



21世纪高等学校教材

普通高等教育“十一·五”汽车类专业(方向)规划教材

QI CHE GONG CHENG ZHUAN YE YING YU

汽车工程 专业英语

主 编 李俊玲 罗永革

副主编 陶健民



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本书是一本全面介绍汽车结构、汽车工作原理以及汽车新技术的英文教材。全书共分七个单元，每个单元均包括课文、词汇注释及思考题几个部分。书后附有汽车常用量名称和符号及总词汇表。本书既可作为大专院校汽车类专业的专业英语教材或汽车构造双语教学辅助教材，也可供通过英语了解汽车的人士学习参考。

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序

汽车被称为“改变世界的机器”。由于汽车工业具有很强的产业关联度，因而被视为一个国家经济发展水平的重要标志。近10年来，我国汽车工业快速而稳步发展，汽车产量年均增长15%，是同期世界汽车产量增长量的10倍。汽车工业正在成为拉动我国经济增长的发动机。汽车工业的繁荣，使汽车及其相关产业的人才需求量大幅度增长。与此相应地，作为人才培养主要基地的汽车工业高等教育也得到了长足发展。据不完全统计，迄今全国开办汽车类专业的高等院校已达百余所。

从未来发展趋势看，打造我国自主品牌、开发核心技术是我国汽车工业的必然选择，但当前我国汽车工业还处在以技术引进、加工制造为主的阶段，这就要求在人才培养时既要具有前瞻性，又要与我国实际情况相结合。要在注重培养具有自主开发能力的研究型人才的同时，大力培养知识、能力、素质结构具有鲜明的“理论基础扎实，专业知识面广，实践能力强，综合素质高，有较强的科技运用、推广、转换能力”特点的应用型人才。这也意味着对我国高等教育的办学体制、机制、模式和人才培养理念等提出了全新的要求。

为了满足新形势下对汽车类高等工程技术人才培养的需求，在中国机械工业教育协会机械工程及自动化学科教学委员会车辆工程学科组的领导下，成立了教材编审委员会，组织制定了多个系列的普通高等教育规划教材。其中，为了解决高等教育应用型人才培养中教材短缺、滞后等问题，组织编写了“普通高等教育‘十一五’汽车类专业（方向）规划教材”。

本系列教材在学科体系上适应普通高等院校培养应用型人才的需求；在内容上注重介绍新技术和新工艺，强调实用性和工程概念，减少理论推导；在教学上强调加强实践环节。此外，本系列教材将力求做到：

1) 全面性。目前本系列教材包括汽车设计与制造、汽车运用与维修、汽车服务工程、物流工程等专业方向，今后还将扩展专业领域，更全面地涵盖汽车类专业方向。

2) 完整性。对于每一个专业方向，今后还将继续根据行业变化对教学提出的要求填平补齐，使之更加完善。

3) 优质性。在教材编审委员会的领导下，继续优化每一本教材的规划、编审、出版和修订过程，让教材的生产过程逐步实现优质和高效。

4) 服务性。根据需要，为教材配备CAI课件和教学辅助教材，召开新教材

讲习班，在相应网站开设研讨专栏等。

相信本系列教材的出版将对我国汽车类专业的高等教育产生积极的影响，为我国汽车行业应用型人才培模式作出有益的探索。由于我国汽车工业还处于快速发展阶段，对人才不断提出新的要求，这也就决定了高等教育的人才培养模式和教材建设也处于不断变革之中。我们衷心希望更多的高等院校加入本系列教材建设的队伍中来，使教材体系更加完善，以更好地为高等教育培养汽车专业人才服务。

中国汽车工程学会 常务理事
中国机械工业教育
协会车辆工程学科 副主任
林 逸

前 言

本书是根据全国普通高等教育汽车类专业（方向）教材编审委员会确定的教材规划编写的。

汽车的诞生和发展影响着人类社会的进步和繁荣。近20年来，我国汽车工业迅猛发展，已成为国家的支柱产业。轿车已逐步进入家庭，成为人们日常工作和生活中不可缺少的工具。

本书用英文全面介绍了汽车结构及工作原理，对汽车新技术包括电控气阀、汽油喷射、汽油直喷、柴油共轨、自动变速、自动防抱死、CAN/LIN总线、安全气囊及混合动力等也有概述。全书共分七个单元，叙述通俗易懂、图文并茂。为了便于学习，书中对难词、词组及专业词汇作了注释，各章节后配有思考题，书后附有汽车常用物理量名称和符号及总词汇表。

