项目一

汽车的基本结构

Lead in

学习目标

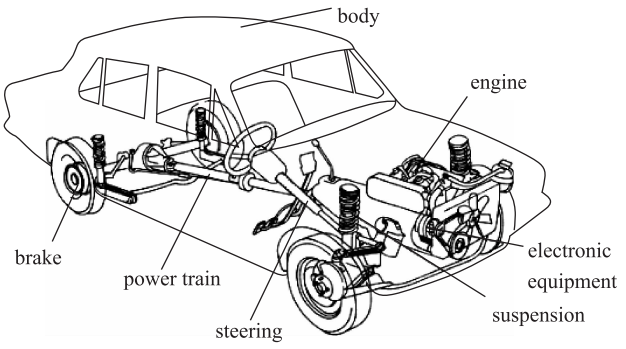
1. 认识关于汽车基本组成部分的英语术语和词汇。
2. 理解汽车总成及其零部件的固定表达方法。
3. 运用所学知识，借助专业词典，对汽车各总成资料进行中英互译。
4. 在教师的指导下，完成与汽车的基本组成及其运行相关的英语资料阅读和翻译工作。
5. 正确完成课后练习。

任务描述

以家用小轿车为例，了解汽车的总体构造及其功用，如发动机、底盘、电气设备、车身等，完成相关词汇、特殊语句的认识。通过完成该任务，能阅读关于汽车总体构造的英文文献，并能运用所学项目知识和翻译技巧对相关文献进行翻译。

引导问题

你知道下图中的英文单词是什么意思吗？



Text

The Basic Structure of Automobile

A typical passenger car of today contains more than 15,000 separate, individual parts that must work together. These parts can be grouped into four major categories: engine, chassis, electrical equipment and body.

1. Engine

The engine acts as the power unit located normally at the front of the car, followed immediately by a clutch, gearbox, propeller shaft, universal joint, differential, back axle, etc.[1] The internal combustion (IC) engine is most commonly used on automobile. It obtains its power by burning 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.

2. Chassis

The chassis is an assembly of those systems that are the major operating parts of a car. It is usually made up of the power train system or transmission system, suspension system, steering system and brake systems. The function of a chassis is to accept the power of engine and to ensure that the car can run normally according to the driver's operation.

The transmission system is a speed and power changing device and conveys the drive to the wheels. Its main components comprise the transmission case, input shaft, output shaft, counter-shaft, driving gear, transmission fork, etc. A common transmission has a

gear arrangement of neutral position, reverse gear, first gear, second gear, third gear, etc. And the reverse gear permits a car to reverse its direction.

The suspension system is used to absorb the road shocks and reduce the impact on dynamic loads which are transmitted to the sprung weight. The sprung weight (including body, engine, power train, etc) is suspended by the front and rear springs.

The steering system controls the direction of the car's movement. Two types of steering system are commonly used on cars: manual system and power system. The manual steering system is composed of steering wheel, shaft and column, steering gear and pitman arm, steering knuckles and ball joint, spindle assembly, etc (shown as Figure 1-1).

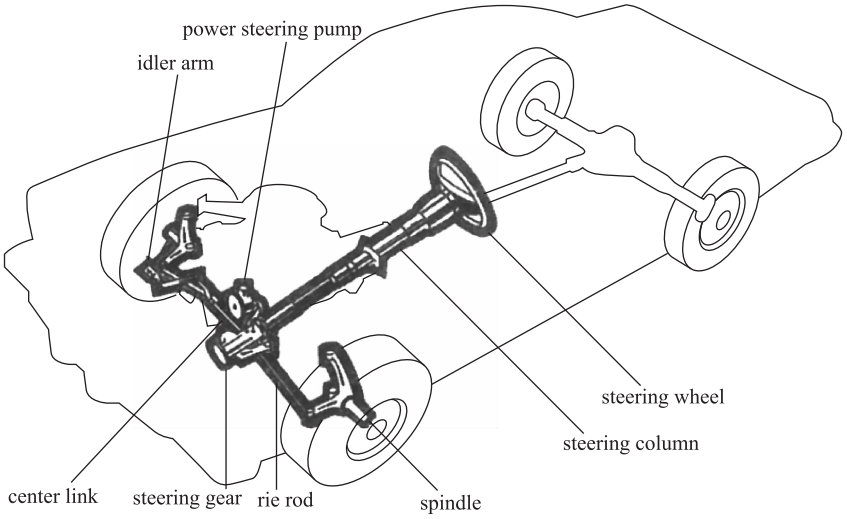


Figure 1-1 The Steering System

The power steering system is made up of a hydraulic pump, fluid reservoir, hoses, a power steering gear assembly, etc.[2] There are several manual steering gears in current use like the rack and pinion type, the worm and tapered pin steering gear, and the worm and roller steering gear.[3] All power steering systems require a power steering pump attached to the engine. Most late model cars with power steering utilize either a power rack and pinion system, or an integrated power steering gear system.

