Высшее профессиональное образование

АНГЛИЙСКИЙ ЯЗЫК ДЛЯ СПЕЦИАЛЬНОСТИ «АВТОМОБИЛИ И АВТОМОБИЛЬНОЕ ХОЗЯЙСТВО»

ENGLISH FOR STUDENTS OF MOTOR TRANSPORT AND MOTOR CAR INDUSTRY

Учебное пособие

Транспорт

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Авторы:
Г. В. Шевцова — Part I, Texts for Supplementary Reading;
В. Е. Сумина — Part II, Glossary;
О. Г. Лебедева — Part III, Grammar Review, Texts for Supplementary Reading;
С. В. Рождественская — Part IV, Abbreviations List

Рецензенты:
кандидат филологических наук, доцент кафедры
социально-гуманитарных дисциплин Ставропольского института
экономики и управления им. О. В. Казначеева *И. И. Лизенко*;
кандидат технических наук, доцент кафедры технологии машиностроения
Южно-Российского государственного технического университета *И. Д. Дерлугян*

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Пособие написано в соответствии с программой по иностранным языкам для неязыковых вузов. Учебный материал направлен на формирование и развитие языковой коммуникативной компетенции и навыков профессионально ориентированного языкового взаимодействия.

Содержит тексты, заимствованные из оригинальной литературы и охватывающие основные направления данной специальности, разнообразные упражнения, дополнительные тексты для чтения, список сокращений, краткий грамматический справочник и глоссарий.

Для студентов 1-го и 2-го курсов учреждений высшего профессионального образования, обучающихся по специальности «Автомобили и автомобильное хозяйство».

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ПРЕДИСЛОВИЕ

Настоящее пособие предназначено для студентов 1-го и 2-го курсов технических вузов, обучающихся по специальности «Автомобили и автомобильное хозяйство», владеющих английским языком в объеме программы средней школы. При его составлении авторы руководствовались требованиями ГОС в образовательной области «Иностранный язык» и Программой по иностранным языкам для неязыковых вузов. Пособие рассчитано на 280 часов аудиторных занятий и внеаудиторной самостоятельной работы студентов.

Поскольку современный вузовский курс иностранного языка призван носить профессионально ориентированный коммуникативный характер, основной целью данного учебного пособия является обучение студентов чтению, пониманию и переводу научно-технической литературы по специальности, а также развитие навыков устной речи в области профессиональной коммуникации.

Как представляется авторам, профориентированность пособия, его тесная связь с профилирующими предметами поможет повысить мотивацию овладения английским языком, позволит студентам расширить свои знания по специальности, а также создаст дополнительные возможности для целенаправленного использования полученных языковых знаний в образовательном процессе и профессионально-трудовой сфере. С этой целью в пособие включены аутентичные тексты научно-популярного характера, общепрофессиональные и специализированные тексты из английских и американских источников, отобранных по тематическому принципу.

Пособие состоит из 4 частей (Parts), содержащих 12 уроков (Units), раздела дополнительных текстов для чтения (Texts for Supplementary Reading), краткого грамматического справочника (Grammar), глоссария (Glossary) и ответов к упражнениям (Keys).

Части 1 — 2, тематика которых носит обучающий, развивающий и познавательный характер, рекомендуются для изучения на первом курсе. Части 3 — 4, тематика которых носит общенаучный и специализированный характер, рекомендуются для изучения на втором курсе.

Каждый урок начинается с раздела «Активный словарь» (*Active Vocabulary*), содержащего наиболее употребительную общенаучную, общепрофессиональную и специализированную лексику, овладение которой повышает способность реализации речевого общения в рамках заданной тематики.

Предтекстовые упражнения (*Pre-Text Exercises*), содержащиеся в каждом уроке, включают лексические упражнения на подбор синонимов и антонимов, перевод терминов и словосочетаний, что готовит студентов к самостоятельной работе над текстом, а также упражнения

на словообразование (*Word-Building*), направленные на расширение потенциального словаря.

Большое внимание уделено чтению и переводу специальных текстов, предназначенных для работы в аудитории, которые содержат большое количество терминов, используемых в области автомобилестроения. Работа с текстами предполагает развитие четырех видов чтения — изучающего, ознакомительного, поискового и просмотрового, широко представленных в каждом уроке, выбор которых определяется задачей, поставленной при работе с оригинальной литературой: аутентичными общенаучными текстами, материалами по истории автомобилестроения, общепрофессиональными текстами, научно-популярной информацией. Для закрепления навыков устной речи по специальности тексты снабжены системой упражнений: ответы на вопросы, составление вопросов, пересказ текстов, дополнение предложений, реферирование.

Послетекстовые упражнения (*Text and Vocabulary Exercises*) предусматривают закрепление пройденного лексического материала, выработку навыков понимания текста и извлечение нужной информации, а также развитие навыков устной речи.

В каждый урок включены тренировочные упражнения по грамматическим темам (*Grammar*), встречающимся в текстах и вызывающим особые трудности при переводе. В заданиях к упражнениям на перевод или тренировку какой-либо грамматической конструкции не указывается форма их выполнения (устная или письменная), поскольку структура пособия разработана таким образом, что преподаватели могут варьировать формы выполнения упражнений с учетом уровня подготовки студентов.

Тексты для дополнительного чтения (*Texts for Supplementary Reading*) служат для закрепления навыков перевода технической литературы, расширения профессионального кругозора студентов, активного обсуждения изученного материала, а также носят воспитательный характер.

Краткий грамматический справочник (*Grammar Review*) поясняет материал, встречающийся в уроках. Он также содержит сведения о способах словообразования и рекомендации по переводу, реферированию, аннотированию. Предназначается для самостоятельной работы над грамматическими темами, представляющими трудности при переводе.

В конце пособия помещен глоссарий (*Glossary*), объясняющий основные термины, список сокращений, часто употребляемых в технических текстах (Abbreviations List), и ключи-ответы к упражнениям для самоконтроля (Keys).

Работа с пособием предполагает аудиторные групповые занятия под руководством преподавателя; обязательную самостоятельную работу студента, выполняемую во внеаудиторное время; индивидуальную самостоятельную работу студента под руководством преподавателя; индивидуальные консультации.

Авторы выражают надежду, что данное пособие будет способствовать интересной и творческой работе студентов.

PART I

HISTORY OF THE AUTOMOBILE

UNIT 1

ACTIVE VOCABULARY

1. Read and remember the following words:

boiler — котел
bore — отверстие
to bypass — обходить
buggy — легкий экипаж
clockwork — заводной механизм
cobble — крупная галька, булыжник
condensing agent — уменьшающий объем реагент
crude — необработанный, грубый
development — развитие
electric spark ignition — зажигание от электрической искры
engine — двигатель
flurry — волнение, суета
freight — груз
gear — привод
gunpowder — порох
to haul — тащить, тянуть
internal combustion engine — двигатель внутреннего сгорания
iron rim — железный обод
overhead — подвесной
piped — соединенный трубами
pressure — давление
rear wheel — заднее колесо
replica — точная копия
to show up — показывать
spinning wheel — вращающееся колесо, прялка
stationary — закрепленный, неподвижный
stroke — рабочий ход, такт
tiller steering — управление с помощью рукоятки
tubular frame — трубчатая рама
vehicle — транспортное средство
walking beam — поворотный рычаг с возвратно-поступательным движением

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

A steam powered vehicle, to be not under pressure, to be much more efficient and compact, to be the first of this kind, there is no information about..., to compress the gas, to be limited by..., purpose of the vehicle, to be under pressure, a wind driven vehicles, to be able to separate from, to drive a car, to offer a prize to the winner.

3. Give antonyms to the following words:

different	unlimited	weakness	to connect
last	uncertain	low speed	unsuitable (for)

4. Give synonyms to the following words:

alike	to suppose	huge	bounded
force	to detach	discovery	vapour
effectual	energy	to topple over	suitable (for)

WORD-BUILDING

5. Translate the following compound words:

Windmill, clockwork, railroad, gunpowder, tramway, waterway, pipeline, railway, highway, airway, airplane, human-powered, skateboard, best-known, household, low-pollution, air-resistance, troubleshooter, air-actuated, air-bag, air-blast, air-break, air-conditioned, air-core, air-cushion, air-dried, air-handling, airflow, airframe.

6. Translate the following nouns with the suffixes:

-age breakage, shortage, storage, bondage, advantage, usage, passage, shrinkage, stoppage, leakage, wreckage, postage;

-al approval, arrival, proposal, refusal, rehearsal;

-ance acceptance, accordance, appearance, observance, resistance, performance, maintenance, admittance;

-ant applicant, occupant, participant, reactant, assistant, resistant, accelerant.

7. Define to what parts of speech the following words with prefixes refer and translate them:

a- amassment, amass, amassable, asymmetry, asymmetrical, acromatism, acromatize, acromatic, adynamia, adynamic;

ab- absorption, absorb, absorptive, abnormality, abnormal, abirritant;

ad- admeasurement, admeasure, admeasurable, adsorption, adsorb, adsorptive, admixture, admix;

ana- anaculture, anacultural, analogy, analogous, anaphase, anaphasic.