本书既可作为大专院校汽车类专业的专业英语教材或汽车构造双语教学辅助教材，也可供通过英语了解汽车的人士学习参考。

本书由湖北汽车工业学院李俊玲、罗永革任主编，湖北汽车工业学院陶健民任副主编，湖北汽车工业学院金阳、郭一鸣、杨朝阳参编；由吉林大学刘明树任主审。

由于时间仓促，编者水平有限，书中难免有不妥之处，敬请读者批评指正。

编 者

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CHAPTER 1 AUTOMOTIVE BASICS

Today's average car contains more than 15000 separate, individual parts that must work together. These parts can be grouped into four major categories: body, engine, chassis and electrical system (Fig. 1-1 and Fig. 1-2).

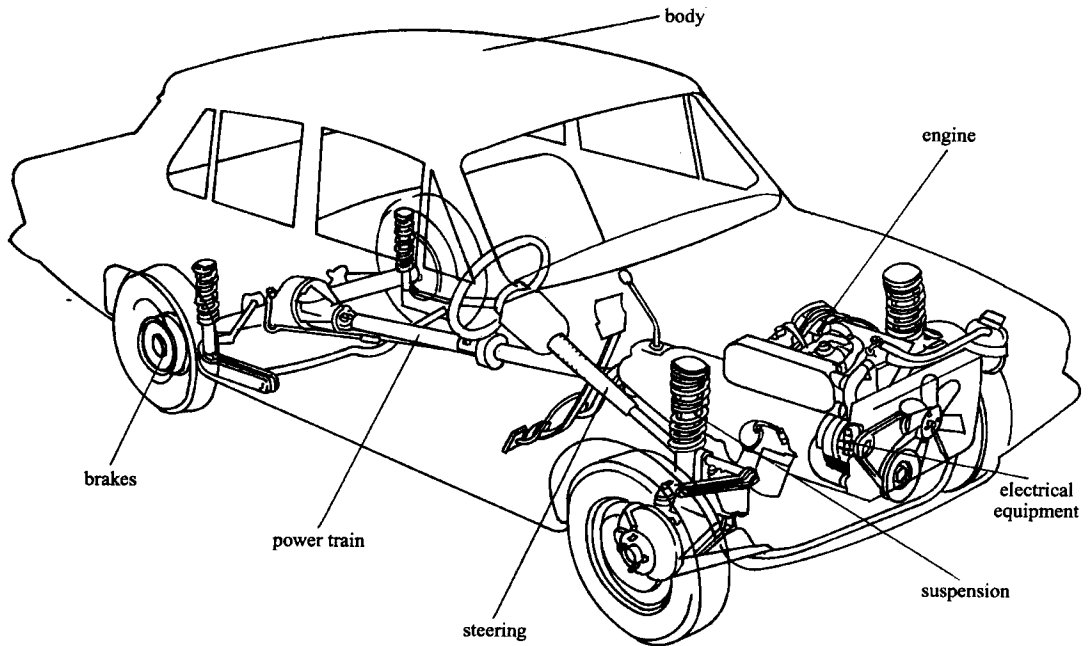


Fig. 1-1 Layout of a passenger car

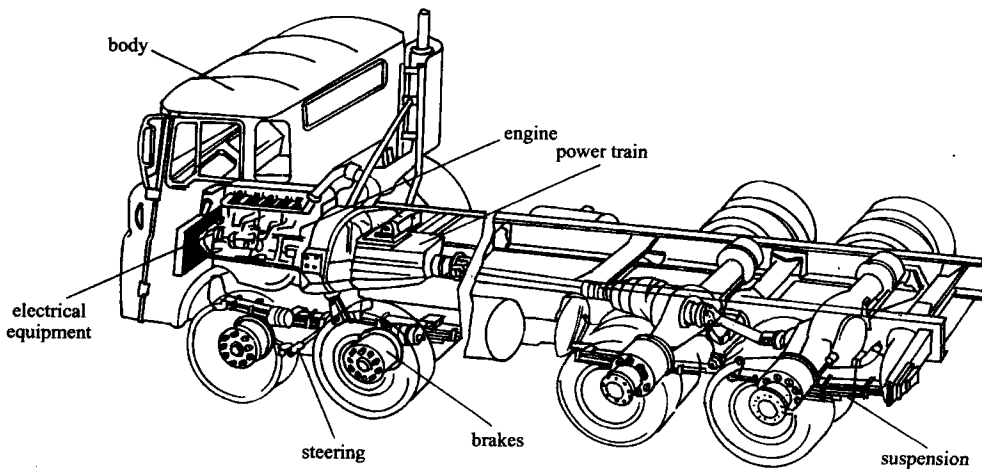


Fig. 1-2 Layout of a commercial vehicle

1.1 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.