The brake system slows down the running car. In general, the front brakes of a car are "disc" type, wherein friction pads in a brake caliper are forced against machined surfaces of a rotating disc at each wheel to slow and stop the car. The rear brakes are "drum" type, wherein internal expanding brake shoe assemblies are forced against the machined surface of a rotating drum at each wheel to slow and stop the car (shown as in Figure 1-2).

The power train/drive system delivers power from the engine to the wheels (shown as Figure 1-3). The power from the engine moves through the transmission. Transmissions are either standard, with a manual shift lever and foot clutch, or automatic.

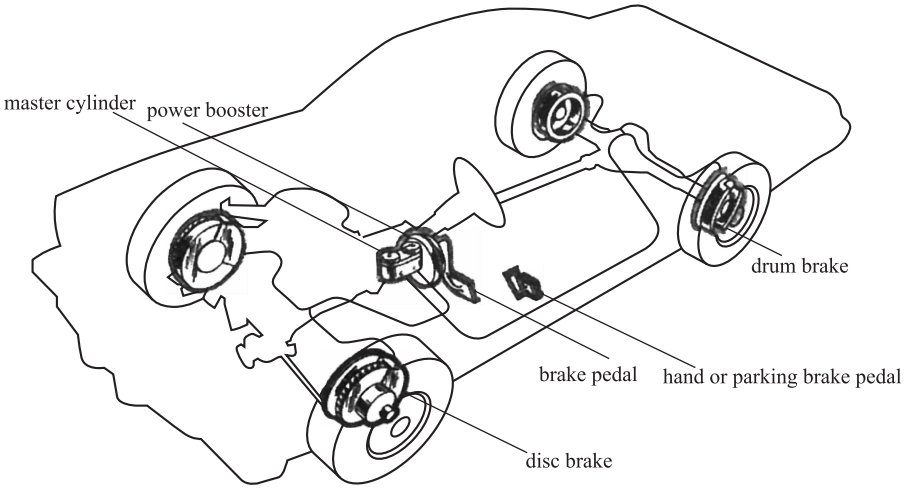


Figure 1-2 The Brake System

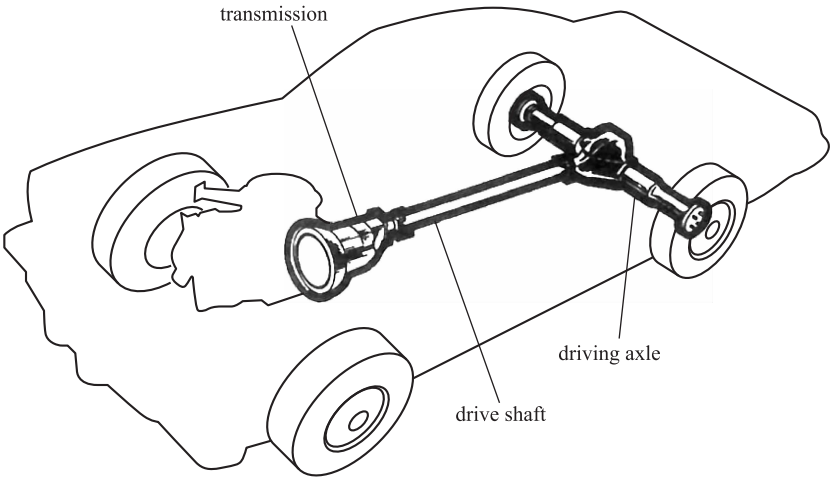


Figure 1-3 The Power Train/Drive System

3. Electrical Equipment

The electrical system is one of the important parts of the automobile, its performance directly affects the power, economy, reliability, safety, comfort and emission performance of the automobile. Electrical equipment consists of power group, engine starting system and ignition system, automotive lighting and signal devices, instrumentation, navigation system, stereos, phones and other electronic equipment, microprocessors, the central computer and various devices such as artificial intelligence system.

