第3版

交通运输专业英语

普通高等教育交通类专业规划教材

陈焕江　主编

机械工业出版社
CHINA MACHINE PRESS

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本书以公路交通运输为主线，系统选编了有关汽车构造、车辆与环境、交通安全、运输管理和车辆、交通运输工程、物流管理6个单元的英语课文共38篇，对每篇课文中的部分长、难句进行了英译汉翻译，对其中的语法特点和语法难点作了较详细的分析或注释，对常用英译汉翻译技巧进行了简要介绍，并附有生词解释和词汇表。

本书为普通高等教育交通类专业规划教材，既可作为高等院校交通运输（汽车运用工程）和其他相关专业“专业英语”课程的教材，也可供具有一定英语基础的交通运输和管理部门的技术人员和管理人员参考。

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前　言

普通高等教育交通类专业规划教材《交通运输专业英语》的第1版和第2版分别于2002年6月和2008年1月出版，且在全国许多高等院校的交通运输（汽车运用工程）专业和其他相关专业的教学中得以广泛应用，累计重印十余次。

《交通运输专业英语》（第3版）的课文内容仍以公路交通运输为主线，涵盖汽车构造、车辆与环境、交通安全、运输管理和车辆、交通运输工程、物流管理；课文难度与公共英语相衔接，且由浅入深；其教学目标侧重于：扩大专业词汇量，熟悉科技英语文献常用句型、篇章结构、表达方法，提高分析和翻译长、难句和阅读英语专业文献的能力。在保持《交通运输专业英语》第1版和第2版的结构框架、内容框架和基本优点的基础上，《交通运输专业英语》（第3版）在以下方面进行了修订更新：

①调整更换了第1单元 汽车构造（Unit One Structure of Automobile）的大部分课文，以使课文内容反映现代汽车的技术特点。

②新增第5单元 交通运输工程（Unit Five Transportation Engineering），以使本书内容更完整。

③调整合并或去掉了其他几个单元的一些课文。

④对第2版课文中的注释和生词解释作了部分修改，使之更便于理解。

《交通运输专业英语》（第3版）由陈焕江主编，参加编写的还有邱兆文、王来军、肖梅、陈昊、沈小燕、朱彤、马壮林、徐婷、彭朝林、何天仓等。在编写本书过程中，参阅了国内外许多有关书籍、文献、资料，在此向它们的作者表示衷心感谢。

恳请读者对本书的内容和章节安排等提出宝贵意见，并对书中存在的错误及不当之处提出批评和修改建议，以便本书再版修订时参考。

编　者

Contents

Unit One Structure of Automobile

Lesson 1 Fundamentals of Automobile

Today's average car contains more than 15,000 separate, individual parts that must work together. Fig. 1.1 shows the major systems of a vehicle. These parts can be grouped into the following major categories:

- Body and frame—support and enclose the vehicle.
- Engine—provides dependable, efficient power for the vehicle.
- Computer systems—monitor and control various vehicle systems.
- Fuel system—provides a combustible air-fuel mixture to power the engine.
- Power-supply system—generates and/or distributes the power needed to operate the vehicle's electrical and electronic components.
- Cooling and lubrication systems—prevent the engine from damage and wear by regulating engine operating temperature and reducing friction between internal engine parts[1].
- Exhaust and emission control systems—quiet engine noise and reduce toxic substances emitted by the vehicle.
- Drive train systems—transfer power from the engine to the drive wheels.
- Suspension, steering, and brake systems—support and control the vehicle.
- Accessory and safety systems—increase occupant comfort, safety and convenience.