A sedan has an enclosed body with a maximum of 4 doors to allow access to the passenger compartment. The design also allows for storage of luggage or other goods. A sedan can also be referred to as a saloon and traditionally has a fixed roof. There are soft-top versions of the same body design except for having 2 doors, and these are commonly referred to as convertibles (Fig. 1-3).

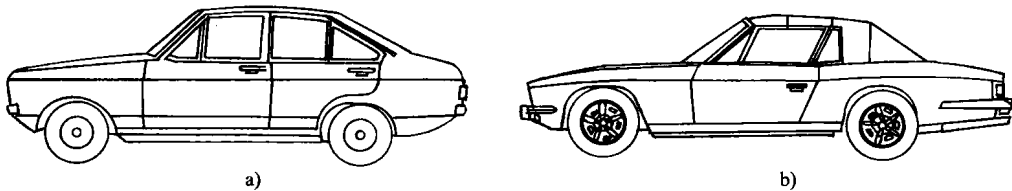


Fig. 1-3 Saloon and convertible
a) Saloon b) Convertible

The utility or pick-up carries goods. Usually it has stronger chassis components and suspension than a sedan to support greater gross vehicle mass.

Light vehicle vans can be based on common sedan designs or redesigns so that maximum cargo space is available.

The bodies of commercial vehicles that transport goods are designed for that specific purpose. Tankers transport fluids, tippers carry earth or bulk grains, flatbeds and vans are used for general goods transport.

Buses and coaches are usually 4-wheel rigid vehicles, but a large number of wheels and axles can be used. Sometimes articulated buses are used to increase capacity. Buses and coaches can be single-deck or double-deck. Buses are commonly used in cities as commuter transports while coaches are more luxurious used for long distances.

New Words

category	['kætɪgəri]	n.	种类, 类型
body	['bɒdi]	n.	车身
chassis	['ʃæsi]	n.	底盘
electrical equipment			电气设备
brake	[breik]	n.	制动, 制动器
power train			传动系统

steering	['stiəriŋ]	<i>n.</i>	转向, 操纵
suspension	[səs'penʃən]	<i>n.</i>	悬架
layout	['leiaut]	<i>n.</i>	布置
sheet metal			金属板
shell	[ʃel]	<i>n.</i>	外壳
hood	[hud]	<i>n.</i>	(发动机)罩
trunk deck			行李箱盖
cargo	['kɑ:gəu]	<i>n.</i>	货物
styling			样式, 外形
sedan	[si'dæn]	<i>n.</i>	私家轿车
maximum	['mksiməm]	<i>n. / a.</i>	最大量, 最大限度; 最多的, 最大极限的
compartment	[kəm'pɑ:tmənt]	<i>n.</i>	车厢, 间隔间
allow for			考虑; 允许
refer to...as...			把……称为……
saloon	[sə'lun]	<i>n.</i>	轿车, 餐车
convertible	[kən've:təbl]	<i>n.</i>	敞篷车
utility	[ju:'tiliti]	<i>n.</i>	皮卡
component	[kəm'pəunənt]	<i>n.</i>	部件, 构件, 元件
van	[væn]	<i>n. / v.</i>	有篷货车; 用车搬运
tanker	['tæŋkə]	<i>n.</i>	罐车
tipper	['tipə]	<i>n.</i>	翻斗车, 自卸车
bulk	[bʌlk]	<i>n.</i>	大批, 大小, 体积, 大多数, 散装
flatbed	['flætbed]	<i>n.</i>	平板车
coach	[kəʊtʃ]	<i>n.</i>	长途汽车, 四轮大马车
axle	['æksl]	<i>n.</i>	轮轴, 车轴
articulated bus			(用铰链连接的)客车
capacity	[kə'pæsiti]	<i>n.</i>	容量, 生产量
commuter	[kə'mju:t]	<i>a.</i>	市郊间上下班交通的

1.2 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 power train.

The way engine cylinders are arranged is called the engine configuration. In-line engines have the cylinders in a line. This design creates a simply cast engine block. In vehicle applications, the number

of cylinders is normally from 2 up to 6. Usually, the cylinders are vertical. As the number of the cylinders increases, the length of the block and crankshaft can become a problem. One way to avoid this is with a V configuration. This design makes the engine block and crankshaft shorter and more rigid.

