

Technology
实用技术

汽车实用技术 

汽车专业英语

张 蕾 编



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内 容 简 介

本书详细介绍了汽车类专业及其相关专业必须掌握的现代汽车英语知识和词汇,内容涉及发动机、底盘、汽车车身、电气系统、电子控制系统的构造、工作原理以及汽车检修知识。主要包括:汽油发动机、柴油发动机、手动变速器、自动变速器、离合器、防抱死制动系统主动悬架、转向系统、自适应巡航控制、中央门锁和防盗系统、计算机控制等内容。

本书可作为高等院校汽车专业及其相关专业的教材,也可作为高职高专、成人教育等汽车工程类专业教材及其相关专业的教材,并可供相关工程技术人员和汽车服务业、维修业人员阅读参考。

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前 言

随着我国汽车工业的发展，汽车新技术的不断更新，以及国外各类车型涌入我国市场，对汽车行业人才的专业外语水平要求也相应提高，要求从业人员能够快速阅读国外的各类汽车资料，掌握国外汽车的最新应用技术。而现有的教材已不适应目前教学的需要，原有的课程设置和教学内容也过于陈旧，所培养的学生已经不能适应目前汽车行业对外语能力的需要。

为了帮助汽车工程及其相关专业的学生以及汽车服务与维修人员全面系统地掌握汽车发动机、底盘、汽车车身、电气系统、汽车电子控制装置及相关系统的构造、工作原理的英语知识和词汇，适应汽车新技术发展的需要，作者根据多年的教学实践、科学研究，并参阅大量的文献资料，编写了《汽车专业英语》教材，力求全面系统地介绍有关汽车专业英语的词汇、理论知识的表达方式、电子控制技术的英文表述。本书注重系统性、实用性、通俗性、新颖性。书中将对最先进的汽车技术，包括电控发动机、自动变速器、主动悬架等内容进行介绍，学习相应的英语词汇和语言表达方式。

本书由天津工程师范学院张蕾担任主编。第1~4章由天津工程师范学院董恩国编写，第5~11章由天津工程师范学院张蕾编写，第12、13章由天津工程师范学院杜慧起编写，第14、15章由江阴职业技术学院庞敬礼编写。

由于编者水平所限，教材存在一些缺点和错误，诚望读者批评和指正。

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Unit 1

Automotive Technology

The first half of the twentieth century saw a trend to increase engine horsepower, particularly in the American models. Design changes incorporated all known methods of raising engine capacity, including increasing the pressure in the cylinders to improve efficiency, increasing the size of the engine, and increasing the speed at which power is generated. The higher forces and pressures created by these changes created engine vibration and size problems that led to stiffer, more compact engines with V and opposed cylinder layouts replacing longer straight-line arrangements. In passenger cars, V-8 layouts were adopted for all piston displacements greater than 250 cubic inches (4 litres).

The automobile engines from Europe had a bigger range, varying from 1 to 12 cylinders with corresponding differences in overall size, weight, piston displacement, and cylinder bores. Several three-cylinder, two-stroke-cycle models were built while most engines had straight or in-line cylinders. There were several V-type models. Overhead camshafts were frequently employed. The smaller engines were commonly air-cooled and located at the rear of the vehicle; compression ratios were relatively low. The 1970s and 1980s saw an increased interest in improved fuel economy which brought in a return to smaller V-6 and four-cylinder layouts, with as many as five valves per cylinder to improve efficiency.

2. Chassis

The chassis forms the main structure of the modern automobile. A large number of designs in pressed-steel frame form a skeleton on which the engine, wheels, axle assemblies, transmission, steering mechanism, brakes, and suspension members are mounted. During the manufacturing process the body is flexibly bolted to the chassis.

There has been a gradual shift in modern small car designs. There has been a trend toward combining the chassis frame and the body into a single structural element. In this grouping, the steel body shell is reinforced with braces that make it rigid enough to resist the forces that are applied to it. To achieve better noise-isolation characteristics, separate frames are used for other cars. The presence of heavier-gauge steel components in modern separate frame designs also tends to limit intrusion in accidents. This combination of the body and frame performs a variety of functions. It absorbs the reactions from the movements of the engine and axle, receives the reaction forces of the wheels in acceleration and braking, absorbs aerodynamic wind forces and road shocks through the suspension, and absorbs the major energy of impact in the event of an accident.

