

普通高等教育交通类推荐教材

# 交通运输专业英语

陈焕江 徐双应 编著



机械工业出版社

书中内容以公路运输为主线, 选编了有关汽车构造、交通环境、交通安全、运输车辆和运输管理等方面的课文共 30 篇。为便于自学, 对每篇课文中的语法难点和长、难句作了较详细注释, 并附有词汇表。

本书可用做高等院校交通运输(汽车运用工程)专业及相关专业“专业英语”课程的教材或教学参考书, 也可供具有一定英语基础的工程技术人员和管理人员自学参考。

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# 前 言

本书以教材的体例和要求编写，可用做高等院校交通运输（汽车运用工程）专业及相关专业“专业英语”课程的教材或教学参考书，供学完高等院校公共英语教学大纲基本内容的高年级学生使用，也可供具有一定英语基础的工程技术人员和管理人员自学参考。

书中共包括课文 30 篇，其主要特点如下：

① 绝大部分课文选自国外交通运输领域的英语科技资料，语言规范。

② 课文内容以公路运输为主线，涵盖汽车构造、交通环境、交通安全、运输车辆和运输管理，与汽车运用工程专业及相关专业拓宽后“专业英语”课程 40~50 学时的教学需求相适应。

③ 课文难度与公共英语相衔接，且由浅入深。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；提高分析长、难句和阅读专业文献的能力。

④ 对每课中的语法难点和长、难句均作了较详细的注释，并附有词汇表，便于自学。

本书由长安大学陈焕江、徐双应编著。在编写过程中，参阅了国内外有关书籍和杂志；得到了长安大学汽车学院有关老师的关心和帮助；研究生文德利、邱泽辑承担了初稿的校对工作。作者在此一并表示感谢。

恳请读者对本书选材及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。

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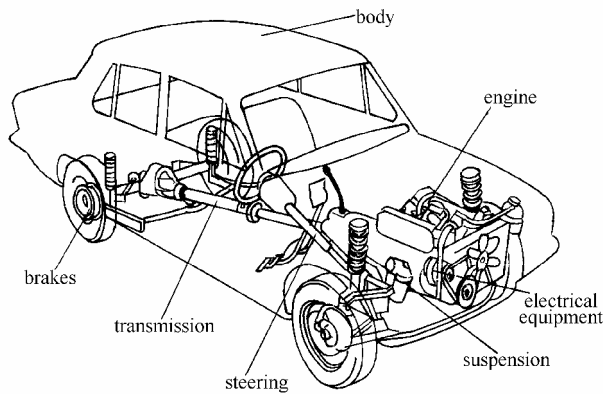
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# Unit One Structure of Automobile

## Lesson 1 Fundamentals of Automobile

Today's average car contains more than 15,000 separate, individual parts that must work together. These parts can be grouped into four major categories: engine, body, chassis and electrical equipment (Fig. 1.1).



**Fig. 1.1** Layout of a modern automobile

### 1 Engine

The engine acts as the power unit. The internal combustion engine is most common: this obtains its power by burning a liquid fuel inside the engine cylinder. There are two types of engine: gasoline (also called a spark-ignition engine) and diesel (also called a compression-ignition engine). Both engines are called heat engines; the burning fuel generates heat which causes the gas inside the cylinder to increase its pressure and supply power to rotate a shaft connected to the transmission <sup>[1]</sup>.

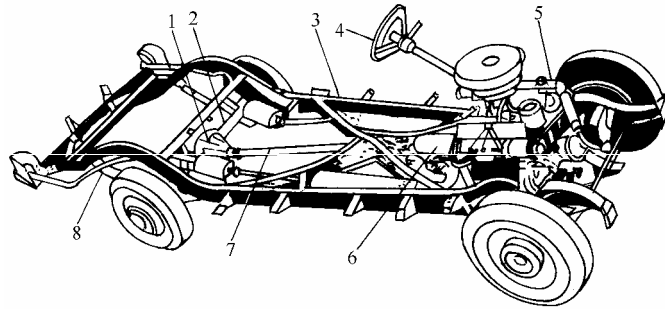
### 2 Body

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.

### 3 Chassis

The chassis is an assembly of those systems that are the major operating parts of a vehicle. The chassis includes the transmission, suspension, steering, and brake systems (Fig. 1.2).



**Fig.1.2 Chassis of a car**

1-differential 2-rear-axle housing 3-frame 4-steering wheel  
5-engine 6-transmission 7-drive shaft 8-suspension

#### 3.1 Transmission

The transmission system comprises clutch, gearbox, propellor shaft, rear axle and differential and the driven road wheels.