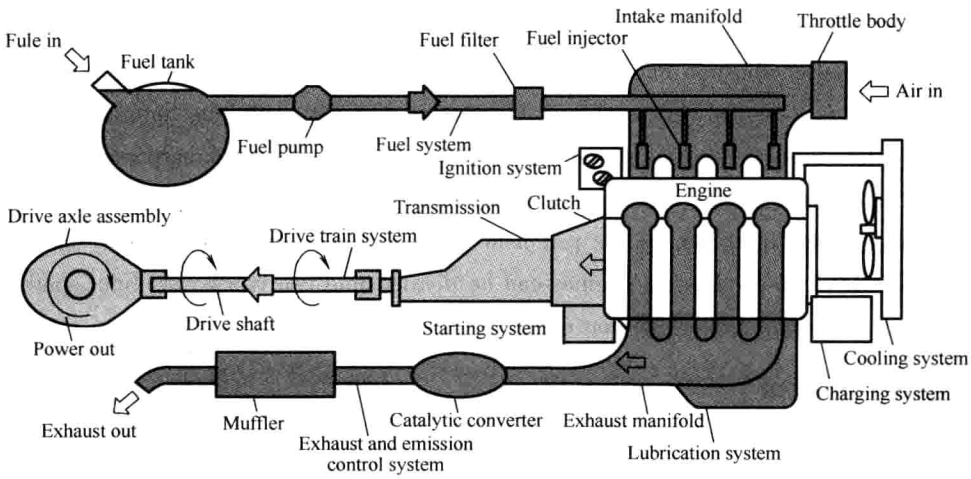

Fig. 1.1 General location of the major vehicle systems

1. Frame, Body and Chassis

The body and frame are the two largest sections of a motor vehicle. The frame is the strong metal structure that provides a mounting place for the other parts of the vehicle. The frame holds the engine, transmission, suspension, and other assemblies in position.

An automobile body is a sheet metal shell with windows, doors, a hood, and a trunk deck built into it. It provides a protective covering for the engine, passengers and cargo. The body is designed to keep passengers safe and comfortable. The body styling provides an attractive, colorful, modern appearance for the vehicle.

The term chassis is often used when referring to a vehicle's frame and everything mounted to it except the body[2]. It includes tires, wheels, engine, transmission, drive axle assembly, and frame, as shown in Fig. 1.2.

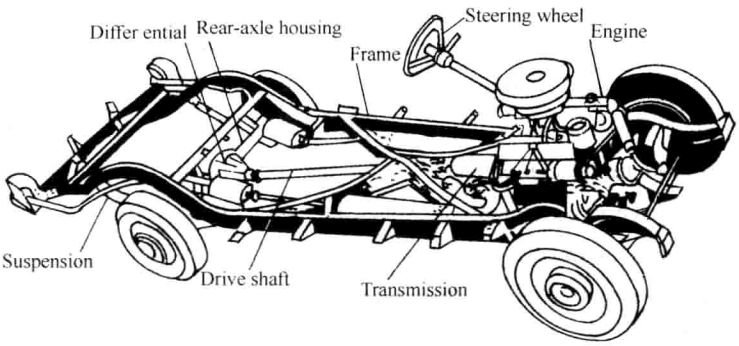

Fig. 1.2 Chassis of a car

2. Engines

The engine acts as the power unit, which is designed to convert energy into useful mechanical motion. The internal-combustion engine (ICE) is widely used in modern automobile. The internal-combustion engine is a device used to convert the chemical energy of the fuel into heat energy, and then to convert this heat energy into usable mechanical energy[3]. The working process includes four strokes, which are intake stroke, compression stroke, power stroke and exhaust stroke. In practical work, the reciprocating movement of the piston in the cylinder is converted to rotary motion of the crankshaft. The internal-combustion engines can be divided into two types: gasoline (spark-ignition engine) and diesel (compression-ignition engine).

3. Computer System

The computer system uses electronic and electrical devices to monitor and control various systems in the vehicle, including the fuel, ignition, drive train, safety and security systems[4]. The use of computer systems has improved vehicle efficiency and dependability. Three major parts are included in the computer system: sensors, control module and actuators.

4. Fuel System

The fuel system must provide the correct mixture of air and fuel for efficient combustion. This system must add the right amount of fuel to the air entering the cylinders, and alter the air-fuel ratio with changes in operating conditions[5]. There are three basic types of automotive fuel systems: gasoline injection system, diesel injection system and carburetor system.

5. Electrical System

The vehicle's electrical system consists of several subsystems (smaller circuits): ignition system, starting system, charging system and lighting system. Each sub-system is designed to perform a specific function, such as fire the spark plugs to ignite the engine's fuel mixture, rotate the crankshaft to start the engine, illuminate the highway for safe night driving, etc[6].