3. Body

The body of an automobile is categorized according to the number of doors, the arrangement of seats, and the roof structure. Their roofs are conventionally supported by pillars on each side of the body in recent times, there are convertible models with retractable fabric tops that rely on the pillar at the side of the windshield. The glass areas have been increased for improved visibility and for aesthetic reasons.

Redesigning was a tough job in the past, when as much as four years of planning and new tool purchasing was needed for a completely new design. Computer-aided design (CAD) and computer-aided manufacturing (CAM) techniques may now be used to reduce this time requirement by 50 percent or more.

Sheet steel is generally used to make automotive bodies. Steel is used because of its general availability, low cost, and good workability. Other materials for certain other materials are also used. Other materials, such as aluminum, fiberglass, and carbon fiber reinforced plastic are used because of their special properties.

Painting and priming processes are used to protect bodies from corrosive elements and to maintain their strength and appearance. Bodies are first dipped in cleaning baths to remove oil and other foreign matter and then they go through a succession of dip and spray cycles.

4. Electrical System

The electrical system of the automobile was, at first limited to the ignition equipment. Electrification was rapid and complete, and, by 1930, six-volt systems were standard everywhere. The electrical system consists of a storage battery, generator, starting motor, lighting system, ignition system, and various accessories and controls.

It was difficult to meet high ignition voltage requirements with the increased engine speeds and higher cylinder pressures. The larger engines required higher cranking torque. Additional electrically operated features, such as radios, window regulators, and multispeed windshield wipers, also added to system requirements. 12-volt systems generally replaced the 6-volt systems in 1956 production to meet these needs.

The ignition system consists of the spark plugs, coil, distributor, and battery, and provides the spark to ignite the air-fuel mixture in the cylinders of the engine. In order to jump the gap between the electrodes of the spark plugs, the 12-volt potential of the electrical system must be stepped up to about 20,000 volts. A high voltage is induced across the secondary of the coil by interrupting the primary circuit. The high-voltage secondary terminal of the coil leads to a distributor, alternately connecting the coil to each of the wires leading to the spark plugs. It was in the 1970s that transistorized ignition systems were introduced. Increased durability by eliminating the frictional contacts between breaker points and distributor cams was provided by these distributor systems. Changes in engine ignition timing are made by vacuum or electronic control unit (microprocessor) connections to the distributor.

The generator is the basic source of energy for the various electrical devices of the automobile. An alternator that is belt-driven from the engine crankshaft is also used at times. The design is usually an alternating-current type with built-in rectifiers and a voltage regulator.

To store excess output of the generator, a lead-acid battery is used which serves as

a reservoir. Energy for the starting motor is thus made available along with power for operating other electric devices when the engine is not running or when the generator speed is not sufficiently high to carry the load.

The starting motor then drives a small spur gear, which is so arranged that it automatically moves into mesh with gear teeth on the rim of the flywheel as the starting-motor armature begins to turn. As soon as the engine starts, the gear is disengaged, which prevents the starting motor from getting damaged due to overspeeding.

In some cars, dimming is automatically achieved. This happens by means of a switch in the lamp circuit that is triggered by the lights of an oncoming car. Larger double-filament lamps permitted a return to two-headlight systems on some cars.

In the 1960s, signal lamps and other special-purpose lights were increased in usage. Amber-colored front and red rear signal lights are flashed as a turn indication; all these lights are flashed simultaneously when a car is parked along a roadway or is traveling at a low speed on a high-speed highway. The law requires that marker lights that are visible from the front, side, and rear be also present. Red-colored rear signals are used to denote braking, and, on some models, cornering lamps to provide extra illumination in the direction of an intended turn are available. These are actuated in conjunction with the turn signals. To provide illumination to the rear when backing up, backup lights are required.

