



中国汽车工程学会

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21世纪高职高专规划教材 · 汽车类

汽车专业英语

(第2版)

主 编 蔡紫薇 崔永春
副主编 宋建桐 闫素芳 李 参

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内 容 简 介

本汽车专业英语教材是21世纪高职高专规划教材,旨在不断提高汽车类专业的学生和汽车行业相关人员的专业英语水平。全书分为三部分。第一部分为汽车构造,分为27篇,讲述汽车各主要系统的机械构造和工作原理。第二部分为汽车维修和保养,分为14篇,讲述汽车各主要系统的常见机械故障的判断和维修保养的方法。第三部分为汽车电控技术,分为14篇,讲述近年来在汽车上应用的一些电控方面的新技术以及相关的维修与保养方法。为了便于查阅和学习,书后还附有总词汇表和汽车常用缩略语。

本书可作为高职高专汽车维修与检测、汽车运用技术与汽车商务专业的教材,也适用于同等学力的职工大学、电视大学、成教等相关专业使用,并可供汽车行业相关的工人和技术人员阅读参考。

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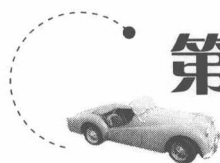
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第2版前言

本书为1998年出版的《汽车专业英语》的第2版。该书第1版自出版至今10余年的时间里,已经印刷8次,深受广大读者的欢迎与关注。近年来,汽车技术的发展日新月异,这就要求作者必须及时更新教材内容,多向读者介绍汽车的新结构、新技术和新材料等方面的专业英语知识。正是在这种背景下,我们对第1版进行了修订。

由于电子技术广泛应用于汽车且发展迅猛,本书除了保持第1版原有的基本结构和内容外,主要对内容进行了更新,增加了第三部分——汽车电控技术。例如与发动机相关的电控汽油喷射和电子点火系统;与底盘相关的自动变速器、自动变速器的维修与保养和制动防抱死系统(ABS);与车身相关的电子稳定程序(ESP)和主动车身控制(ABC);同时还添加了安全气囊系统、巡航控制、全球定位系统(GPS)、控制器局域网(CAN)和汽车空调等电子电气设备的内容。

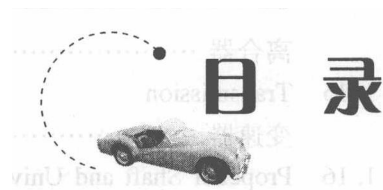
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本书可作为高职高专汽车维修与检测、汽车运用技术与汽车商务专业的教材,也适用于同等学力的职工大学、电视大学、成教等相关专业使用,并可供汽车工业部门和汽车运输部门的工人和技术人员阅读参考。

全书由蔡紫薇、崔永春担任主编,由宋建桐、闫素芳、李参担任副主编。

最后,殷切期望广大读者对书中误漏之处给予批评指正,以使该书不断完善。

编 者



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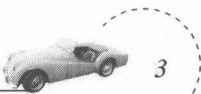


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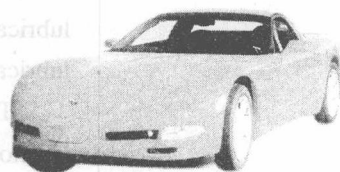
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1

Automobile Mechanics

汽车构造



1.1 Engine Classification and Overall Mechanics

The automobile engines can be classified according to: ① number of cylinders; ② arrangement of cylinders; ③ arrangement of valves; ④ type of cooling; ⑤ number of cycles (two or four); ⑥ type of fuel burned; ⑦ type of ignition.

The engine is the source of power that makes the wheels go around and the car move.¹ The automobile engine is an internal combustion engine because the fuel (gasoline) is burned inside it.² The burning of gasoline inside the engine produces high pressure in the engine combustion chamber.³ This high pressure forces piston to move, the movement is carried by connecting rods to the engine crankshaft. The crankshaft is thus made to rotate; the rotary motion is carried through the power train to the car wheels so that they rotate and the car moves.⁴

The engine requires a fuel system to supply it with a mixture of air and fuel.⁵ The fuel system does this by pumping liquid gasoline from a tank into the carburetor, a mixing device that mixes the gasoline with air.⁶ The mixture is delivered to the engine where it is burned.⁷

