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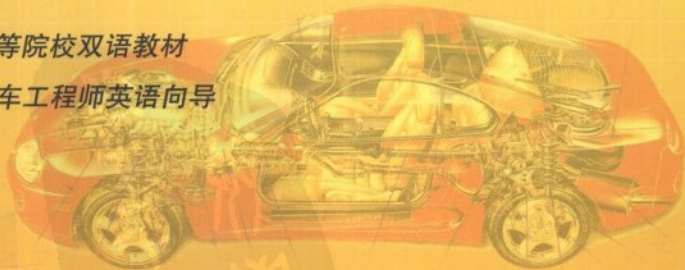
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AUTOMOTIVE FUNDAMENTALS

汽车概论

■ 高等院校双语教材

■ 汽车工程师英语向导



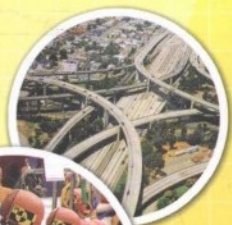
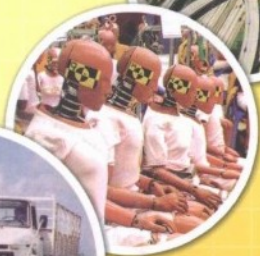
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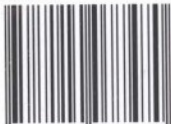
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• A College Bilingual Textbook •
• 汽车工程师英语向导 •
• An English Guide for Automotive Engineers •
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中国汽车工程学会推荐图书

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汽车概论

人民交通出版社

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内 容 提 要

本书是我国高等院校汽车专业自编的第一部双语教材,内容包括:汽车分类、社会纵览、发展历史、结构知识、行驶原理、驾驶维修、道路交通、设计试验、制造技术、展览营销、汽车竞赛、发展趋势等,并附有多媒体教学音像光盘一张。

本书专供理工院校汽车专业开展双语教学使用,并可作为我国汽车工程技术人员提高专业英语交流能力的拓展教材。

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CHAPTER ONE

INTRODUCTION OF MOTOR VEHICLE

1.1 MOTOR VEHICLE CLASSIFICATION

1.1.1 PASSENGER CAR

Passenger cars are motor vehicles that carry people. The classification may differ from country to country. Even the same kind of vehicle can be named differently by region. The classifications in Table 1-1 are commonly used. The relevant classifications of EuroNCAP (European New Car Assessment Program^[1]) and China's standard are also shown.

1.1.1.1 MICROCAR

Microcars^[2] are a type of motor vehicles straddling the range between cars and motorbikes. Although a small amount of microcars are three wheelers, they are not classified into the category of motorbike. The reason is that a microcar has seats and is operated by a steering wheel but a motorbike has a saddle^[3] and a handle bar to steer. Microcars were popular in post-war Europe where their appearance earned them to be called the name Bubble cars^[4]. Examples of microcars are Subaru 360 (Fig. 2-49) and Smart Fortwo (Fig. 1-1a).

两节注释: [1]欧洲新车评估体系; [2]相当于我国的“超微型汽车”; [3]鞍座; [4]带圆形透明顶(像泡泡)的微型轿车。

Car Classifications

Table 1-1

America	Britain	EuroNCAP	China
Microcar	Micro car or Bubble car	—	Mini class car
—	City car	Super mini	
Subcompact car	Super mini		Popular class car
Compact car	Small family car	Small family car	
Mid-size car	Large family car	Large family car	Medium class car
Entry-level luxury car	Compact executive car		
Full-size car	Executive car	Executive car	Mid-high class car
Mid-size luxury car			
Full-size luxury car	Luxury car	—	High class car
Sport car	Sport car	—	Roadster
Grand tourer	Grand tourer	—	
Super car	Super car	—	
Convertible	Convertible	—	
Roadster	Roadster	Roadster	
—	Leisure activity vehicle	Small MPV	MPV
—	Mini MPV		
Compact minivan	Compact MPV		
Minivan	Large MPV	MPV	
Mini SUV	Mini 4 × 4	Small off-roader	SUV
Compact SUV	Compact 4 × 4		
Mid-size crossover SUV	Large 4 × 4	Large off-roader	
Mid-size SUV	Off-roader		
Full-size SUV			