TEXT WORK

8. Read the text below to learn about the early history of vehicles:

Text 1A. What Was the First Car?

by William W. Bottorff

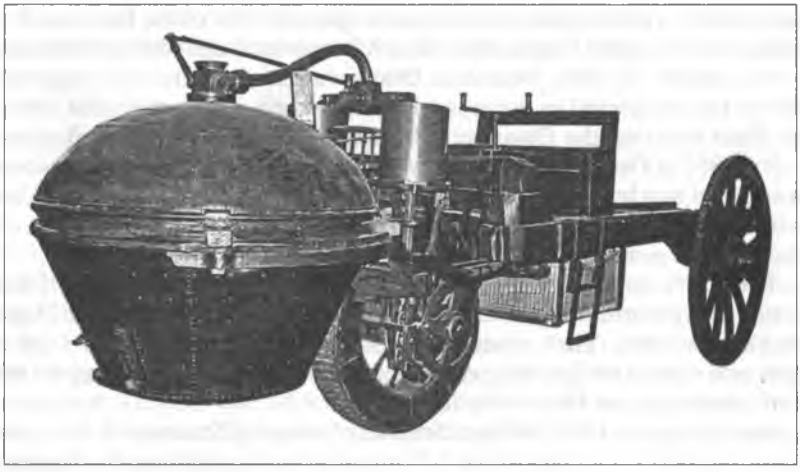
Several Italians recorded designs for wind driven vehicles. The first was Guido da Vigevano in 1335. It was a windmill type drive to gears and thus to wheels. Vaturio designed a similar vehicle which was also never built. Later Leonardo da Vinci designed a clockwork driven tricycle with tiller steering and a differential mechanism between the rear wheels.

A Catholic priest named Father Ferdinand Verbiest has been said to have built a steam powered vehicle for the Chinese Emperor Chien Lung in about 1678. There is no information about the vehicle, only the event. Since Thomas Newcomen built his first steam engine only in 1712, we can guess that this was possibly a model vehicle powered by a mechanism like Hero's steam engine, a spinning wheel with jets on the periphery.

Newcomen's engine had a cylinder and a piston and was the first of this kind, and it used steam as a condensing agent to form a vacuum and with an overhead walking beam, pull on a rod to lift water. It was an enormous thing and was strictly stationary. The steam was not under pressure, just an open boiler piped to the cylinder. It used the same vacuum principle that Thomas Savery had patented to lift water directly with the vacuum, which would have limited his pump to less than 32 feet of lift. Newcomen's lift would have only been limited by the length of the rod and the strength of the valve at the bottom.

Somehow Newcomen was not able to separate his invention from that of Savery and had to pay for Savery's rights. In 1765 James Watt developed the first pressurized steam engine which proved to be much more efficient and compact than the Newcomen engine.

The first vehicle to move under its own power for which there is a record was designed by Nicholas Joseph Cugnot and constructed by M. Brezin in 1769. A replica of this vehicle is on display at the *Conservatoire des Arts et Metiers*, in Paris. The Smithsonian Museum in Washington, D. C. also has a large (half size) scale model. A second unit was built in 1770 which weighed 8,000 pounds and had a top speed on 2 miles per hour, and on the cobble stone streets of Paris this was probably as fast as anyone wanted to go it. The early steam powered vehicles were so heavy that they were only practical on a perfectly flat surface as strong as iron. A road thus made out of iron rails became the norm for the next hundred and twenty five years. The vehicles



got bigger and heavier and more powerful and as such they were eventually capable of pulling a train of many cars filled with freight and passengers.

Many attempts had been made in England by the 1830's to develop a practical vehicle that didn't need rails. A series of accidents and propaganda from the established railroads caused a flurry of restrictive legislation to be passed and the development of the automobile bypassed England. Several commercial vehicles were built but they were more like trains without tracks.

The development of the internal combustion engine had to wait until fuel was available to combust internally. Gunpowder was tried but didn't work out. Gunpowder carburetors are still hard to find. The first gas really did use gas. They used coal gas generated by heating coal in a pressure vessel or boiler. A Frenchman named Etienne Lenoir patented the first practical gas engine in Paris in 1860 and drove a car based on the design from Paris to Joinville in 1862. His one-half horse power engine had a bore of 5 inches and a 24 inch stroke. It was big and heavy and turned 100 rpm. Lenoir died in 1900.

Lenoir had a separate mechanism to compress the gas before combustion. In 1862, Alphonse Bear de Rochas figured out how to compress the gas in the same cylinder in which it was to burn, which is the way we still do it. This process of bringing the gas into the cylinder, compressing it, combusting the compressed mixture, then exhausting it is known as the Otto cycle, or four cycle engine. Lenoir claimed to have run the car on benzene and his drawings show an electric spark ignition. If so, then his vehicle was the first to run on petroleum based fuel, or petrol, or what we call gas, short for gasoline.

Siegfried Marcus, of Mecklenburg, built a car in 1868 and showed one at the Vienna Exhibition in 1873. His later car was called the *Strassenwagen* had about 3/4 horse power at 500 rpm. It ran on crude wooden wheels with iron rims and stopped by pressing wooden blocks against the iron rims, but it had a clutch, a differential and a magneto ignition. One of the four cars which Marcus built is in the Vienna Technical Museum and can still be driven under its own power. In 1876, Nokolaus Otto patented the Otto cycle engine, de Rochas had neglected to do so, and this later became the basis for Daimler and Benz breaking the Otto patent by claiming prior art from de Rochas.

In 1885, in Gottllieb Daimler's workshop in Bad Cannstatt the wooden motorcycle was built. Daimler's son Paul rode this motorcycle from Cannstatt to Unterturkheim and back on November 10, 1885. Daimler used a hot tube ignition system to get his engine speed up to 1000 rpm.

The previous August, Karl Benz had already driven his light, tubular framed tricycle around the Neckar valley, only 60 miles from where Daimler lived and worked. They never met. Frau Berta Benz took Karl's car one night and made the first long car trip to see her mother, travelling 62 miles from Mannheim to Pforzheim in 1888.

Also in August 1888, William Steinway, owner of Steinway & Sons piano factory, talked to Daimler about US manufacturing right and by September

had a deal. By 1891 the Daimler Motor Company, owned by Steinway, was producing petrol engines for tramway cars, carriages, quadracycles, fire engines and boats in a plant in Hartford, CT. Steam cars had been built in America since the Civil War but the early ones were like miniature locomotives. In 1871, Dr. J. W. Carhart, professor of physics at Wisconsin State University, and the J. I. Case Company built a working steam car. It was practical enough to inspire the State of Wisconsin to offer a $10,000 prize to the winner of a 200 mile race in 1878. The 200 mile race had seven entries, of which two showed up for the race. One car was sponsored by the city of Green Bay and the other by the city of Oshkosh. The Green Bay car was the fastest but broke down, and the Oshkosh car finished with an average speed of 6 mph.

From this time until the end of the century, nearly every community in America had a mad scientist working on a steam car. Many old news papers tell stories about the trials and failures of these would be inventors.

By 1890 Ransom E. Olds had built his second steam powered car. One was sold to a buyer in India, but the ship it was on was lost at sea. Running by February, 1893, and ready for road trials by September, 1893, the car built by Charles and Frank Duryea, brothers, was the first gasoline powered car in America. The first run on public roads was made on September 21, 1893, in Springfield, MA. They had purchased a used horse drawn buggy for $70 and installed a 4HP, single cylinder gasoline engine. The car (buggy) had a friction transmission, spray carburettor and low tension ignition. It must not have run very well because Frank didn't drive it again until November 10, when it was reported by the *Springfield Morning Union* newspaper. This car was put into storage in 1894 and stayed there until 1920 when it was rescued by Inglis M. appreciated and presented to the United States National Museum.

TEXT AND VOCABULARY EXERCISES

9. Choose the right word and fill in the gaps.

1. Vaturio ... a similar vehicle which was also never built.
a) designed b) proposed c) applied

2. Newcomen's ... had a cylinder and a piston and was the first of this kind.
a) carburetor b) engine c) muffler

3. The first vehicle ... under its own power for which there is a record was designed by Nicholas Joseph Cugnot.
a) to move b) to fly c) to navigate

4. The early ... powered vehicles were so heavy that they were only practical on a perfectly flat surface as strong as iron.
a) gas b) petroleum c) steam

5. Many attempts had been made in England by the 1830's to develop a practical vehicle that didn't need ... .
a) rails b) road c) highway

6. The development of the internal combustion engine had to wait until fuel was available ... internally.
a) to evaporate b) to combust c) to vaporize

7. ... cars had been built in America since the Civil War.
a) gas b) steam c) petroleum

10. Find in the text equivalents to the following phrases:

Управляемые ветром транспортные средства, сила клапана, пар под давлением, длина рычага, был разработан, высшая скорость, транспортные средства стали больше и тяжелее, делать много попыток, газовый двигатель, двигатель внутреннего сгорания, деревянные колеса, бензиновый двигатель.