##### Clutch

The clutch or torque converter has the task of disconnecting and connecting the engine's power from and to the driving wheels of the vehicle <sup>[2]</sup>. This action may be manual or automatic.

##### Gearbox

The main purpose of the gearbox is to provide a selection of gear ratios between the engine and driving wheels, so that the vehicle can operate satisfactorily under all driving conditions <sup>[3]</sup>. Gear selection may be done manually by the driver or automatically by a hydraulic control system.

##### Propellor Shaft

The function of the propellor (drive) shaft is to transmit the drive from the gearbox to the input shaft of the rear axle and differential assembly. Flexible joints

allow the rear axle and wheels to move up and down without affecting operation.

### **Rear Axle and Differential**

The rear axle and differential unit transmits the engine's rotational power through 90° from propshaft to axle shaft to road wheels <sup>[4]</sup>. A further function is to allow each driven wheel to turn at a different speed; essential when cornering because the outer wheel must turn further than the inside wheel. A third function is to introduce another gear ratio for torque multiplication.

### **3.2 Suspension**

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 <sup>[5]</sup>.

### **3.3 Steering**

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.

### **3.4 Brakes**

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 <sup>[6]</sup>.

## **4 Electrical Equipment and Instrumentation**

The electrical system supplies electricity for the ignition, horn, lights, heater, and starter. The electricity level is maintained by a charging circuit. This circuit consists of a battery, and an alternator (or generator). The battery stores electricity. The alternator changes the engine's mechanical energy into electrical energy and recharges the battery.

The motor vehicle incorporates a number of electrical devices that are used for:

Battery charging	—alternator and regulator.
Engine purposes	—starting and ignition.
Safety and convenience	—lighting, horn, wipers, washers etc.
Driver information	—instrumentation and warning lamps.

Of these devices instrumentation is, perhaps, most influenced by the advance of microelectronics. The basic electromechanical systems of:

Speedometer	—for indicating vehicle speed.
Engine oil pressure	—warning lamp or gauge to show operating limits.
Engine coolant temperature	—warning lamp or gauge to show operating limits.
Battery charging	—warning lamp or gauge to indicate satisfactory/unsatisfactory action.
Fuel tank content	—gauge to show amount of fuel in the fuel tank.

are giving way to computerized vehicle management information centres <sup>[7]</sup>.

### New Words

category	[ˈkætɪgəri] n.	种类, 类型
chassis	[ˈʃæsi] n.	底盘
cylinder	[ˈsɪlɪndə] n.	气缸, 柱体
ignition	[ɪgˈniʃən] n.	点燃, 点火
compression	[kəmˈpreʃən] n.	压缩
transmission	[trænzˈmɪʃən] n.	传动系
hood	[hʊd] n.	罩
trunk deck	n.	行李舱盖
cargo	[ˈkɑ:gə] n.	货物
assembly	[əˈsembli] n.	总成, 装配
suspension	[səˈspenʃən] n.	悬架
clutch	[klʌtʃ] n.	离合器
propellor	[prəˈpelə] n.	螺旋桨, 推进器
propellor shaft		传动轴
differential	[dɪfˈrenʃəl] n.	差速器
hydraulic	[haɪˈdrɒlɪk] a.	水力的, 液力的, 液压的

flexible	[ˈfleksəbl]	a.	易弯的, 灵活的
flexible joint			万向节
torque	[tɔ:k]	n.	转矩, 扭矩
torque convertor			变矩器
multiplication	[mʌltipliˈkeiʃn]	n.	增加, 放大
absorb	[əbˈsɔ:b]	vt.	吸收, 缓冲
shock	[ʃɔ:k]	n.	冲击
occupant	[ˈɔ:kjupənt]	n.	占有者, 乘员
steering	[ˈstiəriŋ]	n.	转向, 操纵
steering wheel			转向盘
manoeuvre	[mæˈnu:və]	n.; v.	机动, 动作, 操纵
stationary	[ˈsteɪnəri]	a.	不动的, 静止的
lining	[ˈlainɪŋ]	n.	衬里, 衬片
drum	[drʌm]	n.	鼓, 圆筒
disc	[disk]	n.	圆盘
charge	[tʃɑ:dʒ]	v.	充电
alternator	[ˈɛ:ltəneɪtə]	n.	交流发电机
incorporate	[ɪnˈkɔ:pəreɪt]	v.	结合, 包括
regulator	[ˈregjuleɪtə]	n.	调节器
horn	[hɔ:n]	n.	喇叭
wiper	[waɪpə]	n.	擦拭之物, 刮水器
washer	[ˈwɔ:ʃə]	n.	洗涤器
speedometer	[spiˈdɔ:mɪtə]	n.	速度计, 里程计
coolant	[ˈku:lənt]	n.	冷却剂
computerise	[kəmˈpjʊ:təraɪz]	vt.	计算机化

### Notes to the Text

[1] Both engines are called ... connected to the transmission.

