)

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- a)
- b)
- c)
- d)

5.

- a)
- b)
- c)
- d)

**END QUIZ**

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