11. Find the English equivalents to the following Russian words:

1) проект	a) design	b) decision	c) designation
2) колесо	a) while	b) wheel	c) wheal
3) транспортное средство	a) vehicle	b) vehicular	c) velocimeter
4) двигатель	a) engineer	b) engineering	c) engine
5) тяжелый	a) heavy	b) have	c) heave
6) мощный	a) powering	b) powerful	c) powerless
7) ограничительный	a) descriptive	b) restocking	c) restrictive
8) развитие	a) devotion	b) description	c) development
9) сгорать	a) to combust	b) to combine	c) to coincide
10) поездка	a) strip	b) trip	c) track
11) вдохновить	a) to impress	b) to inspire	c) to imprint
12) с тех пор	a) science	b) since	c) sincere

12. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

a steam powered vehicle
the first vehicle to move under its own power
a road made out of iron rails
the first gas engine
combusting the compressed mixture
steam powered car
first steam engine
the development of the internal combustion engine
a top speed
one-half horse power engine
wooden wheels
single cylinder gasoline engine

13. Divide text 1A into logical parts and give each a suitable title.

14. Fill in the gaps with the words from the box:

is derived	include	terms	transportation	vehicle	driver

An automobile is a wheeled 1)___ that carries its own motor. Different types of automobiles 2) ___ cars, buses, trucks, vans, and motorcycles, with cars being the most popular. The term 3) ___ from Greek 'autos' (self) and Latin 'movēre' (move), referring to the fact that it 'moves by itself'. Earlier 4) ___ terms for automobile include 'horseless carriage' and 'motor car'. An automobile has seats for the 5) ___ driver and, almost without exception, one or more passengers. It is the main source of 6) ___ across the world.

Check your answers on p. 321

TEXT WORK

15. Read and translate the text.

Text 1B. The First Automobile Companies

Henry Ford had an engine running by 1893 but it was 1896 before he built his first car. By the end of the year Ford had sold his first car, which he called a Quadracycle, for $200 and used the money to build another one. With the financial backing of the Mayor of Detroit, William C. Maybury and other wealthy Detroiters, Ford formed the Detroit Automobile Company in 1899. A few prototypes were built but no production cars were ever made by this company. It was dissolved in January 1901. Ford would not offer a car for sale until 1903.

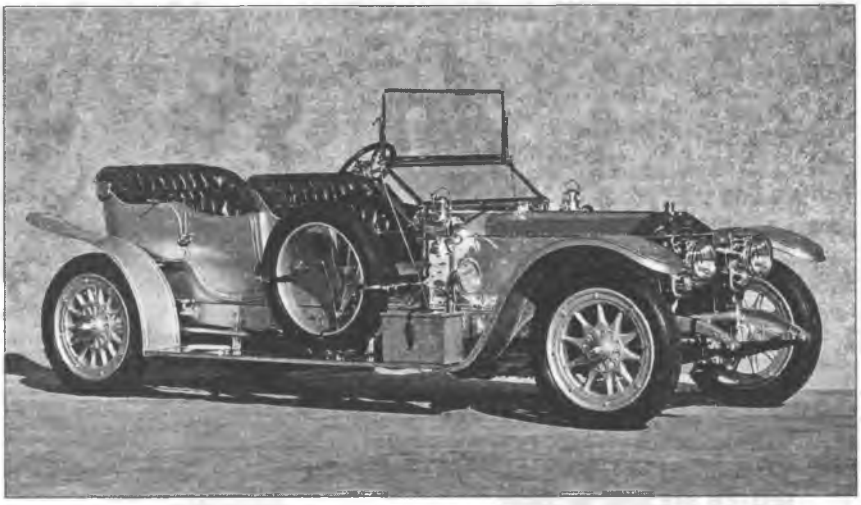
The first closed circuit automobile race held at Narragansett Park, Rhode Island, in September 1896. All cars were Duryeas and a Morris & Salom Electrobat. Thirteen Duryeas of the same design were produced at the factory in 1896, making it the first production car. In 1898, the broth-

ers Duryea, the owners of the factory, went their separate ways and the Duryea Motor Wagon Company was closed. Charles, who was born in 1861 and was eight years older than Frank, had taken advantage of Frank in publicity and patents. Frank went out on his own and eventually joined with Stevens Arms and Tool Company to form the Stevens—Duryea Company which was sold to Westinghouse in 1915. Charles tried to produce some of his own hare-brained ideas with various companies until 1916. Thereafter, he limited himself to writing technical book and articles. He died in 1938. Frank got a half a million dollars for the Westinghouse deal and lived in comfort until his death in 1967, just seven months from his 98th birthday.

In 1899, production of the Olds Motor Vehicle Company of Detroit began. After an early failure with luxury vehicles they established the first really successful production with the classic Curved Dash Oldsmobile.

The Curved Dash Oldsmobile had a single cylinder engine, tiller steering and chain drive. It sold for $650. In 1901, 600 were sold and the next years were 1902 — 2,500, 1903 — 4,000, 1904 — 5,000. In August 1904, Ransom Olds left the company to form Reo (for Ransom Eli Olds). Ransom E. Olds was the first mass producer of gasoline powered automobiles in the United States, even though Duryea was the first auto manufacturer with their 13 cars. Ransom Olds produced a small number of electric cars around the turn of the century. Little is known about them and none survive. In 1899 and 1900, electrics outsold all other type of cars and the most popular electric was the Columbia built by Colonel Albert Augustus Pope, owner of American Bicycle Company.

Lutzmann of 1895 by J. A. Koosen and H. Lawson is typical of American design in the mid 1890's. It was truly a horseless carriage. Tiller steering, engine under the floorboards, very high center of gravity, not



designed for road travel. Imagine climbing into one of these and trying to drive across town and around a few corners. This Daimler of 1899 was owned by Lionel Rothchild. The European design is much advanced of the American designs of the same time. Gottlieb Daimler took part in the London-to-Brighton run in 1896 but died in 1900 at the age of 66 without ever meeting Benz. His German engines powered the automobile industries of Britain and France. The 1908 Haynes in the back ground shows the rapid development of the petrol powered car when compared to the 1894 model in the foreground. The Rolls Royce Silver Ghost of 1906 was a six cylinder car that stayed in production until 1925. It represented the best engineering and technology available at the time and these cars still run smoothly and silently today. This period marked the end of the beginning of the automobile.

Notes on the text

hare-brained ideas — легкомысленные идеи
financial backing — финансовая поддержка

TEXT AND VOCABULARY EXERCISES

16. Translate into Russian the following words and word combinations:

Prototype, production cars, of the same design, a single cylinder engine, tiller steering, chain drive, the first mass producer, gasoline powered automobiles, auto manufacturer, electric cars, a horseless carriage, center of gravity, road travel, rapid development, a six cylinder car, to represent the best engineering and technology.

17. Find in the text the English equivalents to the following Russian words:

строить	выжить
развитие	действительно
преимущество	представлять
изготовитель	богатый
типичный	гонка
создавать; организовывать	бензин
поддержка	тип, модель
производство	быстрый
производитель	начало

18. Compose your own sentences with each English equivalent of the words given in exercise 17. Compare your variants with the sentences of your partner.

19. Work in pairs and decide whether these statements according to text 1B are true or false:

1. Ford had sold his first car, which he called a Quadracycle, to build another one. **2.** Without any financial backing of wealthy people Ford formed the Detroit Automobile Company in 1899. **3.** Ransom E. Olds was the first mass producer of gasoline powered automobiles in the United States. **4.** By the end of the century Ransom Olds had produced a great number of electric cars. **5.** Lutzmann of 1895 was an automobile of typically European design. **6.** The European design was much advanced of the American designs of the same time. **7.** The Rolls Royce Silver Ghost of 1906 was a single cylinder car that stayed in production until 1925. **8.** The Rolls Royce Silver Ghost represented the best engineering and technology available at the time.

20. Translate the following sentences into English using a dictionary:

1. История автомобильной промышленности насчитывает более чем 100 лет. **2.** Автомобильная промышленность часто расценивается как главный двигатель индустриального роста двадцатого столетия. **3.** Методы производства автомобилей, от их кустарного изготовления до массового производства, всегда имели большое влияние на организацию и технологию других отраслей промышленности. **4.** Современные автомобили состоят из более 1 200 деталей. **5.** Автомобильная промышленность является важным и динамичным сектором промышленности практически любой экономически развитой страны. **6.** Использование автомобилей привносит комфорт, скорость и удобство в современную жизнь человека. **7.** Огромный рост количества транспортных средств приводит к загрязнению окружающей среды. **8.** Современная стратегия автомобильной промышленности состоит в том, чтобы сделать транспортные средства более эффективными и экологически безопасными.

GRAMMAR

21. Проанализируйте формы глагола Simple Active и Passive, приведенные в таблице:

Simple Tenses		
	Active	Passive
Infinitive	to discuss	to be discussed
Present	They discuss a lot of questions.	A lot of questions are discussed at the lecture.
Past	They discussed a lot of questions.	A lot of questions were discussed at the lecture.
Future	They will discuss a lot of questions.	A lot of questions will be discussed at the lecture.