New Words

1. halt n. 停止, 暂停, 中断; vt. 使停止, 使立定
2. landscape n. 风景
3. compact vt. 压紧, 压实; n. 小型汽车
4. dysfunction n. 机能障碍, 故障
5. generator n. 发电机
6. turbine n. 汽轮机, 涡轮机
7. transmission n. 变速器
8. refinement n. 精炼, 优雅, 精致的附件
9. alternate adj. 交替的, 轮流的, 预备的; v. 交替, 轮流, 改变
10. accessory n. 附件, 附属装置
11. armature n. 电枢(电机的部件)
12. horsepower n. 马力, 功率
13. correspond vi. 符合, 协调, 通信, 相当, 相应
14. intrusion n. 侵入, 闯入, 向内突入
15. assembly n. 集合, 装配, 集会, 集结, 汇编
16. horn n. 喇叭, 角

17. fiberglass n. 玻璃丝, 玻璃纤维
18. bolt n. 门闩, 螺钉, 跑掉; v. 上门闩, 逃跑
19. reinforced vt. 增强, 补充
20. categorize v. 加以类别, 分类
21. retractable adj. 可收回的
22. brace n. 支撑物, 支架, (车身) 支撑件, 支柱
23. frame n. 骨架, 架子, 车架
24. pillar n. 柱子, 柱状物
25. aerodynamic adj. 空气动力学的
26. suspension n. 悬架
27. alloy n. 合金; vt. 使成合金, 减低成色
28. deformation n. 变形
29. aluminum n. 铝
30. windshield n. 风挡玻璃
31. electrode n. 电极

Phrases and Expressions

1. quest for 寻求
2. passenger car 轿车, 小客车
3. reciprocating-piston 往复循环式活塞
4. four-stroke cycle 四冲程循环
5. diesel engine 柴油机
6. gasoline engine 汽油机
7. emphasis on 强调, 重点在于
8. internal-combustion engine 内燃机
9. owing to 由于, 因……之缘故
10. emission-control device 排放控制装置
11. opposed cylinders 对置式气缸
12. compression ratio 压缩比
13. bring about v. 使发生, 致使
14. cylinder bore 气缸直径
15. in-line cylinders 直列式气缸
16. overhead camshaft 顶置式凸轮轴
17. horizontally opposed cylinders 水平对置式气缸
18. spark plug 火花塞
19. road shocks 路面冲击
20. alternating-current 交流电

21. starting (cranking) motor 起动机
22. windshield wiper 风窗玻璃刮水器
23. interrupter switch 断电开关
24. computer-aided design (CAD) 计算机辅助设计
25. computer-aided manufacturing (CAM) 计算机辅助制造
26. carbon fiber 碳素纤维
27. electric starter 电动机
28. primary winding 初级线圈
29. secondary coil 次级线圈
30. magnetic pulse generator 磁脉冲发电机
31. air-fuel mixture 空气 - 燃料混合气
32. ignition switch 点火开关
33. primary circuit 初级电路
34. electronic control unit 电子控制单元
35. electric device 电子设备
36. transistorized ignition system 晶体管点火系
37. spur gear 直齿圆柱的齿轮 / 直齿轮传动

Reference

1. Since the invention of the wheel, man's quest for automotive mobility led him to experiment with various kinds of vehicles.

自从发明车轮以来, 人类对汽车机动性的探索使之进行了多种车辆试验。

2. It would need only one of the many subsystems to dysfunction for the entire automobile to come to a halt.

只要众多子系统中的一个系统出现故障, 整个汽车就不能运行。

3. These include electric, steam, turbine, rotary, and different types of piston-type internal combustion engines.

这包括电子式、蒸汽式、涡轮式、转子式以及各种类型的活塞式内燃机。

4. The reciprocating-piston internal-combustion system, operating on a four-stroke cycle, has been the most successful for automobiles, while diesel engines are widely used for trucks and buses.

当柴油发动机被广泛地应用于货车和客车时, 四冲程往复循环活塞式内燃机是汽车中最成功应用的部件。

5. Although a few limited-production battery-powered electric vehicles have appeared from time to time, they have not proved to be competitive owing to costs and operating characteristics.

尽管不时涌现出限量生产的电动汽车, 但是其在成本和操纵性方面不具备竞争力。

6. However, the gasoline engine, with its new emission-control devices to improve emission performance, has not yet been challenged significantly.

无论如何, 装有新排放控制装置的汽油机改善了排放性能, 具有极大程度的优势。

7. Design changes incorporated all known methods of raising engine capacity, including increasing the pressure in the cylinders to improve efficiency, increasing the size of the engine, and increasing the speed at which power is generated.

改变的设计合成了所有已知能够提高发动机功率的方法, 包括提高气缸的压力以改善效率, 增大发动机的尺寸以及动力产生的速度。

8. The higher forces and pressures created by these changes created engine vibration and size problems that led to stiffer, more compact engines with V and opposed cylinder layouts replacing longer straight-line arrangements.