- An ignition system is needed on gasoline engines to ignite the air-fuel mixture. It produces an extremely high voltage to operate the spark plugs, which can fire air-fuel mixture at the correct time, thus to produce power.
- The starting system has a powerful electric starting motor that rotates the engine crankshaft until the engine fires and runs on its own power.
- The charging system is needed to replace electrical energy drawn from the battery during starting systems operation. To re-energize the battery, the charging system forces electric current back into the battery.
- The lighting system consists of the components that operate a vehicle's interior and exterior lights (fuses, wires, switches, relays, etc).

6. Cooling and Lubrication Systems

The cooling and lubrication systems are designed to prevent engine from damage and wear. The cooling system maintains a constant engine operating temperature. It removes excess combustion heat to prevent engine damage and also speeds engine warm-up.

The lubrication system reduces friction and wear between internal engine parts by circulating filtered engine oil to high-friction points in the engine. It also helps cool the engine by carrying heat away from internal engine parts.

7. Exhaust and Emission Control Systems

The exhaust system quiets the noise produced during engine operation and routes engine exhaust gases to the rear of the vehicle body.

An automobile exhaust system comprises of various devices or parts of an automotive engine, which are used for discharging burned gases or steam. The exhaust system consists of tubing, which is usually used for emitting out waste exhaust gases with the help of a controlled combustion taking place inside an automobile engine[7]. All the burnt gases are exhaled from an engine using one or more exhaust pipes. These gases are expelled out through several devices like cylinder head, ex-

haust manifold, turbocharger, catalytic converter, muffler and silencer.

The emission control systems are used to reduce the amount of toxic (poisonous) substances produced by an engine. Some systems prevent fuel vapors from entering the atmosphere (air surrounding the earth). Other emission control systems remove unburned and partially burned fuel from the engine exhaust.

8. Drive Train System

The drive train transfers turning force from the engine crankshaft to the drive wheels. The drive train parts (Fig. 1.3) commonly found on a front-engine, rear-wheel-drive vehicle include the clutch, transmission, drive shaft, and rear axle assembly, and the drive train parts used on most front-engine, front-wheel-drive vehicles include the clutch, transaxle, and drive axles[8].

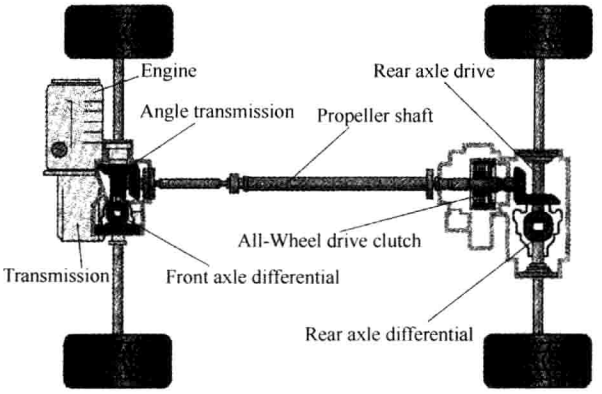

Fig. 1.3 Drive train components

9. Suspension, Steering and Brake Systems

The suspension, steering, and brake systems are the movable parts of the chassis.

The axles and wheels are isolated from the chassis by a suspension system. The basic job of the suspension system is to absorb the shocks caused by irregular road surfaces that would otherwise be transmitted to the vehicle and its occupants, thus helping to keep the vehicle on a controlled and level course, regardless of road conditions[9].

The steering system, under the control of the driver at the steering wheel, provides the means by which the front wheels are directionally turned. The steering system may be power assisted to reduce the effort required to turn the steering wheel and make the vehicle easier to manoeuvre.

The braking system on a vehicle has three main functions. It must be able to reduce the speed of the vehicle, when necessary; it must be able to stop the car in as short a distance as possible; it must be able to hold the vehicle stationary. The braking action is achieved as a result of the friction developed by forcing a stationary surface (the brake lining) into contact with a rotating surface (the drum or disc). Each wheel has a brake assembly, of either the drum type or the disc type, hydraulically operated when the driver applies the foot brake pedal[10].