22. Сравните следующие пары предложений и переведите их на русский язык:

1. We often regard the automobile as convenient means of transportation. The automobile is often regarded by us as convenient means of transportation. **2.** A group of specialists discussed new design of the automobile. New design of the automobile was discussed by a group of specialists. **3.** Professor asked many questions after the lecture. Professor was asked many questions after the lecture. **4.** The development of ecologically safe automobile will positively affect human lives. Human lives will be positively affected with the development of ecologically safe automobile. **5.** My friend will thoroughly develop the plan of the scientific report. The plan of the scientific report will be thoroughly developed by my friend. **6.** Today developers and designers make many attempts to create the practical, effective and safe automobile. Many attempts are made today by developers and designers to create the practical, effective and safe automobile.

23. Переведите следующие предложения, обращая внимание на время и залог сказуемого:

a) 1. First year students *get* general scientific education and *study* Maths, Physics, Foreign Languages and other subjects. **2.** The right to education *is stated* in the constitution of the Russian Federation. **3.** Engineering education in Russia *started* with organization of School for Mathematical and Navigational Crafts in Moscow. **4.** Most of Russia's universities *are located* in large cities. **5.** Moscow State University, which *was founded* in 1755, *enjoys* the highest reputation. **6.** Many Russian universities *offer* distance education. **7.** A number of research institutes *were created* from the laboratories and the departments of the university. **8.** A wide range of educational

services and educational programmes *are provided* by modern universities. **9.** Soon some graduate and training programmes *will be conducted* in foreign languages at our university. **10.** In the United States, students *begin* higher education after completing 12 years of secondary school.

b) 1. The term transport *is derived* from the Latin. **2.** People *need* transport to go from one place to the other. **3.** The most important transport problems *are related* to urban areas, when transport systems cannot satisfy the numerous requirements of urban mobility. **4.** The term 'automobile' *is derived* from Greek. **5.** Early automobiles *were* often *referred* to as 'horseless carriages'. **6.** The automotive industry *is* a key industry in the European economy. **7.** Internal-combustion engine fuel system *includes* all of the units through which the fuel and air travel to the combustion chamber of the engine. **8.** All engines with eight and more cylinders *are* usually *provided* with dual carburettors. **9.** Several Italians *recorded* designs for wind driven vehicles. **10.** The first vehicle to move under its own power *was designed* by Nicholas Joseph Cugnot. **11.** A Frenchman named Etienne Lenoir *patented* the first practical gas engine in Paris, in 1860, and *drove* a car based on the design from Paris to Joinville in 1862. **12.** Automobiles of the future *will be created* from easy, practical and safe materials.

24. Запомните следующие глаголы, требующие после себя определенных предлогов, и переведите предложения:

to refer to	ссылаться на что-л.
to take care of	заботиться
to send for	посылать за кем-то
to listen to	слушать что-л.
to look for	искать что-л., кого-л.
to look after	присматривать
to look through	просматривать
to pay attention to	обращать внимание на
to wait for	ждать кого-л.
to speak to sb about sth	говорить с кем-л. о чем-л.

1. Professor was listened to with great attention. **2.** This scientist is much spoken about. **3.** His books are often referred to. **4.** She looks after her little son. **5.** The documents were sent for. **6.** The works of this scientist are always paid attention to. **7.** He is always waited for. **8.** The document was looked for everywhere. **9.** He looked through the material before the lecture. **10.** He takes care of his elderly parents.

25. Употребите глаголы, данные в скобках, в требуемых по смыслу формах:

1. Accidents (*to seem*) as old as automobile vehicles themselves. **2.** Joseph Cugnot (*to crash*) his steam-powered 'Fardier' against a wall in 1770. **3.** Early safety research (*to focus*) on increasing the reliability of brakes and reducing the flammability of fuel systems. **4.** Modern engine

compartments (*to be opened*) at the bottom. **5.** Leonardo da Vinci (*to design*) a clockwork driven tricycle with tiller steering. **6.** Thomas Newcomen (*to build*) his first steam engine in 1712. **7.** The early steam powered vehicles (to be) very heavy. **8.** The United States (*to have*) a vast network of national highways linking the different US states together. **9.** Soon the main environmental impacts of transport systems (*to include*) traffic congestion, toxic runoff from roads and parking lots. **10.** The automobile industry from the very beginning (*to influence*) on urban life and the environment. **11.** The automobile industry (*to remain*) now and (*to be*) in future an important and dynamic sector. **12.** The possibility of cooperation Russian and foreign motor car building companies (*to be considered*) not long ago. **13.** Steam power (*to be used*) in the 1880's and 1890's on the farms of America. **14.** Eight-cylinder Cadillac roadster (*to be built*) for Mr Baden, and (*to be equipped*) with all modern appliances. **15.** Driving an automobile at that time (*to require*) a high degree to technical dexterity, mechanical skill and special clothing. **16.** The horse racing facilities (*to be converted*) to the new, faster, more dangerous, and more exciting, motor racing. **17.** The brick streets (*to be covered*) with asphalt to provide a smoother ride for the automobile.

TEXT WORK

26. Read the text and underline its main idea. Give a brief summary of the text:

Text 1C. How Cars Changed the County, Town by Town

In 1903, in Winfield Kansas, Mr H.T. Trice is seen standing in front of the first car in town. Actually it was more like a truck and was used to haul customers out to see land. The railroads brought potential customers to town and Mr Trice picked them up at the depot, and took them out to his new developments. Steam power was widely used in the 1880's and 1890's on the farms of America. Cowley County had its share of these behemoths and had a large group of people with the ability to use, and the skill to fix and repair them. The smaller, less expensive automobile, with an internal combustion engine provided a new avenue of interest that was much more personal than the steam engine with its team of attendants.

Mr Martin Baden's new car (eight-cylinder Cadillac roadster) was especially built for him and was equipped with all modern appliances. Driving an automobile required a high degree to technical dexterity, mechanical skill, special clothing including hat, gloves, duster coat, goggles and boots. Tires were notoriously unreliable and changing one was an excruciating experience. Fuel was a problem, since gasoline was in short supply. Mr Baden became interested enough to become a self-taught geologist and

eventually discover major oil deposits in Cowley County, Kansas, and surrounding area.

The drivers of the day were an adventurous lot, going out in every kind of weather, unprotected by an enclosed body, or even a convertible top. Everyone in town knew who owned what car and the cars were soon to become each individual's token of identity. The dirty roads were a challenge in any weather. By 1910 Winfield paved the downtown streets with brick, horses were no longer welcome. The mule drawn trolleys were upgraded to electric streetcars. By 1915 racing had become a passion all over the United States. A typical local race track was at the Cowley County Fairgrounds in Winfield, Kansas. The local obsession with horse racing, started by the earliest settlers in 1870, turned to the new technology of auto racing. Local farm boys who were familiar with motors and equipment used their talents on cars and motorcycles to go faster than anyone in the county.

The horse racing facilities were quickly converted to the new, faster, more dangerous, and thus more exciting, motor racing. Eventually the automobile changed the face of small town of America. The town gentry bought cars, a bit fashioned to match their status of life. In Winfield, Kansas, Main Street went from a gathering place for people and horses, and wagons, to a parking place for the ubiquitous automobile. The Trolley Cars were displaced to make room for more cars. The brick streets were covered with asphalt to provide a smoother ride for the automobile. The old fire maps of Winfield show the inexorable spread of the automobile and all of the supporting businesses. Filling stations, auto dealers, battery stations, oil depots all grew and expanded to displace to older technologies of the day.

Midway through the century, cars had become a central feature of life for young people. The cars owned by the students of Winfield High School in the fifties are typical everywhere in America at that time. It was mobility, status, challenge, and social freedom.

After a century of the automobile, we can begin to assess the effects of long term transport by internal combustion. Nearly every aspect of our lives has developed around this technology. Only now, we are seeing new digital communications technologies, of the internet and beyond, that may eventually displace some of the functions of the automobile and replace our current problems with a new set that people will be charged with solving.

Notes on the text

depot — склад, депо
to take out — (*зд.*) получать права
behemoth — чудовище, громадина, уродливое создание
skill — умение
dexterity — быстрота, сноровка
goggles — защитные очки
notorious — печально известный
lot — доля

excruciating — мучительный
to be in short supply — дефицитный
token — символ, характерный признак
gentry — нетитулованное мелкопоместное дворянство
ubiquitous — вездесущий; повсеместный
inexorable — непреклонный
to displace — заменять, замещать

TEXT AND VOCABULARY EXERCISES

27. Find in the text words or phrases which mean the same as:

больше походить на...	оборудованный современными приборами
техническая сноровка	железная дорога
потенциальные клиенты	широко используемый
быть знакомым с...	распространение автомобиля
заменять старые технологии	подвижность, мобильность
социальная свобода	текущие проблемы

28. Work with a partner. Take turns to ask and answer questions to text 1C. Use the words and word combinations below:

to be equipped with	the drivers of that day
typical local race track	racing facilities
covering of roads/streets	spread of the automobile
central feature of life	status
challenge	digital communications technologies

29. Speak about the role of automobiles in our life. Try to touch as many fields of their application as you can.

30. Fill in the gaps with the prepositions from the box:

in	of	into	for	at	from	by	on	to near

Ransom E. Olds, a young automotive wizard from Lansing who began building Oldsmobiles 1)___ 1896, was the first to produce cars 2)___ Detroit.