由于发动机振动和尺寸问题使发动机产生了更高的作用力与压力, 因此, 坚固的、更加紧凑的 V 型和对置式发动机取代了较长的直列式发动机。

9. The automobile engines from Europe had a bigger range, varying from 1 to 12 cylinders with corresponding differences in overall size, weight, piston displacement, and cylinder bores.

欧洲汽车发动机的气缸数量有较大的变化范围, 从 1 缸到 12 缸, 并且有不同的整体尺寸、重量、活塞位置和缸径。

10. The 1970s and 1980s saw an increased interest in improved fuel economy which brought in a return to smaller V-6 and four-cylinder layouts, with as many as five valves per cylinder to improve efficiency.

20 世纪 70 年代和 80 年代, 人类发现了改善燃油经济性的好处, 这使发动机又重新返回了较小的 V 型 6 缸和 4 缸类型, 以及可以提高效率的每缸 5 气门类型。

11. A large number of designs in pressed-steel frame form a skeleton on which the engine, wheels, axle assemblies, transmission, steering mechanism, brakes, and suspension members are mounted.

大量的钢板组成了汽车的车架, 发动机、车轮、车轴总成、变速器、转向机构、制动系统和悬架都安装在上面。

12. It absorbs the reactions from the movements of the engine and axle, receives the reaction forces of the wheels in acceleration and braking, absorbs aerodynamic wind forces and road shocks through the suspension, and absorbs the major energy of impact in the event of an accident.

车架吸收了发动机和车轴的反作用力、车轮在加速和制动时的反作用力、风阻以及通过悬架传递的路面阻力、碰撞发生时的主要冲击力。

13. Their roofs are conventionally supported by pillars on each side of the body in recent times, there are convertible models with retractable fabric tops that rely on the pillar at the side of the windshield.

当今车辆的车顶通常被每侧车身的支柱支撑。传统的车顶是能够收缩的织布顶, 它由风挡玻璃边缘的支柱支撑。

14. Painting and priming processes are used to protect bodies from corrosive elements and to maintain their strength and appearance.

喷漆和装饰过程用于保护车身免受腐蚀，并维持它们的强度和外观。

15. Bodies are first dipped in cleaning baths to remove oil and other foreign matter and then they go through a succession of dip and spray cycles.

车身首先被浸泡在清洗池中，以清除机油和其他杂质，然后再经过连续的浸泡和冲刷。

16. The electrical system consists of a storage battery, generator, starting motor, lighting system, ignition system, and various accessories and controls.

电气系统包括蓄电池、发电机、起动机、灯光系统、点火系统以及各类附件和控件。

17. Additional electrically operated features, such as radios, window regulators, and multispeed windshield wipers, also added to system requirements.

附加的电子操作部件，例如收音机、车窗调节器、多速雨刮器也成为汽车的必需品。

18. The ignition system consists of the spark plugs, coil, distributor, and battery, and provides the spark to ignite the air-fuel mixture in the cylinders of the engine.

点火系统包括火花塞、线圈、分电器、蓄电池，它通过火花点燃发动机气缸内的空气与燃油的混合气。

19. The high-voltage secondary terminal of the coil leads to a distributor that acts as a rotary switch, alternately connecting the coil to each of the wires leading to the spark plugs.

次级线圈的高压电流向分电器，交替地将次级线圈连接到每个火花塞的线圈。

20. The design is usually an alternating-current type with built-in rectifiers and a voltage regulator.

这种设计通常是带有整流器和电压调节器的交流式发电机。

21. Energy for the starting motor is thus made available along with power for operating other electric devices when the engine is not running or when the generator speed is not sufficiently high to carry the load.

因此，即使当发动机没有起动或者发电机的转速不足以提供充足的电能时，起动机以及其他用电设备依然可以工作。

22. The starting motor then drives a small spur gear, which is so arranged that it automatically moves into mesh with gear teeth on the rim of the flywheel as the starting-motor armature begins to turn.

然后，当起动机电枢开始旋转后，起动机驱动一个小直齿轮，自动与飞轮轮缘的轮齿啮合。

23. Amber-colored front and red rear signal lights are flashed as a turn indication; all these lights are flashed simultaneously when a car is parked along a roadway or is traveling at a low speed on a high-speed highway.