1.1.1.2 HATCHBACKS, SEDANS AND STATION WAGONS

A hatchback car^[1], refers to a small size car with an upper hinged back door^[2]. The term sedan^[3] is used to describe a four-door car with a trunk^[4]. A station wagon^[5] is a car with a roof extending to the rear. The rear body is roomy to carry more luggage than a sedan and suitable for the service at railway station and airport. A station wagon can be equipped with an upper hinged back door, but is not called hatchback car.

CITY CAR

Unlike microcars, a city car with greater speed and safer occupant protection is more adaptable to mixed traffic environments and weather conditions. In Japan, city car is called “kei car^[6]”. Kei car has to meet strict size and engine requirements; engine has a maximum displacement of 660 mL and the car's length must be under 3400 mm. Examples of city cars are Peugeot 107, Fiat Cinquecento and Suzuki Alto.

SUBCOMPACT CAR

Subcompact car^[7] is known as supermini in Europe and light car in Austria. Superminis have three, four or five doors and are designed to seat four passengers comfortably. Current supermini hatchbacks are approximately 3900 mm long, while sedans and station wagons are around 4200 mm long. Today, subcompact cars are of the best selling vehicles in most of the developing countries. Examples of subcompact cars are Ford Fiesta, Suzuki Swift and Volkswagen Polo (Fig. 1-1b).

COMPACT CAR

Compact cars^[8] refer to the longest hatchbacks and sedans and station wagons with similar size. They are approximately 4250 mm long in case of hatchbacks and 4500 mm in the case of sedans and station wagons. Compact cars have room for five adults and usually have engines between 1.6 and 2.2 liters. These are the most popular vehicles in most developed countries. Examples of compact cars are Ford Focus, Toyota Corolla (Fig. 1-1 c) and Volkswagen Golf.

MID-SIZE CAR

Mid-size cars^[9] have room for five adults and a large trunk. Engines are more powerful than compact cars, six-cylinder engines are more common

used than in smaller cars. In Europe, large family cars are rarely over 4700 mm long, while in North America and Australasia they may be well over 4800 mm. Examples of Mid-size cars are Ford Mondeo (Fig. 1-1 d), Toyota Camry, Honda Accord and Volkswagen Passat.

ENTRY-LEVEL LUXURY CAR

Entry-level luxury car^[10] is luxurious equivalent to large family car and compact car. Powerful six- and eight-cylinder engines are common, but rear seat room and trunk space are more reduced than in “non-luxury” models since the extra room is needed to accommodate the larger engine. Examples of entry-level luxury cars are Audi A4 (Fig. 1-1e) and BMW 3 Series.

FULL-SIZE CAR

The term full-size car^[11] is used most in North America and Australia where it refers to the largest sedans on the market. Full-size cars may be well over 5000 mm long and are the roomiest vehicles. Examples of full-size cars are Buick Park Avenue, Chrysler 300 (Fig. 1-1f), Hyundai Grandeur/Azera and Toyota Avalon.

MID-LUXURY CAR

A mid-luxury car^[12] is larger than an entry-level luxury car. They are usually very roomy, powerful and luxurious, making them more expensive than “standard” sedans. Examples of mid-luxury cars are BMW 5 Series and Volvo S80 (Fig. 1-1g).

The full-size car and mid-luxury car are equivalent to the EuroNCAP class “Executive Car^[13]”.

FULL-SIZE LUXURY CAR

A full-size luxury car^[14] is typically a four-door sedan. These are the most powerful sedans, with eight and twelve-cylinder engines and have more equipment than smaller models. Examples of full-size luxury cars are Audi A8, Mercedes-Benz S-Class (Fig. 1-2 d) and Rolls-Royce Phantom.