An engine located at the front can be mounted longitudinally and can drive either the front or the rear wheels. Rear engine vehicles have the engine mounted behind the rear wheels. The engine can be transverse or longitudinal and usually drives the rear wheels only.

New Words

act as			担当, 起作用, 尽职责
power unit			动力装置
internal combustion engine			内燃机
cylinder	['silində]	n.	气缸
gasoline	['gæsəli:n]	n.	汽油机
spark	[spɑ:k]	n.	火花
ignition	[ig'niʃən]	n.	点燃, 点火
diesel	['di:zəl]	n.	柴油机
compression	[kəm'preʃən]	n.	压缩
shaft	[ʃɑ:ft]	n.	轴
transmission	[trænz'miʃən]	n.	变速器; 传输, 传送
configuration	[kən'figju'reiʃən]	n.	结构, 构造, 配置, 外形
vertical	['vɜ:tikəl]	a. /n.	垂直的, 直立的; 垂直线, 垂直面, 竖向
crankshaft	['kræŋkʃɑ:ft]	n.	曲轴, 曲柄
mount	[maunt]	v.	安装, 装上, 安放
longitudinal	[lɒndʒi'tju:dinl]	a.	纵向的, 经度的
transverse	['trænzvɜ:s]	a.	横向的, 横断的

1.3 Chassis

The chassis is an assembly of those systems that are the major operating parts of a vehicle. The chassis includes the power train, steering, suspension, and braking systems.

- 1) Power train system conveys the drive to the wheels.
- 2) Steering system controls the direction of movement.
- 3) Suspension and wheels absorb the road shocks.
- 4) Brake slows down the vehicle.

1.3.1 Power Train System

The power train transfers turning effort from the engine to the driving wheels. A power train can include a clutch for manual transmission or a torque converter for automatic transmission, a transmission, a drive shaft, final drive and differential gears and driving axles. Alternatively, a transaxle

may be used. A transaxle is a self-contained unit with a transmission, final drive gears and differential located in one casing.

A vehicle with a manual transmission uses a clutch to engage and disengage the engine from the power train. Engine torque is transmitted through the clutch to the transmission or transaxle. The transmission contains sets of gears that increase or decrease the torque before it is transmitted to the rest of the power train. The lower the gear ratio selected, the higher the torque transmitted. A vehicle starting from rest needs a lot of torque, but once it is moving, it can maintain speed with only a relatively small amount of torque. A higher gear ratio can then be selected, and engine speed is reduced.

A conventional vehicle with the engine at the front and driving wheels at the rear uses a drive shaft, called a propeller shaft, to transmit torque from the transmission to the final drive.

The final drive provides a final gear reduction to multiply the torque before applying to the driving axles. On front engine rear wheel drive vehicles, the final drive changes the direction of drive by 90 degrees. Inside the final drive, a differential gear set divides the torque to the axles and allows for the difference in speed of each wheel when cornering. Axle shafts transmit the torque to the driving wheels. In a rear-wheel drive vehicle, the axles can be solid or contain joints to allow for movement of suspension. For a front-wheel drive vehicle, the drive shaft has universal joints to allow for suspension and steering movement.

An automatic transmission or transaxle performs similar functions to a manual transmission or transaxle except that gear selection is controlled either hydraulically or electronically. The automatic transmission uses a torque converter, which acts as a hydraulic coupling to transfer the drive.

1.3.2 Steering System

The directional motion of vehicle is controlled by a steering system. A basic steering system has 3 main parts: a steering box connected to the steering wheel, the linkage connecting the steering box to the wheel assembly at the front wheels and front suspension parts to let the wheel assemblies pivot. When the driver turns the steering wheel, a shaft from the steering column turns the steering gear. The steering gear moves tie-rods that connect to the front wheels. The tie-rods move the front wheels to turn the vehicle right or left.

1.3.3 Suspension System

The purpose of the complete suspension system is to isolate the vehicle body from road shocks and vibrations, which will otherwise be transferred to the passengers and load. It must also keep the tires in contact with the road regardless of road surface. A basic suspension system consists of springs, axles, shock absorbers, arms, rods and ball joints.

The spring is the flexible component of the suspension. Basic types are: leaf springs, coil springs and torsion bars. Modern passenger vehicles usually use light coil springs. Light commercial vehicles have heavier springs than passenger vehicles and can have coil springs at the front and leaf springs at the rear. Heavy commercial vehicles usually use leaf springs or air suspension.