The electrical system supplies electricity for the ignition, horn, lights, power seat and window adjusters, heater and starter. The lights include the headlights, parking lights, direction signal lights, side marker lights, stoplights, backup lights, tail lights, and the interior lights. The interior lights cover the instrumental panel lights, various warning,

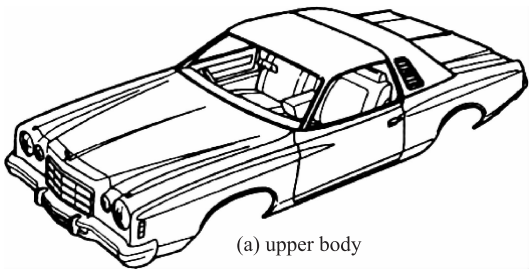
indicator, and courtesy lights.[4] The electricity level is maintained by a charging circuit. This circuit consists of the battery and alternator or generator. The battery stores electricity. The alternator changes the engine's mechanical energy into electrical energy and recharges the battery.

Starter is the only way to start the engine for the modern car. It is composed of DC motor, drive and control organizations. Automotive air-conditioning is the important electrical equipment in vehicle, mainly including the condenser, compressor, evaporator and reserve liquid dryer.

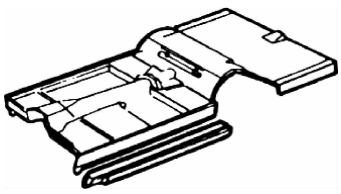
4. Body

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. For example, insulation in the body reduces noise and protects against heat and cold. The body styling provides an attractive, colorful, modern appearance for the vehicle. It is streamlined to lessen wind resistance and to keep the car from swaying at driving speeds.

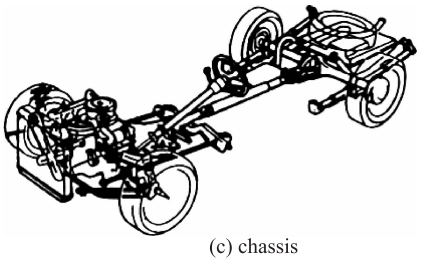
The automobile body has two basic parts: the upper body and the under body (shown as in Figure 1-4).



(a) upper body



(b) under body



(c) chassis

Figure 1-4 The Part of an Automotive

New Words

engine	*n.* 发动机
chassis	*n.* 底盘
assembly	*n.* 总成
clutch	*n.* 离合器
gearbox	*n.* 变速箱;齿轮箱

differential	*n.* 差速器
cylinder	*n.* 气缸
transmission	*n.* 传动装置;变速器
drum	*n.* 鼓式制动器
disc	*n.* 盘式制动器
counter-shaft	*n.* 中间轴,副轴
navigation	*n.* 导航
stereos	*n.* 音响
horn	*n.* 喇叭

Phrases and Expressions

internal combustion (IC)	内燃机
passenger car	乘用汽车,客车
propeller shaft	传动轴,万向节轴
universal joint	万向节
back axle	后桥
DC motor	直流电机
power train system	动力传动系统
transmission system	传输系统
suspension system	悬挂系统
steering system	转向系统
brake systems	制动系统
transmission case	变速箱
input shaft	输入轴
output shaft	输出轴
driving gear	主动齿轮
transmission fork	变速叉
gear arrangement	齿轮排列
neutral position	空挡
brake caliper	制动钳
reverse gear	倒挡
first gear	一挡
pit-man arm	转向臂
steering knuckles	转向节
ball joint	(转向节)球头
spindle assembly	转向轴总成
rack and pinion	齿轮齿条式
the worm and tapered pin	蜗杆锥销式
friction pads	摩擦垫

Notes

1. The engine acts as the power unit located normally at the front of the car, followed immediately by a clutch, gearbox, propeller shaft, universal joint, differential, back axle, etc.

翻译:发动机起着动力单元的作用,它一般位于轿车的前端(发动机前置),紧随其后的为离合器、变速箱、传动轴、万向节、差速器和后桥等。

2. The manual steering system is composed of steering wheel, shaft and column, steering gear and pit-man arm, steering knuckles and ball joint, spindle assembly etc. The power steering system is made up of a hydraulic pump, fluid reservoir, hoses, a power steering gear assembly, etc.

翻译:手动转向系统包括方向盘、转向轴和转向柱、转向器和转向摇臂、转向节和转向节球头以及转向轴总成等部件。动力转向系统由液压泵、液体储罐、软管、动力转向机总成等组成。

3. There are several manual steering gears in current use like the rack and pinion type, the worm and tapered pin steering gear, and the worm and roller steering gear.