The engine also needs a cooling system, the combustion of the air-fuel mixture in the engine creates a very high temperature (as high as 2 000 °C to 2 700 °C). The cooling system takes heat away from the engine by circulating a liquid coolant (water mixed with antifreeze) between the engine and a radiator. The coolant gets hot as it goes through the engine.⁸ It cools off as it goes through the radiator. Thus, the coolant continually takes heat away from the engine, where it could do damage⁹, and delivers it to the radiator. Air passing through the radiator takes heat



away from the radiator.¹⁰

The engine also includes a lubricating system. The purpose of the lubricating system is to supply all moving parts inside the engine with lubricating oil; the oil keeps moving parts from wearing excessively.¹¹

The engine requires a fourth system, the ignition system. The ignition system provides high-voltage electric sparks that ignite, or set fire to, the charges of air-fuel mixture in the engine combustion chambers.¹²

The fifth is starting system and its purpose is to change the electrical current into the mechanical energy to push the crankshaft around. By means of this, the engine can be started.

These five systems are discussed briefly in following sections.

New Words

combustion *n.* 燃烧

chamber *n.* 室

rod *n.* 杆, 连杆, 活塞杆

crankshaft *n.* 机轴, 曲轴

rotate *vi. / vt.* (使) 旋转

rotary *a.* (指运动的) 旋转的

circulate *vt. / vi.* (使) 循环

coolant *n.* 冷却剂 (液态)

antifreeze *n.* 防冻剂 (液), 抗凝剂

excessively *ad.* 过度地, 极端地

voltage *n.* 电压, 伏 (特) 数

ignition *n.* 点火

ignite *v.* 点燃

briefly *ad.* 简洁地, 简短地

→ Phrases and Expressions

power train

supply... with

keep... from

动力传动系统

给……提供

阻止

Notes

1. The engine is the source of power that makes the wheels go around and the car move.

发动机是使车轮转动, 从而驱动汽车行驶的动力来源。

that makes the wheels go around and the car move 为定语从句, 修饰 the source of power.

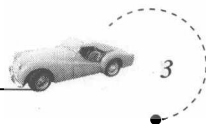
make sth. or sb. do sth. 迫使某人或某物做某事, 作宾语补语的不定式要省略 to.

例如:

He made his son stay at home. 他要儿子待在家里。

The driver made the crankshaft rotate. 司机使曲轴转动。

但是当句子变为被动语态时, 不定式的 to 要加上。



例如:

His son was made to stay at home. 他的儿子被迫待在家里。

The crankshaft is thus made to rotate. 这样,使得曲轴转动。

2. The automobile engine is an internal combustion engine because the fuel (gasoline) is burned inside it.

汽车发动机是一种内燃机,因为它的燃油(汽油)是在发动机内燃烧的。

because 引导原因状语从句。

3. The burning of gasoline inside the engine produces high pressure. . .

汽油的燃烧在发动机的燃烧室中产生高压……

动名词短语 the burning of gasoline inside the engine 在句中作主语。

4. . . the rotary motion is carried through the power train to the car wheels so that they rotate and the car moves.

……动力传动系统将发动机的旋转运动传给汽车车轮,从而使车轮转动,汽车行驶起来。

through the power train 为状语。

so that 引导结果状语从句。

5. The engine requires a fuel system to supply it with a mixture of air and fuel.

发动机要求燃料供给系统为之供应汽油混合燃料。

supply . . . with 给……提供。

例如:

We supplied them with money and clothes. 我们向他们供应钱和衣服。

Many countries in the world supplied Africa with food. 世界上许多国家向非洲供应食品。

6. . . a mixing device that mixes the gasoline with air.

……将汽油、空气进行混合的装置。

a mixing device 为 carburetor 的同位语, that 引导定语从句, 在从句中作主语。

7. The mixture is delivered to the engine where it is burned.

将可燃混合气输送到发动机,并在那里进行燃烧。

where 关系副词,引导定语从句,在从句中做状语。

8. The coolant gets hot as it goes through the engine.

当冷却液流经发动机时,冷却液就会变热。

as 当……的时候,引导时间状语从句,文章中此句后面一句中的 as it goes through the radiator 也是时间状语从句。

9. . . where it could do damage.

……热量会在发动机中造成损害。

这是非限制性定语从句,说明上文。

10. Air passing through the radiator takes heat away from the radiator.

空气经过散热器使温度降低。

passing through the radiator 为分词短语做定语,修饰 air。

11. The purpose of the lubricating system is to supply all moving parts inside the engine with lubricating oil; the oil keeps moving parts from wearing excessively.