New Words

category [ˈkætigəri] n. 种类，类别，范畴
combustible [kəmˈbʌstəbl] a. 易（可）燃的
distribute [disˈtribju:t] vt. 分配，分发，散布
lubrication [ˌlu:briˈkeiʃən] n. 润滑
exhaust [igˈzɔ:st] v. ; n. 排出；排气（口），废气
emission [iˈmiʃən] n. 排放，排出物
drive train system 传动系统
suspension [səsˈpenʃn] 悬架
occupant [ˈɔkjəpənt] n. 占有者，乘员
accessory [ækˈsesəri] a. ; n. 附属的，次要的；附件，附属装置
chassis [ˈʃæsi] n. 底盘
hood [hud] n. 罩
trunk deck 行李箱盖
transmission [trænzˈmiʃən] n. 传送，传动系，变速器
assembly [əˈsembli] n. 装配，总成
differential [ˌdifəˈrenʃl] a. ; n. 差异的；差别，差速器
steering wheel 方向盘
stroke [strəuk] n. 冲程，行程
intake [ˈinteik] n. ; v. 进气；吸入
compression [kəmˈpreʃən] n. 压缩，压力，加压
reciprocate [riˈsiprəkeit] v. 往复运动，交替
module [ˈmɔdju:l] n. 单元，组件
actuator [ˈæktjueitə] n. 激励器，执行机构
injection [inˈdʒekʃən] n. 喷射，注射，射入
carburetor [ˈkɑ:bjuretə] n. 化油器
charge [tʃɑ:dʒ] v. ; n. 装料，充电；电荷，充量
spark plug 火花塞
crankshaft [ˈkræŋkʃɑ:ft] 曲轴
energize [ˈenəˌdʒaiz] v. 激励，通电流，给能量
discharge [disˈtʃɑ:dʒ] v. ; n. 卸料，放出，放电
exhale [eksˈheil] v. 呼出，发出
manifold [ˈmænifəuld] a. ; n. 多样的，许多的；歧管，支管
turbocharger [ˈtəbəutʃɑ:dʒə] n. 涡轮增压器
catalytic [ˌkætəˈlitik] a. 催化的
catalytic converter 催化转化器
muffler [ˈmʌflə] n. 消声器
clutch [klʌtʃ] n. 离合器

transaxle	[træns'æksl]		变速驱动桥
manoeuvre	[mə'nu:və]	n. ; v.	动作，操纵
stationary	['steiʃənəri]	a. ; n.	不动的，静止的；固定物

Notes to the Text

[1] prevent engine from ... between internal engine parts.

通过调节发动机工作温度及降低内部零件的摩擦防止发动机损坏和磨损。

句中 by 引导的短语作方式状语。

[2] The term chassis is often used when referring to ... except the body.

汽车车架及装于其上的除车身外的所有部件通常称为底盘。

句中 referring to 意为“涉及”“表示”；when 引导的短语作时间状语。

[3] The internal-combustion engine is a device used to ... usable mechanical energy.

内燃机是用于把燃油的化学能转化为热能，再将其转化为有用的机械能的装置。

句中 used to ... 作 a device 的定语；and 表示并列关系；后一个定语中的 used 省略。

[4] The computer system uses ... safety and security systems.

计算机系统采用电子和电气装置监控汽车的各个系统，包括：燃油、点火、传动、安全等系统。

句中分词短语 including ... 作补充说明。

[5] This system must add the right amount of fuel ... in operating conditions.

这个系统必须把适量燃油添加到进入气缸的空气中，随着运转工况的变化改变空燃比。

[6] Each sub-system is designed to perform ... for safe night driving, etc.

每个子系统用于完成特定功能，例如：使火花塞产生火花点燃发动机的燃油混合气，使曲轴旋转起动发动机，照亮公路保障晚间安全行驶，等等。

句中 designed to ... 意为“用来……”“设计成能……”“目的是使……”。

[7] Exhaust system consists of ... taking place inside an automobile engine.

排放系统由管道装置构成，借助于发生在发动机内部的可控燃烧向外排出废气。

句中 which 引导的从句为修饰 tubing 的定语从句；with the help of ... 意为“借助于……”“在……帮助下”。

[8] The drive train parts (Fig. 1.3) commonly found on ... transaxle, and drive axles.