3)___ March, 1901, fire destroyed most 4)___ the Olds Motor Works 5)___ the Belle Isle Bridge, most recently the site 6)___ Uniroyal's tire factory, including 10 7)___ 11 models the plant was building. The only car saved was a small single-cylinder Curved Dash Olds. Olds decided to rebuild immediately and put all the firm's production resources 8)___ the little Curved Dash Olds, the 'Merry Oldsmobile' 9)___ musical fame. It was a momentous decision, because it committed Olds to production 10)___ a small, relatively inexpensive car, the first 'high-volume' model.

11)___ late summer, Olds had so many orders that he sought an outside source 12)___ engines. So he went to see another man who was a potent factor 13)___ making Detroit the Motor City, Henry M. Leland, head 14)___ Leland and Faulconer Co. His company was the foremost machine shop 15)___ the Midwest, located just north 16)___ the Eastern Market 17)___ Trombley and Dequindre. Leland agreed to build engines 18)___ Olds.

Olds then ordered 2,000 transmissions 19)___ a smaller machine shop owned 20)___ John and Horace Dodge 21)___ Beaubien 22)___ East Lafayette. The Dodges later moved 23)___ larger quarters 24)___ 240 Monroe, then to what became the Dodge Main plant 25)___ the site now occupied 26)___ Cadillac's Poletown plant. The Dodges also built engines, transmissions and axles 27)___ Henry Ford, who was assembling cars 28)___ his plant on Piquette and Beaubien and later 29)___ his Highland Park plant. Both facilities still exist, at least 30)___ part.

SUPPLEMENTARY READING

31. Read the texts 1, 2, 3 to get more information about the automobile inventors.

WRITING PRACTICE

32. Read the following text carefully in order to discover the main line of thought. Write a short summary of the text:

The Pioneer Motorist

Roger Bacon in the 13th century prophesied that 'one day we shall endow chariots with incredible speed without the aid of any animal', and was promptly imprisoned for being in league with devil. The dream of a self-propelled vehicle occupied inventive minds for many centuries. Sails, clockwork and kites were all tried and failed. Steam-powered vehicles seemed to be the answer but their slowness and tendency to explode were serious drawbacks.

A new kind of engine was developed in 1860 by Lenoir using gas in an internal combustion engine. The next step forward — the first petrol engined car, is shrouded in controversy and false claims. The first person to build internal combustion vehicles for sale to the public, and not purely experimental vehicles, was the German Karl Benz. He ran his first car in 1885, the same year as Gottlieb Daimler produced a high speed, four-stroke petrol engine, the forerunner of a modern car engine.

Benz and Daimler between them had found the solution to the centuries — old dream of a self-propelled form of a private transport — a motor car. However, the architect of the modern car was Emile Levassor who

realized that a vehicle had to be designed from the outset to incorporate an engine and not with a motor super-imposed on to a horse drawn carriage (minus the horse). The Panhard — Levassor of 1891 established the layout for front-engine, rear-drive cars which remains till this day-radiator, engine, clutch, gearbox, transmission and rear axle, in that order.

The car was born in Germany, flourished in France, but was woefully neglected in Britain. In France, pioneers were buying German Daimler and Benz engines and fitting them into cars of their own design. The French forged ahead with suspension, transmission, brakes and all other aspects of development.

Motor racing began in France with huge crowds of spectators turning out for every event. Across the Channel, there was little incentive for British innovators due to the restrictive 'Red Flag' Act. This law, first passed in 1865, required a mechanical road vehicle to travel at a maximum of 4 mph with a person walking ahead with a red flag (the flag was not required after 1878).

This law was aimed at steam traction engines, but motor cars were confined in the same category. In 1896 the law was repealed and a new speed limit of 12 m. p. h. introduced. The few motorists there were, with their imported cars, received this news with great rejoicing and an Emancipation Run was held from London to Brighton on 14 November 1896. It was not quite a triumphant parade since the weather was poor, a pedestrian was killed at Crawley and some motorist put their cars on a train to Brighton!

33. Render the following text into English:

Изобретение Н. Ж. Куньо (1725 — 1804), Париж, Франция

Многообещающий изобретатель и рационализатор Никола Жозеф Куньо не был в достаточной мере обеспечен, чтобы финансировать свои эксперименты. Он поступил на военную службу и в качестве капитана французской армии сделал много изобретений.

Свой второй усовершенствованный паровой тягач для нужд артиллерии Н. Куньо представил гражданским и военным ведомствам 22 апреля 1770 года. Одноцилиндровая паровая машина размещалась над передним колесом трехколесной телеги. Тягач развивал скорость не более 4 км/ч, но зато котел имел собственную топку, так что огонь не надо было разводить на земле, как в предшествующей модели 1769 года. Во время демонстрации модели заклинило систему управления. Агрегат врезался в стену и обрушил ее, но тягач остался неповрежденным. Это свидетельствовало о высоком качестве боевой машины.

Сегодня этот паровой тягач можно увидеть в музее.

UNIT 2

ACTIVE VOCABULARY

1. Read and remember the following words and word combinations:

to allude — упоминать, ссылаться
to ban — запрещать
bike — велосипед
brake — тормоз
brand — торговая марка, бренд
to combine — сочетать
combination — сочетание, комбинация
full-fledged — окончательно готовый, полностью отработанный
hallmark — критерий, признак
headquarter — штаб-квартира
high-end line — высококачественная линия
independent — независимый
internal gear changing system — внутренняя система замены механизма
jet engine — реактивный двигатель
launch — запуск, выпуск
losses — потери, убытки
luxury — роскошь, предмет роскоши
to manufacture — производить
notable — выдающийся, известный
parent company — компания-учредитель
piston ring — поршневое кольцо
rear wheel — заднее колесо
to restart — повторно запускать, перезапускать
scooter — мотороллер, скутер
sedan — (легковой) автомобиль с кузовом типа седан
Stock Exchange — фондовая биржа
to supply — поставлять
supplier — поставщик
suspension — подвеска
truck — грузовик
venture — предприятие
water craft — судно

PRE-TEXT EXERCISES

2. Look at the following international words, guess their meaning and check the pronunciation:

Corporation, company, automobile, product, scooter, robot, electric, aeronautical, mobile, technology, system, million, diesel, motor, filter, standard, mechanic, design, transport, institute, associate, official, reputation, global, prestige, brand.

3. Translate into Russian the following words and word combinations:

Engine manufacturer, engineering corporation, internal combustion engines, engine-maker, diesel motors, to pass pollution standards, joint ventures, to starve of money and fuel, in honor of, to need extra financing, to gain the support, to be reconstituted, basic transportation, car brands, to symbolize, air-cooled horizontally-opposed engine, newer technology,

major innovation, driveshaft, to restart production, commercially successful, shareholder, trade union, four-wheel independent suspension, sporting cars, two-door version, bloodline, high-quality sports saloon, passenger car, modern specification.

4. Give synonyms to the following words:

movable	to launch	authoritative	enlarge
biggest	fortunate	alike	substantially
fortune	strong	contemporary	novelty
inexpensive	main	celebrated	establish

5. Give antonyms to the following words:

stable	old	unsuccessful	powerless
smallest	expensive	unpopular	outdated
refinement	to finish	open	inofficial
failure	gains	vertically	low-quality
inglorious	to disagree	dependent	decrease

WORD-BUILDING

6. Translate the following compound words:

Air-resistance, troubleshooter, broadcast, network, breathtaking, battery-operated, sky-rocket, checkpoint, typewrite, post-graduate, high-quality, full-time, waterpower, motorcycle, aircraft, background, electromagnet, sunlight, semiconductor, doorbell, high-pressure, bloodline, hallmark, bodywork, workforce, trademark, test-bed, nameplate, motor-car, absent-minded, half-life, high-rise, taxi-cab, earthday, hard-line, easy-to-use, control-surface, full-time, circuit-breaker.

7. Guess the meaning of the words in italic:

To work — *worker*; to produce — *producer*; noble — *nobility*; design — *designer*; change — *unchangeable*; to manufacture — *manufacturer*; expensive — *inexpensive*; beauty — *to beautify*; possible — *impossible*; to reflect — *reflection*; to train — *trainer*; to discover — *to rediscover*; advantage — *disadvantage*; cover — *discover*; approve — *disapprove*; appear — *disappear*; continue — *discontinue*; interested — *disinterested*; accuracy — *inaccuracy*; definitely — *indefinitely*; frequent — *infrequent*; legal — *illegal*; respectively — *irrespectively*; necessary — *unnecessary*; even — *uneven*; load — *unload*.

8. Translate the following words with the suffixes:

-able considerable, desirable, reliable, valuable, variable, comfortable, believable, profitable, arguable, readable, acceptable, agreeable, changeable, enjoyable, applicable, suitable, conceivable, breakable, storable, assignable, adjustable;

-ar beggar, scholar, radar, mortar;

-ate cultivate, abbreviate, indicate, participate, percolate, resonate, activate, actuate;

-dom boredom, freedom, officialdom, wisdom.