润滑系统的作用是向发动机内的各个运动零件提供润滑油,从而使运动零件免于过度磨损。

keep... from 阻止。

例如:

What shall we do to keep the parts from getting rust?

我们怎样才能让这些零件不生锈?

12. The ignition system provides high-voltage electric sparks that ignite, or set fire to, the charges of air-fuel mixture in the engine combustion chambers.

点火装置产生高压电火花,从而使发动机燃烧室中的可燃混合气燃烧。

that 引导定语从句,修饰 sparks。

译文

发动机的分类和总体结构

汽车发动机可以按这样几种情况分类:①按气缸的数量分类;②按气缸排列的方式分类;③按进气方式分类;④按冷却方式分类;⑤按工作循环的行程数分类(二行程或四行程);⑥按所用的燃料分类;⑦按点火方式分类。

发动机是使车轮转动,从而驱动汽车行驶的动力来源。汽车发动机是一种内燃机,因为燃油(汽油)是在发动机内燃烧的。汽油的燃烧在发动机燃烧室中产生的高压,推动活塞运动,并通过连杆传到发动机曲轴。曲轴转动,动力传动系统将发动机的转动运动传给汽车车轮,从而使车轮转动,汽车行驶起来。

发动机要求燃料供给系统为之供应汽油混合燃料。燃料系统把汽油从油箱中抽出来,通过化油器,即一种把汽油、空气进行混合的装置,将可燃混合气输送到发动机,并在那里进行燃烧。

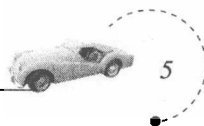
发动机还配备有冷却系统,发动机内部的混合气燃烧会产生高温(高达 $2\,000\,^{\circ}\text{C}$ ~ $2\,700\,^{\circ}\text{C}$)。冷却系统通过在发动机和散热器之间流动的液体冷却液(加了防冻液的水)使发动机降温。当冷却液流经发动机时,冷却液就会变热,而流到散热器时又会被冷却,这样冷却液不断地将发动机中有可能造成损害的热量传递到散热器。经过散热器的空气,又将热量从散热器中带走。

发动机还包括润滑系统,润滑系统的作用是向发动机内的各个运动零件提供润滑油。润滑油可使运动零件免于过度磨损。

发动机的第四个系统是点火系统。点火装置产生高压电火花,从而使发动机燃烧室中的可燃混合气起燃。

发动机的第五个系统是启动系统,启动系统的作用是把电能转变为机械能推动曲轴转动。发动机借助这种办法启动。

这五个系统将在以后的章节中简要讨论。



1.2 Four-stage-engine Operation

The actions taking place in the engine cylinder can be divided into four stages, or strokes.¹ “Stroke” refers to piston movement; a stroke occurs when the piston moves from one limiting position to the other.² The upper limit of piston movement is called TDC (top dead center). The lower limit of piston movement is called BDC (bottom dead center). A stroke is piston movement from TDC to BDC or from BDC to TDC. In other words, the piston completes a stroke each time it changes its direction of motion.³

Where the entire cycle of events in the cylinder requires four strokes (or two crankshaft revolutions), the engine is called a four-stroke-cycle engine, or a four-cycle engine. The four piston strokes are intake, compression, power, and exhaust.

Intake stroke. On the intake stroke, the intake valve has opened, the piston is moving downward, and a mixture of air and vaporized gasoline is entering the cylinder through the valve port. The mixture of air and vaporized gasoline is delivered to the cylinder by the fuel system and carburetor.

Compression stroke. After the piston reaches BDC, or the lower limit of its travel, it begins to move upward. As this happens, the intake valve closes. The exhaust valve is also closed, so that the cylinder is sealed. As the piston moves upward (pushed now by the revolving crankshaft and connecting rod), the air-fuel mixture is compressed. By the time the piston reaches TDC, the mixture has been compressed to as little as one-tenth of its original volume, or even less.⁴ When the air-fuel mixture is compressed, not only does the pressure in the cylinder go up, but the temperature of the mixture also increases.⁵

Power stroke. As the piston reaches TDC on the compression stroke, an electric spark is produced at the spark plug. The ignition system delivers a high-voltage surge of electricity to the spark plug to produce the spark. The spark ignites, or sets fire to, the air-fuel mixture. It now begins to burn very rapidly, and the cylinder pressure increases to as much as 3-5 MPa or even more.⁶ This terrific push against the piston forces it downward, and a power impulse is transmitted through the connecting rod to the crankpin on the crankshaft. The crankshaft is rotated as the piston is pushed down by the pressure above it.