翻译:目前(在轿车中)应用的手动转向机有多种形式,如齿轮齿条式、蜗杆锥销式以及蜗杆滚柱式等。

4. The lights include the headlights, parking lights, direction signal lights, side marker lights, stoplights, backup lights, tail lights, and the interior lights. The interior lights cover the instrumental panel lights, various warning, indicator, and courtesy lights.

翻译:车灯包括前大灯、驻车灯、转向信号灯、侧灯、停车灯、倒车灯、尾灯和车内灯等。其中,车内灯又包括仪表板灯、各种警示灯、指示灯和门控灯等。

Exercises

1. Choose the best answer from the following choices according to the test.

1) A typical passenger car of today contains more than _____ separate, individual parts that must work together.

A. 5,000　　B. 10,000　　C. 15,000　　D. 20,000

2) The _____ acts as the power unit located normally at the front of the car.

A. engine　　B. chassis

C. electrical equipment　　D. body

3) The _____ supplies electricity for the ignition, horn, lights, power seat and window adjusters, heater and starter.

A. engine　　B. chassis

C. electrical system　　D. body

4) _____ is the only way to start the engine for the modern car.

A. Alternator　　B. Starter

C. Battery　　D. DC motor

2. Translate the following words or phrases into Chinese.

1) internal combustion (IC) _____ 2) steering system _____
3) chassis _____ 4) electronic equipment _____
5) body _____ 6) suspension system _____
7) universal joint _____ 8) brake system _____
9) pit-man arm

3. Translate the following words or phrases into English.

1) 变速箱 _____ 2) 差速器 _____
3) 气缸 _____ 4) 总成 _____
5) 球头 _____ 6) 齿轮排列 _____
7) 直流电机 _____ 8) 鼓式制动器 _____
9) 盘式制动器 _____

4. Translate the following sentences into Chinese.

1) In general, the front brakes of a car are "disc" type, wherein friction pads in a brake caliper are forced against machined surfaces of a rotating disc at each wheel to slow and stop the car.

_____

_____

2) The function of the chassis is to accept the power of the engine and to ensure that the car can run normally according to the driver's operation.

_____

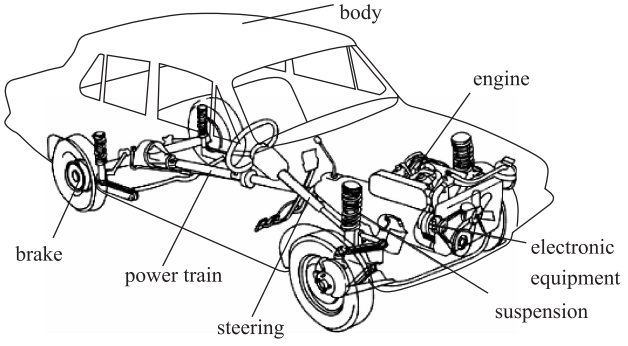
_____

3) The electrical system is one of the important parts of the automobile, its performance directly affects the power, economy, reliability, safety, comfort and emission performance of the automobile.

_____

_____

5. Translate the words or phrases in the following figure into Chinese.



Practical Reading

Layout of an Automobile

The layout of different types of vehicles is different. A private car which is to carry up to eight persons is generally four-seater.

A car consists of engine located at the front of the vehicle, followed by a clutch, gear box, propeller shaft, universal joint, differential, back axle etc. The radiator is located in front of the engine. Various other parts of the vehicle shown in the layout are dynamo, horn, steering box, fan timing gear, carburetor, air filter, gear control, steering wheel, cylinder, petrol tank, rear axle. The drive from the gear box is conveyed through a short shaft to the front universal joint of the propeller shaft. From the propeller shaft it is conveyed to the rear universal joint through a sliding splined type of joint. The bevel gear of the short shaft is driven by the rear universal joint. This bevel gear meshes with a larger bevel gear which drives the two rear axle shafts through a differential gear.

The layout also consists of independent front-wheel springing with quarter-elliptic leaf springs, steering column bevel-gear control and hydraulic braking system.

The wheels which are four in number are fitted below the car chassis to support the load of the vehicle and passengers as well as to run the car. They are fitted with hollow rubber tires filled with air in rubber tubes under sufficient pressure necessary for carrying the load. The shocks caused by road irregularities are absorbed by them. By fitting springs between the wheels and the vehicle allowing the vertical movement of wheels in relation to vehicle, greater part of unevenness of road surfaces is taken care of.

Front axle is used for steering front wheels carried on stub axles swiveling upon kingpins at the axle extremities.