9. Define to what parts of speech the following words with prefixes refer and translate them:

anti- anticorrosion, anticorrosive, anticyclone, anticyclonic, antitoxin, antitoxic, anti-aircraft, antifreeze, antiseptic;

bi- bifurcation, bifurcate, bilaterism, bilateral, bicycle, bicyclist, bimetallism, bimetallic, bilingual;

co- coexistence, coexist, coexistent, coherence, cohere, coherent, co-operation, co-operate, co-author, co-operative, correspondent, correspondence, correspond;

counter- counteraction, counteract, counteractive, counterattack, counterespionage, counteroffer;

de- degradation, degrade, degraded, decomposition, decompose, decomposable, deformation, deform, deformable, deformity, depolizer, depolarization, depolarize, degenerate, derailed, depopulated, deforested.

10. Give nouns corresponding to the following verbs:

Inform, know, contain, publish, entitle, introduce, review, investigate, recognize, refer, suggest.

11. Give nouns corresponding to the following adjectives:

Regrettable, wealthy, different, significant, friendly, original, major, chemical, relative, interesting.

12. Give verbs corresponding to the following nouns:

Examination, death, claim, attempt, hardness, softness, decoration, choice.

TEXT WORK

13. Read the text below to learn about Honda Corporation.

Text 2A. Honda

Honda Motor Co., Ltd., or simply called Honda, is a Japanese engine manufacturer and engineering corporation. The company is perhaps most notable for its automobiles and motorcycles, but it also produces a long list of other products: trucks, scooters, robots, jets and jet engines, water craft, electrical generators, marine engines, lawn and garden equipment, and aeronautical and other mobile technologies. Honda's high-end line of cars

Honda Motor Co., Ltd.

HONDA

Type	Public TYO: 7267
Founded	September 24, 1948
Headquarters	Tokyo, Japan
Key people	Soichiro Honda, Founder Takeo Fukui, CEO
Industry	Automobile & Truck manufacturer
Products	Automobiles, trucks, motorcycles, scooters, ATVs, electrical generators, robotics, marine equipment, jets and jet engines, and lawn and garden equipment
Revenue	$84 billion USD (2006)
Net income	$2.7 billion USD (2006)
Employees	144,785
Slogan	The Power of Dreams
Web-site	Honda.com, World.Honda.com, Autos.Honda.com

are branded Acura in North America and China. More recently they have ventured into the world of mountain bikes, producing the very first bike to use an internal gear changing system in the Honda RN-01 G-cross. With more than 14 million internal combustion engines built each year, Honda is the largest engine-maker in the world. In 2004, the company began to produce diesel motors, which were very quiet whilst not requiring particulate filters to pass pollution standards. It is arguable, however, that the foundation of Honda's success is the motorcycle division. Honda is headquartered in Tokyo. Their shares trade on the Tokyo Stock Exchange and the New York Stock Exchange, as well as exchanges in Osaka, Nagoya, Sapporo, Kyoto, Fukuoka, London, Paris and Switzerland. American Honda Motor Co. is based in Torrance, California. Honda Canada Inc. is headquartered in the Scarborough, Ontario district of Toronto, Ontario, and is building new corporate headquarters in Richmond Hill, Ontario, scheduled to relocate in 2008. Honda has also created many joint ventures around the world.

Company history. Soichiro Honda was a mechanic who, after working at Art Shokai, developed his own design for piston rings in 1938. He attempted to sell them to Toyota who did not reject his first design like believed. He constructed a new facility to supply Toyota, but soon after, during World War II, the Honda piston manufacturing facilities were almost completely destroyed.

Soichiro Honda created a new company with what he had left in the Japanese market that was decimated by World War II; his country was starved of money and fuel, but still in need of basic transportation. Honda, utilizing his manufacturing facilities, attached an engine to a bicycle which created a cheap and efficient transport. He gave his company the name Honda Giken Kōgyō Kabushiki Kaisha which translates to Honda Research Institute Company, Ltd. Despite its grandiose name, the first facility bearing

that name was a simple wooden shack where Mr Honda and his associates would fit the engines to bicycles. The official Japanese name for Honda Motor Company, Ltd. remains the same in honour of Soichiro Honda's efforts. On 24 September, 1948, the Honda Motor Co. was officially founded in Japan. Honda began to produce a range of scooters and motorcycles and Soichiro Honda quickly recovered from the losses incurred during the war. Honda's first motorcycle to be put on sale was the 1947. A-Type (one year before the company was officially founded). However, Honda's first full-fledged motorcycle on the market was the 1949 Dream D-Type. It was equipped with a 98cc engine producing around 3 horsepower. This was followed by a number of successful launches of highly popular scooters throughout the 1950s.

Note on the text

wooden shack — деревянная лачуга

TEXT AND VOCABULARY EXERCISES

14. Choose the right word and fill in the gaps.

1. Honda Motor Co., Ltd., or simply called Honda, is a ... engine manufacturer and engineering corporation.
a) Japanese b) American c) Italian

2. The company is perhaps ... notable for its automobiles and motorcycles.
a) least b) most c) more

3. With more than 14 million internal combustion engines built each year, Honda is the largest engine-maker in the ... .
a) country b) hemisphere c) world

4. Soichiro Honda was a mechanic who, after working at Art Shokai, developed ... design for piston rings in 1938.
   a) his chief's b) his own c) main engineer's
5. He ... a new facility to supply Toyota.
   a) constructed b) showed c) cleared up
6. Soichiro Honda ... a new company with what he had left in the Japanese market that was decimated by World War II.
   a) decided b) destroyed c) created
7. The official Japanese name for Honda Motor Company, Ltd. remains the same ... Soichiro Honda's efforts.
   a) in the name of b) for the sake of c) in honour of
8. Honda began ... a range of scooters and motorcycles and Soichiro Honda quickly recovered from the losses incurred during the war.
   a) to produce b) to repair c) to renovate
9. Honda's ... motorcycle to be put on sale was the 1947 A-Type (one year before the company was officially founded).
   a) last b) first c) next

15. Find in the text equivalents to the following phrases:

Наиболее известный, список изделий, компания начала производить, оборудовать, перемещать, высококачественная линия автомобилей, мобильные технологии, совместное предприятие, новое оборудование, дешевый и эффективный транспорт, во всем мире, грандиозное название, очень популярный.

16. Find the English equivalents to the following Russian words:

1) эффективный	a) officiate	b) efficiency	c) efficient
2) торговля	a) take	b) trade	c) trace
3) оборудование	a) facility	b) faculty	c) factory
4) оставаться	a) to recall	b) to remain	c) to remind
5) производить	a) to produce	b) to protect	c) to predict
6) лошадиная сила	a) horsestrength	b) horsepower	c) horseforce
7) простой	a) simple	b) sample	c) simper

17. Divide text 2A into logical parts and give each a suitable title.

18. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

Japanese engine manufacturer	most notable for its automobiles and motorcycles
a long list of other products	high-end line of cars
the largest engine-maker	to construct a new facility
need of basic transportation	to create a cheap and efficient transport
a number of successful launches	highly popular

19. Fill in the gaps with the words from the box:

recovery	barriers	imports	top	market	automobiles
world	production	supply	exports	penetration	

The outstanding change in the world supply of 1) ___, after the post-war 2) ___ of European producers, was the enormous surge in Japanese 3) ___ in the 1970s and 1980s. Japanese producers accounted for about a quarter of 4) ___ car production. If Japanese car production from overseas transplants and trade 5) ___ against Japanese imports are taken into account, Japan's share of automobile 6) ___ would have been even higher. By 1988 five Japanese manufacturers were amongst the 7) ___ fifteen world producers of automobiles.

The performance of Japanese automobile 8) ___ during the 1980s is even more extraordinary. Japanese 9) ___ was greatest in the US domestic market, while the lower share of the European 10) ___ was due in large part to the non-tariff barriers and trade agreements limiting 11) ___ into Europe.

Check your answers on p. 321

SUPPLEMENTARY READING

20. Read the texts 4, 5, 6, 7 to get more information about Honda.

21. Read the text about another Japanese company — Toyota Motor Corporation and give a brief summary of it.

TOYOTA

Toyota Motor Corporation, or Toyota, is a Japanese multinational corporation and the world's largest automaker by sales revenue as 2006 (in front of General Motors). Together with its half-owned subsidiary Daihatsu, the company was the world's second largest auto company by revenue of $179 billion and total vehicle production, most profitable automaker with net income of around $11 billion, and the world's eighth largest company by revenue in 2006. The company is part of Toyota Group and is its largest company. Toyota owns and operates Toyota, Lexus, Scion, and parts of Daihatsu brands, divisions and companies.

The company was founded in 1937 by Kiichiro Toyoda as a spinoff from his father's company Toyota Industries to create automobiles. It created, first as a department of Toyota Industries, its first product Type A engine in 1934 and its first passenger car (the Toyota AA) in 1936. It is headquartered in Toyota, Aichi, Japan. It also provides financial services through its division Toyota Financial Services and also creates robots besides automobiles.

Toyota together with its half owned subsidiary Daihatsu is the world's largest seller of cars for the first quarter of 2007 selling 2.35 million vehicles. Toyota plans to produce 9.4 million vehicles in 2007.