发动机前置后轮驱动汽车传动系通常包括离合器、传动轴、后轴总成等部件；而大多数发动机前置、前轮驱动汽车的传动系包括离合器、变速驱动桥和驱动轴等部件。

该长句为 and 连接的并列复合句。

[9] The basic job of the suspension system ... regardless of road conditions.

悬架系统的基本作用是吸收由不规则路面引起的振动，从而有助于使车辆保持在一个受控的水平方向上，否则振动将传至车辆和车辆上的乘员。

句中 that 引导的从句为与现在事实相反的虚拟的条件句，作 the shocks 的分隔定语；现在分词短语 thus helping ... 表示结果；keep one's course 意为“保持……的方向”。

[10] Each wheel has a brake assembly ... the foot brake pedal.

每个车轮具有一个鼓式或盘式制动总成，当驾驶员踩制动踏板时靠液力产生制动。

句中连词 either . . . or . . . 意为“或者……或者……”；过去分词短语 operated when . . . 作 a brake assembly 的分隔定语。

Learn to Translate

翻译简介（1）

翻译：翻译是把一种语言表达的事物用另一种语言重新表达出来的过程。

翻译标准：确切的翻译并不是逐字逐句的原文翻译，而是要把原文的内容准确地表达出来，同时原文的意思不能受到歪曲。翻译的标准可以归纳为：以合乎规范的译文语言确切忠实地表达原作的内容，并在译文中保持和原作一致的修辞作用。

应强调的是：翻译技巧和水平只有通过大量的练习和实践才能提高，本书仅仅结合课文简单介绍科技文献英译汉过程中常用的一些基本方法。

Lesson 2 Engines

The engine is the power plant that produces the energy needed to propel the vehicle and operate other systems. It converts the heat energy of a fuel (gasoline, diesel, alcohol, etc) into movement. The burning and expansion of the gases in the combustion chamber produces pressure. The engine piston, connecting rod and crankshaft convert this pressure into motion for moving the car and operating other systems[1].

Engine is usually located in the front portion of the body. Placing the heavy engine in this position makes the vehicles safer in the event of a head-on collision. In a few vehicles, the engine is mounted in the rear to improve handling.

1. Components

The basic parts of an engine are shown in Fig. 2. 1.

- block—main supporting member of the engine to hold all the other engine parts in place.
- cylinder—a round hole machined in the block, which guides piston movement.
- piston—a cylindrical component that transfers the energy of combustion to the connecting rod.
- rings—seal the small gap around the side of the piston, to keep combustion pressure and oil from leaking between the piston and the cylinder wall.
- connecting rod—links the piston to the crankshaft.
- crankshaft—changes the reciprocating movement of the piston and rod into useful rotary motion.
- cylinder head—covers and seals the top of the cylinder, and also holds the valves, rocker arms, and camshaft.
- combustion chamber—a small cavity between the top of the piston and the bottom of the cylinder head, where the burning of the air-fuel mixture occurs.
- valves—control the flow of air-fuel mixture into the combustion chamber and exhaust gases out of the combustion chamber, through opening and closing.
- camshaft—controls the opening of the valves.
- valve springs—keep the valves closed when they do not need to be open.

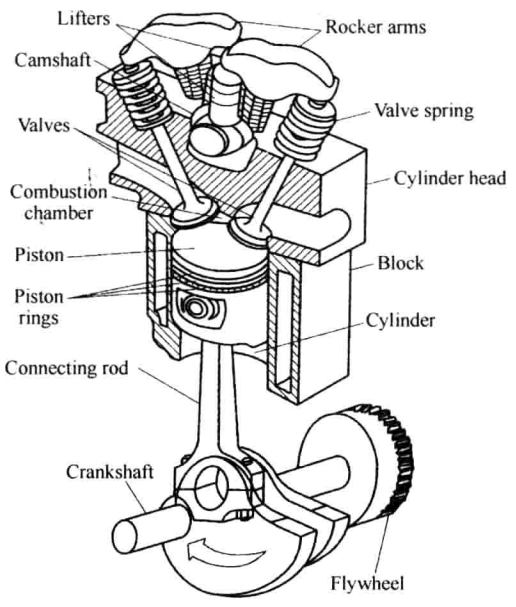

Fig. 2. 1 Engine components

- rocker arms—transfer camshaft action to the valves.
- lifters or followers—ride on the camshaft and transfer motion to the other parts of the valve train.
- flywheel—helps keep the crankshaft turning smoothly, and provides a large gear for the starting motor.