Steering arms and a track rod link the two stub axles together for swiveling them by a steering wheel about the king pins. The steering wheel linked to one of the stub axles by a shaft, a gear box and a suitable linkage is operated by the driver's hand wheel. Previously the axle—a one-piece beam was used to support the vehicle through springs. An arrangement known as independent front suspension has replaced the axle and spring arrangement. Under the control of springs, the wheels are free to rise and fall vertically independently of each other.

For fixing rear wheels, a tube like shaft enclosing driving shafts with suitable bearings for rotating the wheels is used. It is enlarged at the center for enclosing the final-drive gears used for providing main speed reduction between the engine and the driving wheels. The change of direction of the drive from the fore and aft line of the propeller shaft to the transverse line of the axle shafts is also provided by this tube known as rear axle.

When going round a curve, the inner wheel has to travel a smaller distance in comparison to the outer wheel. But both the rear wheels would rotate at the same speed if

they are connected by a shaft. This rotation of both the wheels would result in slipping of one or both of them on the road surface causing excessive tire wear as well as severe twisting loads on the shaft. Moreover, the two wheels of the exactly similar diameter (which is not usually so) can only turn at the same speed without slip on the straight road. Tires fitted on the opposite sides may be of different states of wear and even tire of same nominal diameter made by different or same manufacturer may differ in actual dimensions or may not be exactly similar. Due to change of rolling radius(the distance from the wheel center to the ground) the effective size of the tire may be altered by different inflation pressure also.

Each wheel is provided with its own separate half shaft connected by a differential gear and meeting at about the center of the axle. The wheels are free to rotate at different speeds although they are provided with equal drive by the differential gear.

For preventing the transmission of shock from uneven road surfaces to the vehicle, springs are used to support the vehicle on the axle. In order to allow for the vertical movements of the wheels relative to the frame as well as to allow the parts of the shaft to operate at different angle, another increasingly used arrangement is used. It consists of mounting the final-drive gears and the differential gear in a casing attached to the frame with independently sprung wheels attached to them by means of shafts through devices called universal joints.

Power unit consists of an internal combustion engine. It is usually mounted at the point end of the car. The clutch and the gear box are placed immediately behind it. The three components, engine, clutch and gear box are assembled into a single unit.

For connecting the output shaft of the gear box to the rear axle, a long shaft known as propeller shaft is used. This shaft is either enclosed in a tubular casing or kept exposed or opened with a universal joint fitted at each end for allowing the changes in the shaft alignment with the rise and fall of the rear axle due to road surface variations. Universal joints cannot be eliminated even if the final drive gears are fixed to the frame with the wheel springing independently. Neither the misalignment resulting from the flexing of the vehicle structure over bumpy road surfaces can be avoided nor the precise alignment of shaft can be ensured without them.

For controlling the movement of the vehicles or to stop them, efficient braking system is a necessity for a vehicle. Brakes attached to each of the four wheels are of two types. In the initial type, a pair of shoes carried on a stationary plate is expanded in contact with a rotating drum mounted on the wheels to arrest the motion of the drum. In the modern type of brakes, one or more pairs of pads are carried in a caliper attached to the axle or wheel supporting linkage. The sides of the disk mounted on the wheel are griped by these pads. By applying pressure on a pedal, the brakes are applied. A hand lever acting through a separate linkage and locked in the on position is used.

For operating the brake, either mechanical or hydraulic system is used. Mechanical

system requiring gearing system for mechanical and hydraulic fluid for the hydraulic brakes are used.

New Words

dynamo	*n.* 直流发电机
horn	*n.* 喇叭
swivel	*v.* 旋转

Phrases and Expressions

steering box	转向器
timing gear	正时齿轮
bevel gear	锥齿轮，伞齿轮
mesh with	与……啮合
leaf springs	钢板弹簧
stub axle	转向节

Notes

1. They are, fitted with hollow rubber tires filled with air in rubber tubes under sufficient pressure necessary for carrying the load.

翻译：它们(车轮)安装有中空的橡胶轮胎(外胎)，轮胎中装有充气的内胎，内胎的充气压力应足以承载车辆的载荷。

2. Front axle is used for steering front wheels carried on stub axles swiveling upon kingpins at the axle extremities.

翻译：前桥用来安装前转向轮，该车轮装在转向节上，可绕主销转动，而该转向节则位于前桥的外端。

3. For operating the brake, either mechanical or hydraulic system is used. Mechanical system requiring gearing system for mechanical and hydraulic fluid for the hydraulic brakes are used.

翻译：对于制动器的操纵，机械或液压操纵系统均有使用。它们分别是纯机械传动或者带有液压传动的机械操纵系统。