本节注释: [1]掀背式轿车; [2]顶部装铰链的背门; [3]轿车、四门轿车; [4]行李箱; [5]旅行车(直译:接站车); [6]轻四轮车; [7]准紧凑型轿车; [8]紧凑型轿车; [9]中型轿车; [10]准豪华型轿车; [11]大型轿车; [12]中型豪华轿车; [13]行政轿车; [14]大型豪华轿车。

1.1.1.3 SPORT CARS AND GRAND TOURERS

SPORT CAR

Sport car^[1] is a small lightweight class combining power and handling performance. Often inspired by racing vehicles, this class ranges from sporty vehicles such as the Mazda Miata/MX-5 to derivatives of true racing thoroughbreds^[2] such as the Lotus Elise. Examples of sports cars are Austin-Healey 3000, Honda NSX and Porsche 911 (Fig. 1-2 a).

GRAND TOURER

Grand tourer^[3] is larger, more powerful and heavier than sports cars, these vehicles typically have a FR layout and seating for four passengers (2+2). These are more expensive than sports cars but not expensive as supercars. Some grand tourers are hand-built. Examples of grand tourers are Aston Martin DB9, Ferrari 612 Scaglietti, Jaguar XK8, Maserati Coupe and Mitsubishi GTO.

SUPERCAR

Supercars^[4] are ultra-high performance cars, typically very expensive, luxurious and exceptionally fast. Supercars typically contain cutting-edge technology^[5] and are usually assembled by hand. Examples of supercars are Bugatti Veyron, Lamborghini Murcielago (Fig. 1-2b), McLaren F1 and Porsche Carrera GT.

CONVERTIBLE

Convertible^[6] is also called an open saloon, roadster^[7] or drop-head coupe. This type of car has a roof (fabric, vinyl, metal or glass) which can be folded away. Convertibles were very popular in hotter places before the advent of automotive air-conditioning. 2-seat convertible sports cars are commonly named roadster or spyder. Examples of convertibles are Fiat Barchetta, Volkswagen Eos, Mercedes-Benz SLK and Porsche Boxster.

本节注释: [1]运动汽车; [2]纯血统; [3]跑车、轿跑车; [4]超级跑车; [5]尖端技术; [6]敞篷轿车; [7]活顶跑车。

1.1.1.4 OFF-ROADERS^[1]

SUV

SUVs (Sport Utility Vehicles) are off-road vehicles with a body-on-

frame chassis^[2], four-wheel drive and true off-road capability. They can be troublesome in accidents. A high center of gravity in SUVs means that they rollover more easily than passenger cars. Examples of off-roaders / SUVs are Mitsubishi Pajero, Land Rover, Range Rover and Suzuki Samurai. This category is equivalent to the EuroNCAP class “Large Off-Roaders”.

CROSSOVER SUV

Crossover SUVs^[3] have a monocoque construction^[4] and lower ground clearance^[5] than SUVs. Some of them have traction control^[6] and adjustable suspension^[7] to improve off-road capabilities. Examples of crossover SUVs are Acura MDX, Toyota RAV4 and Volvo XC90. This category is equivalent to the EuroNCAP class “Small Off-Roaders”.

本节注释: [1]越野汽车; [2]非承载式车身、车身与车架分开的结构; [3]轿车式SUV; [4]承载式车身、无车架的整体车身结构; [5]离地间隙; [6]驱动力控制装置; [7]可调节车身离地高度的悬架。

1.1.1.5 MINIVANS^[1]/MPVS (Multi-Purpose Vehicles^[2])

Also known as people carriers, this class of cars resemble tall station wagons^[3]. Larger minivans may have seating for up to eighth passengers. Being taller than a family car improves visibility for the driver (while reducing visibility for other road users) and may help access for the elderly or disabled^[4]. They also offer more seats and increased load capacity than hatchbacks or station wagons. Examples of mini MPVs are Fiat Idea, Hyundai Matrix, Renault Modus and Suzuki Wagon R. Examples of compact MPVs are Chevrolet HHR, Volkswagen Touran (Fig. 1-3 a) and Mazda 5. Both categories are equivalent to the EuroNCAP class “Small MPVs”. Examples of large MPVs / minivans are Buick G8 (Fig. 1-3 b), Dodge Caravan, Peugeot 807 and Toyota Previa. This category is equivalent to the EuroNCAP class “MPVs”.