转向时，琥珀色的前信号灯和红色的后信号灯闪烁；当汽车在公路上停车或者在高速公路上低速行驶时，所有具有闪烁功能的灯将同时闪烁。

24. Red-colored rear signals are used to denote braking, and, on some models, cornering lamps to provide extra illumination in the direction of an intended turn are available.

红色的后信号用于指示制动状态, 在一些车型中, 转向灯可以在转向的方向上提供附加照明。

Exercises

1. Answer the following questions.

- 1) Which parts does a vehicle make up ?
- 2) Which types are engines included in?
- 3) What functions does this combination of the body and frame perform?
- 4) What kind of material is generally used to manufacture automotive bodies?
- 5) How to protect bodies from corrosive elements and maintain their strength and appearance?
- 6) What functions does battery have?
- 7) What is the automobile electrical system included in?

2. Translate the following into Chinese.

- | | |
|-----------------------|------------------------------------|
| 1) opposed cylinders | 2) overhead camshaft |
| 3) cylinder bore | 4) in-line cylinders |
| 5) windshield wiper | 6) electric device |
| 7) interrupter switch | 8) transistorized ignition systems |
| 9) breaker point | 10) starting motor |

3. Translate the following into English

- | | |
|---------------|----------|
| 1) 排放性能 | 2) 6缸发动机 |
| 3) 燃油经济性 | 4) 电子系统 |
| 5) 电机 | 6) 火花塞 |
| 7) 初级线圈 | 8) 次级线圈 |
| 9) 空气 / 燃油混合气 | 10) 压缩比 |

4. Translate the following passages into Chinese.

1) Different systems like the engine, electrical, cooling etc. combine to make up a vehicle.

2) Automotive production down the ages has required a wide range of energy-conversion systems. These include electric, steam, solar, turbine, rotary, and different types of piston-type internal combustion engines.

3) A large number of designs in pressed-steel frame form a skeleton on which the engine, wheels, axle assemblies, transmission, steering mechanism, brakes, and suspension members are mounted.

4) Steel is used because of its general availability, low cost, and good workability.

Other materials for certain other materials are also used. Other materials, such as aluminum, fiberglass, and carbon fiber reinforced plastic are used because of their special properties.

5) The ignition system consists of the spark plugs, coil, distributor, and battery, and provides the spark to ignite the air-fuel mixture in the cylinders of the engine.

6) As soon as the engine starts, the gear is disengaged, which prevents the starting motor from getting damaged due to overspeeding.

7) The law requires that marker lights that are visible from the front, side, and rear be also present.

5. Translate the following into Chinese.

Hydraulic hybrid technology uses a hydraulic energy storage and propulsion system in the vehicle. This hydraulic system captures and stores a large fraction of the energy normally wasted in vehicle braking and uses this energy to help propel the vehicle during the next vehicle acceleration. The hydraulic system also enables the engine to operate more efficiently when it is needed.

Hydraulic hybrids draw from two sources of power to operate the vehicle - the diesel or gasoline engine and the hydraulic components. In other words, a typical diesel-powered or gasoline powered vehicle can be fitted with hydraulic components as a secondary energy storage system. The primary hydraulic components are two hydraulic accumulator vessels (a high-pressure accumulator capable of storing hydraulic fluid compressing inert nitrogen gas and a low-pressure accumulator) and one or more hydraulic pump/motor units.

Future of Hydraulics: Hydraulic hybrid systems create a unique opportunity to optimize engine operations. EPA has produced research concept vehicles that demonstrate the hydraulic technology. This delivery truck retains its conventional engine and transmission, but adds on a hydraulics package optimized for fuel economy. The next generation of hydraulic vehicles involves fully integrating hydraulic technology. In this configuration, the "full" hydraulic hybrid replaces the conventional drivetrain with a hydraulic drivetrain and eliminates the need for a transmission and transfer case. Using the full hydraulic drive in conjunction with EPA's clean diesel combustion technology is projected to improve fuel economy even more.

EPA also has achieved major breakthroughs in designing hydraulic accumulators and pump/motors to be more efficient, smaller, and lighter for motor vehicle applications, which will help improve fuel efficiency. EPA currently has cooperative research and development agreements with several private sector partners to further the development of hydraulics.

6. Reading material.