Exhaust stroke. As the piston reaches BDC again, the exhaust valve



opens. Now, as the piston moves up on the exhaust stroke, it forces the burned gases out of the cylinder through the exhaust-valve port. Then, when the piston reaches TDC, the exhaust valve closes and the intake valve opens. Now, a fresh charge of air-fuel mixture will be drawn into the cylinder as the piston moves down again toward BDC. The above four strokes are continuously repeated.

New Words

stroke *n.* 行程, 冲程

limit *n.* 极限, 界限

upper limit 上限

lower limit 下限

TDC (top dead center) 上止点

BDC (bottom dead center) 下止点

event *n.* 事件, (发动机各行程的) 工作内容

revolve *vt./vi.* (使) 旋转

revolution *n.* 旋转, 转数

valve *n.* 气门, 阀

seal *v.* 密封

plug *n.* 火花塞

surge *n.* 冲击, 脉动

MPa (mega pascal) 兆帕 (压力单位)

terrific *a.* 了不起的, 绝妙的

impulse *n.* 推动力

transmit *v.* 传送

crankpin *n.* 曲柄销, 连杆轴颈

port *n.* 进排气道

draw *v.* 吸(进, 引, 收)

→ Phrases and Expressions

take place

divide... into

refer to

in other words

by the time

as little as

even less

not only... but also

as much as

even more

fresh charge

发生

把……分为

涉及, 有关系

换言之

到……为止

少到

甚至更少

不仅……而且

多达

甚至更多(高)

(发动机)吸入的新鲜混合油气

Notes

1. The actions taking place in the engine cylinder can be divided into four stages, or strokes.



发动机气缸内的工作过程可以分为四个阶段,或行程。

taking place in the engine cylinder 现在分词短语做定语,修饰 the actions。

2. "Stroke" refers to piston movement; a stroke occurs when the piston moves from one limiting position to the other.

行程涉及活塞的运动;活塞从某一限定位置到另一限定位置的运动称为一个行程。

when the piston moves from one limiting position to the other 为时间状语从句。

3. In other words, the piston completes a stroke each time it changes its direction of motion.

换句话说,活塞每完成一个行程,就改变一次其运动的方向。

each time 在这里起连词作用,引导时间状语从句。

4. By the time the piston reaches TDC, the mixture has been compressed to as little as one-tenth of its original volume, or even less.

当活塞到达上止点时,可燃混合气被压缩到只有原体积的十分之一,甚至更少。

by the time the piston reaches TDC 为时间状语从句。

5. When the air-fuel mixture is compressed, not only does the pressure in the cylinder go up, but the temperature of the mixture also increases.

当油气混合燃料被压缩时,不仅气缸里的压力上升,可燃混合气的温度也随之增加了。

在这个复合句中,主句因由 not only 开头,谓语使用了部分倒装,在主语之前加了助动词 does。

6. ... and the cylinder pressure increases to as much as 3-5 MPa or even more.

气缸内压力达到3~5兆帕,甚至更高。



四行程发动机的工作过程

发动机气缸内的工作过程,可以分为四个阶段,或行程。行程涉及活塞的运动;活塞从某一限定位置到另一限定位置的运动称为一行程。活塞运动的上限称为TDC(上止点),下限称为BDC(下止点)。一个行程就是活塞从上止点到下止点,或下止点到上止点的运动。换句话说,活塞每完成一个行程,就改变一次其运动的方向。

发动机气缸中的全部工作过程分为四个行程的(或者曲轴旋转两周的),叫做四行程循环发动机,或四循环发动机。发动机的四个活塞行程是进气、压缩、做功和排气。

进气行程:在进气行程中,进气门打开,活塞向下移动,可燃混合气通过进气门进入气缸。适当浓度可燃混合气是由燃料系统和化油器提供的。

压缩行程:在活塞到达下止点时,或者是活塞下限时,活塞开始向上运动。同时,进气门关闭,排气门也关闭,所以这时的气缸是封闭的。当活塞向上运动时(这时是由转动的曲轴和连杆推动活塞),可燃混合气被压缩。当活塞到达上止点时,可燃混合气被压缩到只有原体积的十分之一,甚至更少。当油气混合燃料被压缩时,不仅气缸里的压力上升,可燃混合气的温度也随之增加。