In some countries, the term “van” can refer to a small panel van^[5] based on a passenger car design (often the station wagon / estate model); it also refers to light trucks, which themselves are sometimes based on SUVs or MPVs. (But note that those retaining seats and windows, while being larger and more utilitarian than MPVs, may be called “minibuses”.) The term is

also used in the term “camper van^[6]”, equivalent to a North American recreational vehicle^[7]. In the United States, the term “van” refers to vehicles that, like European minibuses, are even larger than large MPVs and are rarely seen being driven for domestic purposes, except for “conversion vans^[8]”. These possess extremely large interior space and are often more intended for hauling cargo than people. Most vans use body-on-frame construction and are thus suitable for extensive modification and coachwork, known as conversion. Conversion vans are often quite luxurious, boasting comfortable seats, soft rides, built-in support for electronics such as television sets, and other amenities. The more elaborate conversion vans straddle the line between cars and recreational vehicles. Examples of North American “vans” are Dodge Ram Van, Ford E-Series and GMC Savana. Examples of European “vans” are Ford Transit, Mercedes-Benz Sprinter and Renault Trafic.

本节注释: [1]小厢式车; [2]多用车; [3]加高旅行车; [4]功能障碍者、残疾人; [5]小型厢式货车(两侧的后窗用钢板封闭); [6]野营厢式车; [7]娱乐车; [8]经装修的厢式车。

1.1.2 BUS

A bus is a large road vehicle designed to carry numerous passengers in addition to the driver and sometimes a conductor^[1]. The name is a neologic version of the Latin “omnibus”, which means “for everyone.”

Types of Buses

Table 1-2

America	China	
	Name	Bus length (m)
Commuter bus	Urban bus, City bus	Medium ($7 < L \leq 10$) or Large ($10 < L \leq 12^*$)
Motorcoach	Intercity bus	
Double-decker bus	Double-decker bus	$10 < L \leq 12^*$
Articulated bus	Articulated bus	$L \leq 18$
—	Microbus	$L \leq 3.5$
Minibus	Light bus	$3.5 < L \leq 7$
Midibus	Medium bus	$7 < L \leq 10$
Trolley bus	Trolley bus	

* Length of a triple-axle single unit bus can be up to 13.7 m.

1.1.2.1 BUS FOR LOCAL TRANSPORTATION

COMMUTER BUS

Commuter bus^[2] (Local transit bus or City bus) (Fig. 1-4 a) usually has two axles (duallies^[3] on the drive axle), and two doors (one front, one mid-rear), allowing efficient internal traffic flow. Their seats are usually fixed and limited, leaving room for standing passengers. Having no need for a luggage compartment, many have low floor design, further easing entry and exit. Double-decker buses^[4] (Fig. 1-4c), articulated buses^[5] or extra-long triple-axled buses are often used on urban routes with heavy passenger loads. An articulated bus is sometimes called a bendy bus.

SCHOOL BUS

School buses^[6] (Fig. 1-4b) are lighter, they have only one passenger door, seats more closely spaced, and no standing room. North American versions are based on truck chassis, and must meet special USDOT (US Department of Transportation)^[7] standards including distinct color, design or markings to make the bus recognizable as a school bus, and warning lights and signs to warn traffic when children are getting in and out.

TROLLEY BUS

Trolley buses^[8] are similar in appearance and function to commuter buses, but powered by an electric motor supplied by overhead power cables^[9] rather than by an onboard internal combustion engine.