2. Four-Stroke Cycle

Automobile engines normally use a four-stroke cycle. Piston stroke is the distance the piston slides up and down from the top dead center (TDC) to the bottom dead center (BDC). This takes one-half turn of the crankshaft. The crank rotates 180° during one piston stroke (Fig. 2.2). Four separate piston strokes are needed to produce one cycle, which are the intake stroke, compression stroke, power stroke and exhaust stroke. The piston must slide down, up, down and up again to complete one cycle[2].

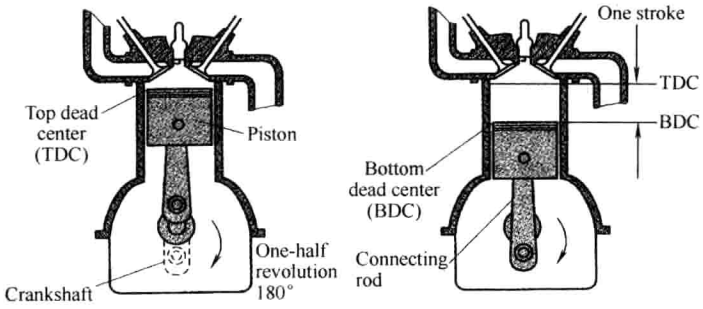

Fig. 2.2 Piston stroke

2.1 Intake Stroke

During this stroke, the piston is moving downward and the intake valve is open and the exhaust valve is closed. This downward movement of the piston produces a partial vacuum in the cylinder. Atmospheric pressure can then force air and fuel rush into the combustion chamber past the open intake valve, as shown in Fig. 2.3a.

2.2 Compression Stroke

When the piston reaches the bottom dead center at the end of the intake stroke, the intake valve closes and seals the upper end of the cylinder. As the crankshaft continues to rotate, it pushes the connecting rod up against the piston. The piston then moves upward and compresses the combustible mixture in the cylinder. This action is known as the compression stroke (Fig. 2.3b). In gasoline engines, the mixture is compressed to about one-eighth of its original volume. (In a diesel engine the mixture may be compressed to as little as one-sixteenth of its original volume.) This compression of the air-fuel mixture increases the pressure within the cylinder. Compressing the mixture in this way makes it more combustible; not only does the pressure in the cylinder go up, but the temperature of the mixture also increases[3].

2.3 Power Stroke

As the piston reaches the top dead center at the end of the compression stroke, the ignition system produces an electric spark. The spark sets fire to the fuel-air mixture. In burning, the mixture gets very hot and expands in all directions. The pressure rises to about 600 to 700 pounds per square inch. Since the piston is the only part that can move, the force produced by the expanding gases forces the piston down. This force, or thrust, is carried through the connecting rod to the crankpin on the crankshaft. The crankshaft is given a powerful twist. This is known as the power stroke (Fig. 2.3c). This turning effort, rapidly repeated in the engine and carried through gears and shafts, will turn the wheels of a vehicle and cause it to move along the highway[4].

2.4 Exhaust Stroke

After the fuel-air mixture has burned, it must be cleared from the cylinder. Therefore, the exhaust valve opens as the power stroke is finished and the piston starts back up on the exhaust stroke (Fig. 2.3d). The piston forces the burned gases of the cylinder past the open exhaust valve and the intake valve is closed. The burned fuel mixture is pushed out of the engine and into the exhaust system.

The crankshaft must rotate two complete revolutions to complete the four-stroke cycle. The four strokes (intake, compression, power, and exhaust) are continuously repeated as the engine runs. With the help of the heavy flywheel, this action produces smooth, rotating power output at the engine crankshaft.