The Toyota Motor Corporation was founded in September, 1933, when Toyoda Automatic Loom created a new division devoted to the production of automobiles under the direction of the founder's son, Kiichiro Toyoda. Soon thereafter, the division produced its first Type A engine in 1934, which was used in the first Model A1 passenger car in May, 1935, and the G1 truck in August, 1935. Production of the Model AA passenger car started in 1936. Early vehicles bear a striking resemblance to the Dodge Power Wagon and Chevrolet, with some parts actually interchanging with their American originals. The company was founded in 1933 by Kiichiro Touoda as an offshoot of Toyoda Automatic Loom Company, under the encouragement of the Japanese government, which needed domestic vehicle production partly due to the worldwide money shortage and partly due to the war with China. Although the Toyota Group is best known today for its cars, it is still in the textile business and still makes automatic looms, which are now fully computerized, and electric sewing machines which are available worldwide.

Toyota Motor Co. was established as an independent and seperate company in 1937. Although the founding family name is Toyoda, the company name was changed in order to signify the separation of the founders' work life from home life, to simplify the pronunciation, and to give the company a happy beginning.

During the Pacific War (World War II) the company was dedicated to truck production for the Imperial Japanese Army. Because of severe shortages in Japan, military trucks were kept as simple as possible. For example, the trucks had only one headlight on the center of the hood. The war ended shortly before a scheduled Allied bombing run on the Toyota factories in Aichi.

After the war, commercial passenger car production started in 1947 with the model SA. The quality and production principles on which Toyota is based originated in an education program from the United States Army in

the postwar era. In 1950, a separate sales company, Toyota Motor Sales Co., was established (which lasted until July, 1982). In April 1956, the Toyopet dealer chain was established. The following year, the Toyota Crown became the first Japanese car to be exported to the United States and Toyota's American and Brazilian divisions, Toyota Motor Sales Inc. and Toyota do Brazil S.A., were also established. Toyota began to expand in the 1960s with a new research and development facility, a presence in Thailand was established, the 10 millionth model was produced, a Deming Prize and partnerships with Hino Motors and Daihatsu were also established. By the end of the decade, Toyota had established a worldwide presence, as the company had exported its one-millionth unit.

22. Read the texts 8—9 to get more information about Toyota.

23. Read and translate the text below:

Text 2B. BMW

Type	Aktiengesellschaft (Joint-Stock Company) (ISIN: DE0005190003, FWB: BMW)
Founded	1913 by Karl Friedrich Rapp
Headquarters	Munich, Germany
Key people	Dr Norbert Reithofer, Chief Executive Officer
Industry	Automotive
Products	Automobiles, motorcycles
Revenue	€49 billion (2006)
Employees	106,179 (First quarter 2006) 105,798 (2005)
Subsidiaries	Mini, Rolls-Royce
Slogan	DE: Freude am Fahren UK/US: The Ultimate driving machine
Web-site	www.bmw.com

BMW AG — Bavarian Motor Works, is an independent German company and manufacturer of automobiles and motorcycles. BMW is the parent company of the MINI and Rolls-Royce car brands, and formerly,

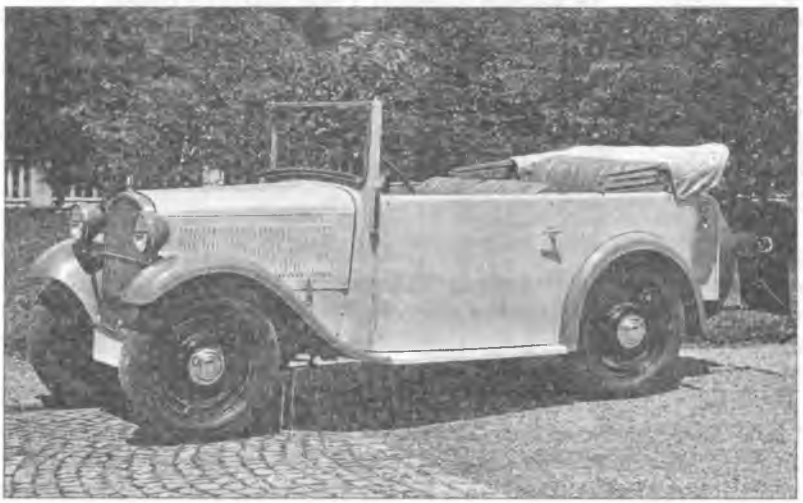
Rover. The company's tagline in English is currently 'The Ultimate Driving Machine'. The original German slogan was 'Freude am Fahren', which translates to 'Joy in Driving' in English.

Pre-World War II History. BMW was founded by Karl Friedrich Rapp originally as an aircraft engine manufacturer. The Milbertshofen district of Munich was chosen, because it was close to the Gustav Otto airplane-building plant site. The blue-and-white roundel BMW logo which is still used alludes to the white and blue checkered flag of Bavaria. It is often said to symbolize a spinning white propeller on a blue-sky background, although this interpretation developed after the logo was already in use.

In 1916, the company secured a contract to build V12 engines for Austro-Daimler. Needing extra financing, Rapp gained the support of Camillo Castiglioni, Cornelius Jagdmann and Max Fritz, the company was reconstituted as the Bavarian Motor Works (Bayerische Motoren Werke). Over-expansion caused difficulties; Rapp left and the company was taken over by the Austrian industrialist Franz Josef Popp in 1917, and named BMW AG in 1918.

After World War I, the Treaty of Versailles (1919) prohibited the production of aircraft in Germany. Otto closed his factory and BMW switched to manufacturing railway brakes. In 1924, BMW built its first model motorcycle, the R32. This had a air-cooled horizontally-opposed engine, a feature that would resonate among their various models for decades to come, albeit with displacement increases and newer technology. The major innovation was the use of a driveshaft instead of a chain to drive the rear wheel. For decades to follow, the shaft-drive boxer engine was the mark of the BMW motorcycle.

In 1927, the tiny Dixi, an Austin Seven produced under licence, began production in Eisenach. BMW bought the Dixi Company the following year, and this became the company's first car, the BMW 3/15. By 1933, BMW



was producing cars that could be called truly theirs, offering steadily more advanced I6 sports and saloons (sedans). The pre-war cars culminated in the 327 coupé and convertible, the 328 roadster, fast 2.0 L cars, both very advanced for their time, as well as the upscale 335 luxury sedan.

World War II History. BMW was a major supplier of engines; supplying the Luftwaffe (*военно-воздушные силы*) with engines and vehicles, and the Wehrmacht (*вермахт*, *вооруженные силы фашистской Германии, 1935— 1945*) with motorcycles. Planes using the aero-engines included the BMW 801, one of the most powerful available. Over 30,000 were manufactured up to 1945. BMW also researched jet engines, producing the BMW 003, and rocket-based weapons. BMW has admitted to using between 25,000 and 30,000 slave labourers during this period, consisting of both prisoners of war and inmates of infamous concentration camps such as Dachau.

The BMW works were heavily bombed towards the end of the war. Of its sites, those in eastern Germany were seized by the Soviets. The factory in Munich was largely destroyed.

Post-War History. After the war the Munich factory took some time to restart production in any volume. BMW was banned from manufacturing for three years by the Allies and did not produce a motorcycle, the R24, until 1948, and a car model until 1952. In the east, the company's factory at Eisenach was taken over by the Soviet Awtowelo group which formed finally the Eisenacher Motoren-Werke. That company offered 'BMWs' for sale until 1951, when the Bavarian company prevented use of the trademarks: the name, the logo and the 'double-kidney' radiator grille.

The cars and motorcycles were then branded EMW (Eisenacher Motoren-Werke), production continuing until 1955. In the west, the BAC, Bristol Aeroplane Company, inspected the factory, and returned to Britain with plans for the 326, 327 and 328 models. These plans, which became official war reparations, along with BMW engineer Fritz Fiedler allowed the newly formed Bristol Cars to produce a new, high-quality sports saloon (sedan), the 400 by 1947, a car so similar to the BMW 327 that it even kept the famous BMW grille.

In 1948, BMW produced its first post-war motorcycle and in 1952 it produced its first passenger car since the war. However, its car models were not commercially successful; models such as the acclaimed BMW 507 and 503 were too expensive to build profitably and were low volume. By the late 1950s, it was also making bubble-cars such as the Isetta.

In 1959, BMW's management suggested selling the whole concern to Daimler-Benz. Major shareholder, Herbert Quandt was close to agreeing such a deal, but changed his mind at the last minute because of opposition from the workforce and trade unions and advice from the board chairman, Kurt Golda. Instead Quandt increased his share in BMW to 50 % against the advice of his bankers, and he was instrumental in turning the company around. That same year, BMW launched the 700, a small car with an air-cooled, rear-mounted boxer engine from the R67 motorcycle. Its bodywork was designed by Giovanni Michelotti and the model had a sporty look. There

was also a more powerful RS model for racing. Competition successes in the 700 began to secure BMW's reputation for sports sedans.

At the Frankfurt Motor Show in 1961, BMW launched the 1 500, a powerful compact sedan, with front disc brakes and four-wheel independent suspension. This modern specification further cemented BMW's reputation for sporting cars. It was the first BMW to officially feature the 'Hofmeister kink', the rear window line that has been the hallmark of all BMWs since then. The 'New Class' 1 500 was developed into 1 600 and 1 800 models. In 1966, the two-door version of the 1 600 was launched, along with a convertible in 1967. These models were called the '02' series — the 2002 being the most famous — and began the bloodline that later developed into the BMW 3 Series.