两节注释: [1]乘务员、售票员; [2]城市客车(注意:不要误译为我国的“班车”); [3]指双胎; [4]双层客车; [5]铰接式客车; [6]校车; [7]美国交通局; [8]无轨电车; [9]电力架线。

1.1.2.2 MOTORCOACH

Motorcoaches^[1] (Fig. 1-4d), also known as intercity coaches, are heavier, with usually three axles, one passenger door and no standing room. Seats are usually soft and able to recline. The floor is high, allowing large under-floor luggage compartments. There is usually a small carry-on luggage rack within the passenger cabin. Besides their use for intercity transportation, motorcoaches are used for long-distance airport shuttle service^[2], local touring and charters^[3], for large groups, and so on. They

have seats for 47 to 62 passengers. Tour coaches^[4], especially cross-country touring coaches, are often equipped with a lavatory, video system, PA system^[5], and other amenities appropriate for hours of comfortable travel.

Short-distance tour buses are simpler, having a PA system and sometimes a video system. Some retired double-deckers and specialty vehicles are used in the local tour bus business.

本节注释: [1]长途客车; [2]穿梭于两地的营运; [3]包车; [4]旅游客车、游览客车; [5]有线广播系统。

1.1.2.3 OTHER TYPES OF BUSES

MINIBUS

Minibuses^[1] are one size up from large passenger vans, and seat up to 25 passengers. Some may include a small space for luggage. Usually derived from heavy-duty small truck platforms such as cutaway van chassis, minibuses are often used for short-distance shuttles, city tours, and local charters. Many are wheelchair-lift^[2] equipped and used in paratransit^[3] capacities.

MIDIBUS

Midibuses^[4], or mid-sized buses, are larger than minibuses, but smaller than motorcoaches, thus seating between 26 and 47. They can be front- or rear-engined, and have a variety of designs depending on specific needs. For example, they may be used to transport airport passengers between the terminal and distant parking lots; such vehicles may sacrifice seats for interior luggage space. The truck-based ones^[5] can pack in enough seats to rival a motorcoach, but lack the luggage space and other amenities. However, they are also much cheaper.

SHUTTLE BUS

Shuttle bus^[6] provides transit service between two destinations, such as an airport and city center. Shuttle bus services are often provided by colleges, airports, shopping areas, companies, and amusement destinations.

TOUR BUS

Tour bus service shows tourists notable sights by bus. City tour buses often simply pass by the sites while a tour guide^[7] describes them. Longer

distance tour coaches generally allow passengers to disembark at specific points of interest.

PARKING LOT TRAMS

Parking lot trams are a specialized form of bus, found in the parking lots of amusement parks such as Disneyland^[8] and Walt Disney World. Those vehicles consist of an engine-car or motor-car (which may or may not be passenger-carrying) chained up to a passenger-carrying trailer or number of trailers, thus making a kind of road train.

本节注释: [1]相当于我国的轻型客车,或“中巴”(注意:不要误译为微型客车); [2]轮椅提升器; [3]运送残疾人; [4]中型客车; [5]在货车的基础上改装的客车; [6]穿梭客车; [7]导游员; [8]迪斯尼乐园。

1.1.3 TRUCK

1.1.3.1 AMERICAN DEFINITIONS

The following definitions are given by the United States Federal Highway Administration (FHWA).

Trucks are motor vehicles to carry goods. They are further subdivided by number of axles and number of units, including both power and trailer units^[1]. Note that the addition of a light trailer to a vehicle does not change the classification of the vehicle.

In reporting information on trucks the following criteria should be used:

(1) Truck tractor units^[2] traveling without a trailer will be considered single-unit trucks.

(2) A truck tractor unit pulling other such units in a “saddle^[3] mount” configuration will be considered one single-unit truck and will be defined only by the axles on the pulling unit.

(3) Vehicles are defined by the number of axles in contact with the road. Therefore, “floating” axles^[4] are counted only when in the down position.

(4) The term “trailer” includes both semi- and full trailers^[5].