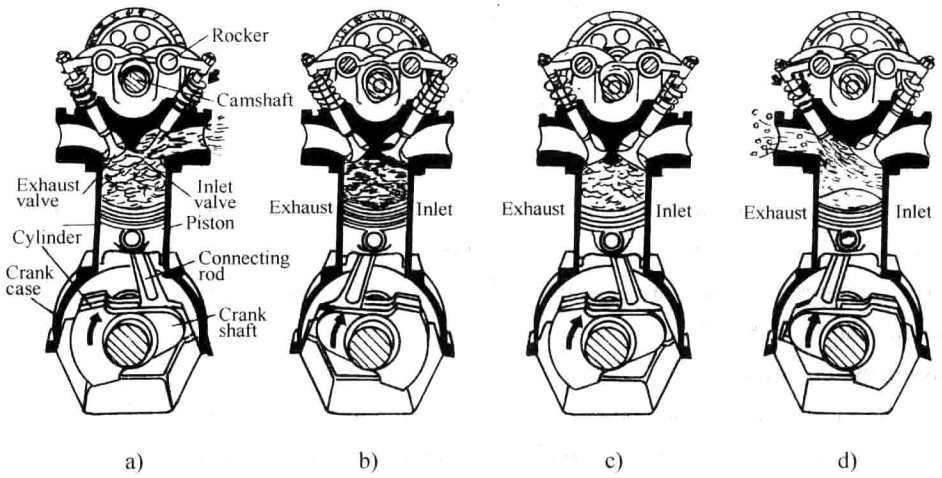

Fig. 2.3 Four stroke cycle principle of operation

a) Intake stroke b) Compression stroke c) Power stroke d) Exhaust stroke

3. Engines Subsystems

3.1 Oiling System

Oil is the life blood of the engine. An engine running without oil will last about as long as a human without blood[5]. Oil is pumped under pressure to all the moving parts of the engine by an oil

pump. The oil pump is mounted at the bottom of the engine in the oil pan and is connected by a gear to either the crankshaft or the camshaft. In this way, when the engine is turning, the oil pump is pumping. There is an oil pressure sensor near the oil pump that monitors pressure and sends this information to a warning light or a gauge on the dashboard. When you turn the ignition key on, but before you start the car, the oil light should light, not only indicating that there is no oil pressure yet, but also letting you know that the warning system is working[6]. As soon as you start cranking the engine to start it, the light should go out indicating that there is oil pressure.

3.2 Engine Cooling

Internal-combustion engines must maintain a stable, operating temperature, not too hot and not too cold. With the massive amounts of heat that is generated from the combustion process, if the engine did not have a method for cooling itself, it would quickly self-destruct[7]. Major engine parts can warp causing oil and water leaks and the oil will boil and become useless.

While some engines are air-cooled, the vast majority of engines are liquid-cooled. The water pump circulates coolant throughout the engine, hitting the hot areas around the cylinders and heads and then sends the hot coolant to the radiator to be cooled off.

3.3 Valve trains

The valve train consists of valves, rocker arms, pushrods, lifters, and camshaft (s). Valve train opening/closing and duration, as well as the geometry of the valve train, control the amount of air and fuel entering the combustion chamber at any given point in time. Timing for open/close/duration is controlled by the camshaft that is synchronized to the crankshaft by a chain, belt or gear[8].

Valve trains are built in several configurations, each of which varies slightly in layout but still performs the task of opening and closing the valves at the time necessary for proper operation of the engine. These layouts are differentiated by the location of the camshaft within the engine:

- Overhead camshafts: The camshaft (or camshafts, depending on the design employed) is located above the valves within the cylinder head, and operates either indirectly or directly on the valves.
- Cam-in-block: The camshaft is located within the engine block, and operates directly on the valves, or indirectly via pushrods and rocker arms. Because they often require pushrods they are often called pushrod engines.
- Camless: This layout uses no camshafts at all. Technologies such as solenoids are used to individually actuate the valves.

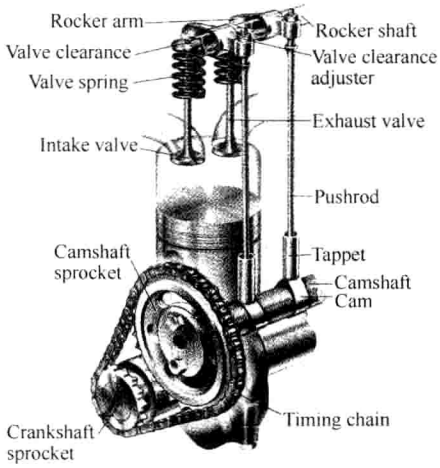

Fig. 2.4 Valve train system