

VESL Automotive – Lesson 1 (Part B)

(Based on textbook of "Modern Automotive Technology" by James E. Duff published in 2000)

Textbook Summary (pp. 1-19)

1. A **part** is the smallest removable item on a car.
2. The word **component** is usually referring to an electrical or electronic part.
3. An **assembly** is a set of fitted parts designed to complete a function.
4. An automotive **system** is a group of related parts and assemblies that perform a specific job.
5. Automotive parts and systems can be organized into 10 major categories, which are (1) Body and frame, (2) Engine, (3) Computer systems, (4) Fuel system, (5) Electronic systems, (6) Cooling and lubrication systems, (7) Exhaust and emission control systems, (8) drive train systems, (9) Suspension, steering, and brake systems, and (10) Accessory and safety systems.
6. **Body and frame** support and enclose the vehicle.
7. The **vehicle body** includes the sheet metal, plastic, or fiberglass parts that form the passenger compartment and serve as an attractive covering for the chassis.
8. The **chassis** generally includes everything but the body; in other words, the chassis includes engine, suspension, steering, brakes, wheels, tires, etc.
9. The **frame** is a very strong metal structure that supports various vehicle components.
10. Automobiles are available in several body types, including the sedan, hardtop, convertible, hatchback, and station wagon.
11. A **sedan** is a car that has a front and back seats and will carry four to six people. It has center body pillars, which are also called "B" pillars.
12. A **hardtop** is similar to the sedan, but it has no "B" pillars.
13. A **convertible** has a vinyl or cloth top that can be raised and lowered.
14. A **hatchback**, or **liftback**, has a large rear door for easy access when hauling items.
15. A **station wagon** has a long, straight roof that extends to the rear of the vehicle.
16. The **minivan** is similar to the station wagon, but it has a higher roofline for more headroom and cargo space.
17. **Sport-utility vehicles** are often equipped with four-wheel-drive systems and have a tall body design.
18. **Engine** provides dependable, efficient power for the vehicle.
19. **Fuel system** provides a combustible air-fuel mixture to power the engine.
20. The engine provides the energy to propel (move) the vehicle and operate the other systems.
21. Most engines consume **gasoline** or **diesel** fuel.
22. The fuel burns in the engine to produce heat.
23. The heat causes gas expansion, creating pressure inside the engine.
24. The pressure moves internal engine parts to produce the power.
25. Automotive engines are a **multi-cylinder engine**, which means they have more than one piston and cylinder.
26. Vehicles commonly have 4-, 6-, 8-, or 10-cylinder engines.
27. The **cylinder** is a round hole bored (machined) in the block. It guides piston movement.
28. The **block** is metal casting that holds all the other engine parts in place.
29. The **piston** is a cylindrical component that transfers the energy of combustion to the crankshaft.
30. **Computer systems** monitor and control various vehicle systems.
31. Three major parts of automotive computer systems are (1) Sensors, (2) Control module, and (3) Actuators.
32. **Sensors** input devices that can produce or modify electrical signals indicating a change in a condition, such as speed, temperature, pressure, etc.
33. **Control module** is the "brain" of the computer system that uses signals from input devices to control various output devices.
34. **Actuators** serve as the "hands and arms" of the computer system, which carry out commands from the control module.
35. **Electrical system** generates and/or distributes the power needed to operate the vehicle's electrical and electronic components.
36. Electrical system consists of several subsystems or smaller circuits including ignition system, starting system, charging system, and lighting system.
37. An **ignition system** is needed on gasoline engines to ignite the air-fuel mixture. It produces an extremely high voltage surge, which operates the **spark plugs**.

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38. The **starting system** has a powerful electric starting motor that rotates the engine crankshaft until the engine "fires" and runs on its own power.
39. A **battery** provides the electricity for the starting system.
40. The **charging system** is needed to replace electrical energy drawn from the battery by the other electric systems..
41. The **lighting system** consists of the components that operate a vehicle's interior and exterior lights.
42. The **exterior lights** typically include the headlights, turn signals, brake lights, parking lights, backup lights, and side marker lights, and tail lights.
43. The **interior lights** include the dome light, trunk light, instrument panel lights, and other courtesy lights.
44. **Cooling and lubrication systems** prevent engine damage and wear by regulating engine operating temperature and reduce friction between internal engine parts.
45. The **cooling system** removes excess combustion heat to prevent engine damage and also speeds engine warm-up.
46. The **water pump** forces **coolant**, which is a water and antifreeze solution, through water jackets in the engine, hoses, and radiator.
47. The **radiator** allows the coolant heat to transfer into the outside air.
48. An **engine fan** draws cool air through the radiator.
49. The **thermostat** controls coolant flow and engine temperature.
50. The lubrication system reduces friction and wear between internal engine parts by circulating filtered engine oil to high-friction points in the engine.
51. **Exhaust and emission control systems** quiet engine noise and reduce polluting gases emitted by the vehicle.
52. The **exhaust system** quiets the noise produced during engine operation and routes engines exhaust gases out the rear of the vehicle.
53. Various **emission control systems** are used to reduce the amount of polluting gases produced by an engine.
54. **Drive train systems** transfer power from the engine to the drive wheels.
55. The drive train parts commonly found on a front engine, rear-wheel-drive vehicle include the clutch, transmission, drive shaft, and rear axle assembly.
56. The **clutch** allows the driver to engage or disengage the engine and manual transmission or transaxle.
57. The **transmission** uses various gear combinations, or ratios, to multiply engine torque to accommodate driving conditions.
58. Low gear ratios allow the vehicle to accelerate quickly.
59. High gear ratios permit lower engine speed, providing good gas mileage.
60. A **manual transmission** uses gears and shafts to achieve various gear ratios. It lets the driver change gear ratios to better accommodate driving conditions..
61. An **automatic transmission** uses an internal hydraulic system and electronic controls to shift gears; therefore, it does not need to be shifted by the driver.
62. The **drive shaft**, or propeller shaft, transfers power from the transmission to the rear axle assembly.
63. The **rear axle assembly** contains a differential and two axles.
64. The **differential** is a set of gears and shafts that transmit power from the drive shaft to the axles.
65. The **transaxle** consists of a transmission and a differential in a single housing.
66. **Suspension, steering, and brake systems** support and control the vehicle.
67. The **suspension system** allows the vehicle's wheels and tires to move up and down with little effect on body movement.
68. The **steering system** allows the driver to control vehicle direction by turning the wheels right or left.
69. The **brake system** produces friction to slow or stop the vehicle.
70. **Accessory and safety systems** increase occupant comfort, safety, security, and convenience.
71. The common **accessory systems** include the air conditioner, sound system, power seats, power windows, and rear window defogger.
72. Common **safety systems** include seat belts, air bags, and security systems.

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