两种发动机均被称为热机, 由燃烧的燃油产生热, 引起气缸内气体的压力升高, 并输出动力使联接到传动系的轴旋转。

句中: which 所引导的从句为修饰 heat 的定语从句; 过去分词短语 connected to ... 作定语, 修饰 a shaft。

[2] The clutch or torque converter ... of the vehicle.

离合器或变矩器具有接合和切断发动机与汽车驱动轮间动力的作用。

[3] The main purpose of ... under all driving conditions.

变速器或变矩器的主要作用是在发动机与驱动轮间具有一个齿轮比的选择，以便车辆可以在各种运行工况下满意地工作。

句中：between...and ...意为“在.....与.....之间”；so that 意为“为了”、“以便”，引导结果状语从句。

[4] The rear axle and differential unit ...to road wheels.

后轴和差速器装置把发动机的旋转动力，经在传动轴与后轴间转向 90° 后传递给车轮。

句中：from ...to ...意为“从.....到.....”；transmit...to...意为“把.....传递到.....”。

[5] 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，从而有助于把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”。

[6] 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，当驾驶员踩下脚制动踏板时，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。

[7] The basic electromechanical systems of ...to computerized vehicle management information centre.

该长句的主语为 the basic electromechanical systems, 谓语（系词）为 are；介词 of 后有多多个并列的宾语；give way to 意为“让位于”。

# Lesson 2 Internal Combustion Engine (Part I)

## 1 Principle of Operation

The engine is a self-contained power unit which converts the heat energy of fuel into mechanical energy for moving the vehicle. Because fuel is burned within, the engine is known as an internal combustion (IC) engine. In the IC engine, an air-fuel mixture is introduced into a closed cylinder where it is compressed and then ignited. The burning of the fuel (combustion) causes a rapid rise in cylinder pressure which is converted to useful mechanical energy by the piston and crank-shaft.

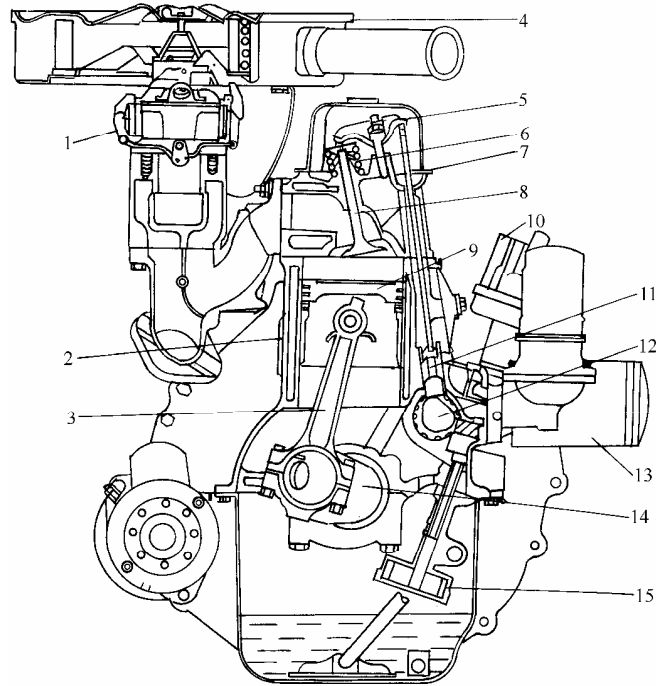
The fuel may be ignited either by a spark or by compression giving rise to classifications of spark-ignition (SI) and compression-ignition (CI) engines<sup>[1]</sup>. An sectional engine view of a typical spark ignition petrol engine is shown in Fig.2.1, detailing the major components.

The four strokes of such an engine are shown in Fig.2.2. At the beginning of the induction stroke (Fig.2.2a), the inlet valve opens and the piston travels down the cylinder from top dead centre (TDC) to bottom dead centre (BDC). The partial vacuum created by the moving piston causes the air-fuel mixture to rush in from the inlet manifold and through the open valve, into the cylinder. The correct air-fuel mixture is provided by the carburetor. When the piston reaches the end of its stroke the inlet valve closes, sealing the top end of the cylinder as both valves are closed.

In Fig.2.2b the piston is moving up the cylinder, compressing the air-fuel mixture between the piston and cylinder head to a very small volume — the compression stroke. Just before TDC an electrical spark, generated across the electrodes of the spark plug, ignites the air-fuel mixture. For good performance the timing of the spark must be closely controlled.