做功行程:当活塞到达压缩行程的上止点时,火花塞产生电火花。电火花是由点火系统向火花塞提供高压电脉冲而产生的。电火花点燃可燃混合气。可燃混合气开始发生剧烈燃烧,



气缸内压力达到3~5兆帕,甚至更高。作用于活塞上强大的推动力推动活塞向下运动,并将这一推力通过连杆传到曲轴上的连杆轴颈上。因此,当活塞受压向下运动时,推动曲轴转动。

排气行程:当活塞再一次到达下止点时,排气门打开。同时,活塞向上移动,把废气经排气门排出气缸。随后活塞到达上止点,排气门关闭,进气门打开。当活塞又一次向下移动到达下止点时,新鲜可燃混合气被吸入气缸,上述的四个行程又继续重复。

1.3 Two-stage-engine Operation

In the four-stroke-cycle engine, already discussed in 1.2, the complete cycle of events requires four piston strokes (intake, compression, power, and exhaust). In the two-stroke-cycle, or two-cycle engine, the intake and compression strokes and the power and exhaust strokes are in a sense combined. This permits the engine to produce a power stroke every two piston strokes, or every crankshaft rotation.

In the two-cycle engine, the piston acts as a valve, clearing valve ports in the cylinder wall as it nears BDC.¹ A fresh air-fuel charge enters through the intake port, and the burned gases exit through the exhaust port. The complete cycle of operation is as follows: As the piston nears TDC, ignition takes place. The high combustion pressures drive the piston down, and the thrust through the connecting rod turns the crankshaft. As the piston nears BDC, it passes the intake and exhaust ports in the cylinder wall. Burned gases, still under some pressure, begin to stream out through the exhaust port. At the same time, the intake port, now cleared by the piston, begins to deliver air-fuel mixture, under pressure, to the cylinder.² The top of the piston is shaped to give the incoming mixture an upward movement. This helps to sweep the burned gases ahead and out through the exhaust port.

After the piston has passed through BDC and starts up again, it passes both ports, thus sealing them off.³ Now the fresh air-fuel charge above the piston is compressed and ignited. The same series of events takes place again and continues as long as the engine runs.⁴

We mentioned that the air-fuel mixture is delivered to the cylinder under pressure. In most engines, this pressure is put on the mixture in the crankcase. The crankcase is sealed except for a leaf, or reed, valve at the bottom. The reed valve is a flexible, flat metal plate that rests snugly against the floor of the crankcase. There are holes under the reed valve that connect to the engine carburetor. When the piston is moving up, a partial vacuum is produced in the sealed crankcase. Atmospheric pressure



lifts the reed valve off the holes, and air-fuel mixture enters the crankcase. After the piston passes TDC and starts down again, pressure begins to build up in the crankcase. This pressure closes the reed valve so that further downward movement of the piston compresses the trapped air-fuel mixture in the crankcase. The pressure which is built up on the air-fuel mixture then causes it to flow up through the intake port into the engine cylinder when the piston moves down far enough to clear the intake port.⁵

The two-stroke engine is not only very simple but gives nearly twice the power of a four stroke engine from a cylinder of given size, but it is wasteful of gasoline, as some mixture inevitably finds its way into the exhaust system on the combines intake/exhaust stroke, and there are always some combustion products left in the cylinder which reduce the rapid burning of the fuel.⁶ This kind of engine is always used in motorcycles.

New Words

require *v.* 需要

combine *v.* 合并, 结合

permit *v.* 允许

rotation *n.* 旋转

clear *v.* 清除, 开通

valve *n.* 阀门

near *v.* 接近

thrust *n.* 推进

pressure *n.* 压力

stream *v.* 流出

deliver *v.* 将……发送

shape *v.* 成形

sweep *v.* 扫除

seal *v.* 密封

continue *v.* 继续

mention *v.* 提及

crankcase *n.* 曲轴箱

leaf *n.* 叶片

reed *n.* 簧片

flexible *a.* 柔韧的, 有弹性的

flat *a.* 平坦的

metal *n.* 金属

plate *n.* 板

rest *v.* 搁在, 安置在

snugly *ad.* 紧贴地

connect *v.* 连接

carburetor *n.* 化油器

partial *a.* 部分的

vacuum *n.* 真空

atmospheric *a.* 空气的

lift *v.* 提起

cause *v.* 引起

trap *v.* 诱入, 使(某物)留在某处

wasteful *a.* 浪费的

inevitably *ad.* 不可避免地

motorcycle *n.* 摩托车