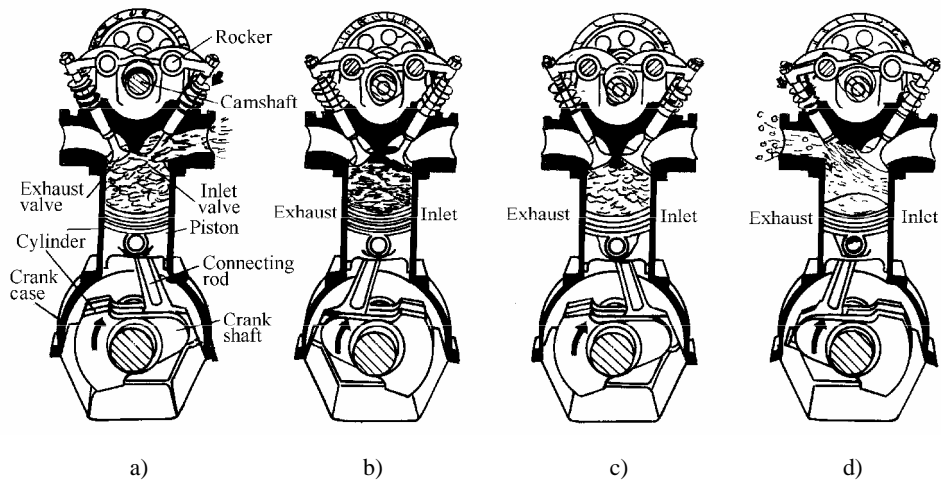
As the mixture burns, the hot gas expands causing a rapid and extreme rise in cylinder pressure, to such an extent that the piston is forced down the cylinder and the connecting rod gives the crankshaft a powerful turning effort<sup>[2]</sup>. This is the combustion stroke, also called the power stroke, shown in Fig.2.2c.

Once the mixture has been burned it must be removed from the cylinder as quickly as possible<sup>[3]</sup>. In the exhaust stroke (Fig.2.2d) the rising piston pushes the hot gases and combustion products out of the cylinder through the open exhaust valve and exhaust system into the earth's atmosphere.



**Fig. 2.1** Sectional view of a six-cylinder engine

1-carburetor 2-cylinder wall 3-connecting rod 4-air cleaner 5-rocker arm  
 6-valve spring 7-pushrod 8-valve 9-piston 10-distributor 11-valve lifter  
 12-camshaft 13-oil filter 14-crankshaft 15-oil pump



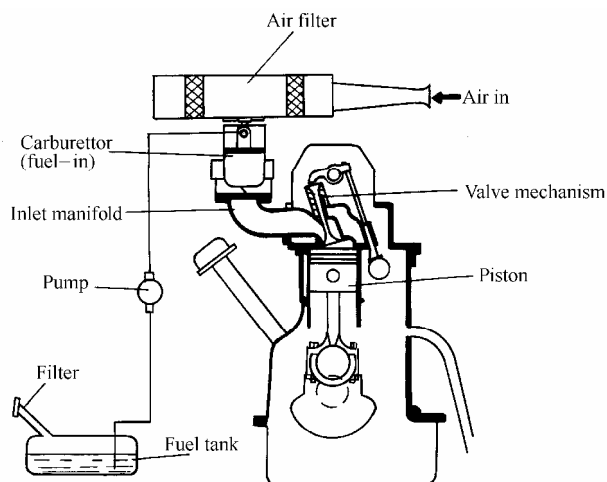
**Fig. 2.2** Four-stroke cycle principle of operation

a) Induction stroke b) Compression stroke c) Combustion stroke d) Exhaust stroke

This sequence of events is repeated continually, with power delivered to the crankshaft on only one of the four strokes—the combustion stroke<sup>[4]</sup>. Crankshaft rotation continues through the other strokes due to the kinetic energy of the heavy flywheel which is connected to the crankshaft. Note that the crankshaft rotates through *two* full revolutions for each four-stroke cycle and a spark occurs only once in the cylinder<sup>[5]</sup>. In a multicylinder engine, power strokes of each cylinder are staggered so that power is delivered almost continuously to the crankshaft for a smooth operation.

## 2 Mixture Supply System

Fuel stored in a large tank, is fed via a pump to the carburetor. The carburetor (Fig.2.3) mixes the liquid petrol with filtered air on its way to the cylinders and in the



**Fig.2.3 Basic fuel supply system**

process turns it into a vapor. The inlet manifold (Fig.2.4) directs the mixture to the cylinders. The ratio of air to fuel in the mixture delivered to the cylinder is controlled by the size and shape of the carburetor bore and venturi, and the size of the fuel metering jets. The standard manual control for the amount of air and fuel mixture delivered to the engine is the throttle valve, which is controlled by the driver's depression of the accelerator pedal. The throttle valve is simply a round disc, mounted on a thin pivot shaft so that it can be tilted at different angles under the control of the accelerator pedal<sup>[6]</sup>. In the vertical position the throttle valve offers virtually no restriction and the full volume of air and fuel passes to the cylinders to produce

maximum engine power. As the throttle valve moves towards the horizontal position the airflow is restricted (throttled) and engine power and speed is reduced accordingly. In normal operation the air-fuel ratio (by mass) varies, typically, in the range 12: 1 to 17:1.

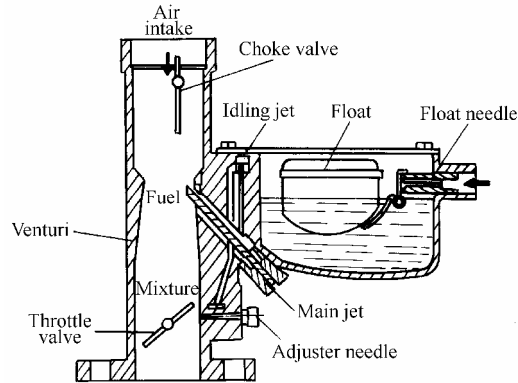


Fig.2.4 Mixture supply principles

### New Words

Self-contained	独立的
compress [kəm'pres] vt.	压缩
piston ['pɪstən] n.	活塞
crankshaft ['kræŋkʃɑ:ft] n.	曲轴
carburetor ['kɑ:bjuretə] n.	化油器
connecting rod	连杆
rocker [rɒkə] n.	摇臂
rocker arm	摇臂
pushrod [puʃrɒd] n.	推杆
distributor [dɪs'trɪbjutə] n.	分配器, 配电盘
camshaft ['kæmʃɑ:ft] n.	凸轮轴
valve lifter	阀门挺杆
oil filter	机油滤清器
oil pump	机油泵
top dead centre	上止点
bottom dead centre	下止点
manifold ['mænɪfəʊld] n.	歧管, 支管, 导管

inlet	[ˈinlet]	n.	进气, 入口
inlet valve			进气阀
induction	[inˈdʌkʃən]	n.	引入, 诱导, 感应, 进气
exhaust	[ɪgˈzɔːst]	v.;n.	排出; 排气(口), 废气
exhaust valve			排气阀
stagger	[ˈstæɡ]	v.	交错
bore	[bɔː]	n.	孔
venturi	[venˈtuːri]	n.	缩喉管
jet	[dʒet]	n.	喷嘴
throttle	[ˈθrɒtl]	n.	节流阀
depression	[diˈpreʃən]	n.	降低, 下降, 衰减
pivot	[ˈpɪvɒt]	n.	枢轴, 支点
tilt	[tɪlt]	v.	倾斜, 翻转

### Notes to the Text

[1] The fuel may be ignited ...and compression-ignition engines.

燃油可以由火花或者通过压缩点燃, 从而分为火花点燃式和压燃式两种类型的发动机。

句中: 连词 either...or ...意为“或者……或者……”; 现在分词短语 giving rise to ...作状语, 表示结果。

[2] As the mixture burns...a powerful turning effort.

随着混合气燃烧, 热空气膨胀, 气缸压力急剧上升, 以致活塞被迫向气缸下方运动, 使连杆对曲轴作用一个强大的回转力。

句中: as 所引导的从句为时间状语从句; 现在分词短语 causing...作状语, 表示结果; to such an extent that 意为“结果”、“甚至于”。

[3] once the mixture ...as quickly as possible.

一旦混合气被燃烧, 它必须尽可能快地从气缸内排出。

句中: once 意为“一旦”、“一经”, 连接时间状语从句; remove...from...意为“从……中排出……”。

[4] This sequence of event ... the combustion stroke.

该冲程顺序连续循环, 动力只在四个冲程之一的燃烧行程传递给曲轴。

句中: with power delivered to ...为过去分词复合结构, 表示伴随情况; the combustion stroke 为同位语。

[5] Note that ...only once in the cylinder.

注意到曲轴在一个四冲程循环中转过两整圈，一个火花只在一个行程中出现在气缸内。

该句为祈使句。

[6] The throttle valve is ...of the accelerator pedal.

节流阀是一个安装在细枢轴上的简单的圆盘，所以在加速踏板控制下，能够以不同角度倾斜。