By 1966, the Munich plant had reached the limits of its production capacity. Although BMW had initially planned to build an entirely new factory, the company bought the crisis-ridden Hans Glas GmbH with its factories in Dingolfing and Landshut. Both plants were restructured, and in the following decades BMW's largest plant took shape in Dingolfing.

Of major importance to BMW was the arrival of Eberhard von Kuenheim from Daimler-Benz AG. Just 40 years old, he presided over the company's transformation from a national firm with a European-focused reputation into a global brand with international prestige. Already commercially successful by the mid 60s, in December 1971, BMW moved to the new HQ present in Munich, architecturally modeled after four cylinders.

In 1972, the 5 Series was launched to replace the New Class sedans, with a body styled by Bertone. The new class coupes were replaced by the 3 Series in 1975, and the New Six became the 7 Series in 1977. Thus the three-tier sports sedan range was formed, and BMW essentially followed this formula into the 1990s. Other cars, like the 6 Series coupes that replaced the CS and the M1, were also added to the mix as the market demanded. From 1970 to 1993, under von Kuenheim, turnover increased 18-fold, car production quadrupled and motorcycle production tripled.

Notes on the text

tagline — подзаголовок
Treaty of Versailles — Версальский договор
Allies — союзники

TEXT AND VOCABULARY EXERCISES

24. Answer the following questions:

1. What is BMW? **2.** What does the logo of the company symbolize? **3.** What were the difficulties of the company in 1916? **4.** When did the Treaty of Versailles prohibit the production of aircraft in Germany? **5.** When was the first motorcycle built by BMW? **6.** What was the first car of BMW? **7.** In what activity was the company engaged during the World War II? **8.** What did the company do just after the World War II?

25. Read once more the part of text 2B which tells about post-war history of the BMW. Work with a partner, take turns to ask and answer the questions. Use the words and word combinations below:

to restart production
to prevent use of the trademarks
first postwar motorcycle
to build profitably
to change one's mind
to secure reputation
to reach the limits of production capacity
to be restructured
company's transformation
global brand
entirely new factory
to be branded
to be too expensive
to sell the concern
to increase the share
modern specification
to be banned from manufacturing
to be of major importance
European-focused reputation
architecturally modeled

26. Find in the text the English equivalents to the following words:

фон	строить	поддерживать	важность
вызывать	запрещать	переключаться	различный
увеличивать	новшество	карданный вал	быстрый
сочетание	версия	поставщик	включать
мощный	исследовать	позволять	развивать
бесславный	фабрика	после	объем
формировать	предотвратить	использовать	возвращать
модель	компенсация	инженер	план
подобный	пассажир	успешный	престиж
низкий	соглашаться	профсоюз	председатель

27. Compose your own sentences with each English equivalent of the words given in exercise 26. Compare your variants with the sentences of your partner.

28. Work in pairs and decide whether these statements according to text 2B are true or false:

1. BMW AG — Bavarian Motor Works, is an independent German company and manufacturer of office furniture and accessories. **2.** BMW was founded by Karl Friedrich Rapp originally as an aircraft engine manufacturer. **3.** In 1916 the company secured a contract to repair V12 engines for Austro-Daimler. **4.** After World War I, the Treaty of Versailles allowed the mass production of aircraft in Germany. **5.** For decades to follow, the shaft-drive boxer engine was the mark of the BMW motorcycle. **6.** In 1927, the tiny Dixi, an Austin Seven produced under licence, began production in Eisenach. **7.** BMW has never been a supplier of engines; supplying the Luftwaffe with engines and vehicles. **8.** BMW researched jet engines, producing the BMW 003, and rocket-based weapons. **9.** After the war there was no need to restart production because the company flourished. **10.** BMW was banned from manufacturing for three years by the Allies and did not produce a motorcycle. **11.** In 1948, BMW produced

its first post-war motorcycle and in 1952 it produced its first passenger car since the war. **12.** In 1959 BMW's management suggested selling the whole concern to Daimler-Benz and the major shareholder, Herbert Quandt agreed such a deal. **13.** In December 1971, BMW moved to the new HQ present in Munich, architecturally modeled after four cylinders.

29. Translate the following sentences into English using a dictionary:

1. Чтобы проследить историю компании БМВ с самого начала, нужно отправиться в Восточную Германию, в город Эйзенах и вспомнить 3 декабря 1896 года. **2.** Первыми транспортными средствами, производимыми компанией, были автомобили скорой помощи и грузовики для перевозки боеприпасов. **3.** Марка «Дикси» развивалась с 1904 по 1927 год, производя гоночные автомобили, а также грузовики, спрос на которые сильно возрос в период Первой мировой войны. **4.** После войны все промышленное производство Германии было в упадке. **5.** Во время Второй мировой войны большие автомобили производились малым тиражом ввиду растущего финансового кризиса. **6.** В феврале 1962 года модель 1500 впервые сошла с конвейера, и эта долгожданная машина среднего класса явилась настоящим возрождением БМВ. **7.** Модель 1500, оснащенная сильным 4-цилиндровым двигателем, положила начало двухдверной модели BMW в 1966 году. **8.** Сочетание кузова 02 и двигателя в 100 л.с. дало начало модели прекрасно сбалансированной БМВ 2002.

SUPPLEMENTARY READING

30. Read the texts 10, 11, 12 to get more information about BMW.

GRAMMAR

31. Проанализируйте формы глагола Continuous Active и Passive, приведенные в таблице:

Continuous Tenses		
	Active	Passive
Infinitive	to be + Ving	to be + being + Ved/3
Present	They are carrying out an experiment.	The experiment is being carried out now.
Past	They were carrying out an experiment.	The experiment was being carried out when I came in.
Future	They will be carrying out an experiment.	Не употребляется

32. Сравните следующие пары предложений и переведите их на русский язык:

1. My friend is writing the report on mechanics now. The report on mechanics is being written by my friend now. **2.** Our professor was reading the lecture from 2 till 4 yesterday. The lecture was being read by our professor from 2 till 4 yesterday. **3.** They will be working on this project the whole day tomorrow. **4.** This company is manufacturing modern automobiles now. Modern automobiles are being manufactured by this company. **5.** He will be reporting about innovations in this field of industry.

33. Поставьте глаголы в скобках в Past Continuous:

1. This time yesterday I (*not/to work*), I (*to lie*) on the beach. **2.** I (*to read*) a book when he came in. **3.** We met him when he (*to cross*) the street. **4.** The bus started while I (*to get*) on. **5.** When I arrived at his house he still (*to sleep*). **6.** The boy jumped off the bus while it (*to move*). **7.** The sun (*shine*) when I went out.

34. Раскройте скобки, употребляя глаголы в Past Simple или Past Continuous:

1. I (*to read*) a book when she came in. **2.** The sun (*to shine*) when I went out. **3.** He (*to sit*) in the house when the phone rang. **4.** They (*to visit*) many nice places last year. **5.** ... you (*to go*) to the university last Saturday? **6.** I (*to meet*) her when she (*to cross*) the street. **7.** They (*to live*) in Paris ten years ago. **8.** What you (*to do*) at 7 o'clock yesterday? — I (*to have supper*). **9.** When I (*to go*) to the university, I (*to meet*) my friends.

35. Поставьте глаголы в скобках в Present Simple или Present Continuous в зависимости от ситуации:

1. I (*to live*) in Rostov, though I (*to stay*) in Moscow at the moment. **2.** The car isn't here today because Ann (*to drive*) it. She generally (*to take*) the bus, but the drivers are on strike. **3.** We usually have dinner at home, but today we (*to have*) it in the restaurant. **4.** I (*to stay*) with my parents at the moment, though I (*to have*) my own flat. **5.** They usually (*to work*) at the weekend, though they (*not to work*) at the moment. **6.** He usually (*to drink*) coffee but today he (*to drink*) tea. **7.** I usually (*to work*) at night, though I (*to have*) a rest now.

36. Переведите следующие предложения, обращая внимание на время и залог сказуемого:

а) 1. Now I *am writing* a short report and my friend *is watching* TV. **2.** We *were planning* to come back in ten days. **3.** What *was* your father *doing* at the same time? **5.** The new building *is being built* here now. **6.** *Were* you *listening* to the radio for 2 hours yesterday? **7.** The students *are having* an English lesson now. **8.** The students *will be writing* a very difficult test. **9.** The students *are writing* the exercise.

10. *Were* you *drinking* tea when your friend phoned you? **11.** The engine *was working* the whole evening. **12.** The computer *was being repaired* by my fellow. **13.** This time next week I *shall be writing* my diploma work. **14.** English *is speaking* all over the world. **15.** We *shall be waiting* for you at 5 o'clock tomorrow. **16.** *Will* you *be using* your computer this evening?

b) 1. New alloys which stand higher temperatures *are being developed*. **2.** Many old plants *were being expanded* and reconstructed. **3.** The speed of a body is the rate at which the body *is passing* through space. **4.** Much attention *is being given* at present to the modern equipment of research laboratories. **5.** Our scientists *are developing* many alloys which have greater resistance to various loading conditions. **6.** Today our knowledge of materials *is being* greatly *extended*. **7.** The modern industry *is producing* all types of mobile machines and mechanisms. **8.** When an object suddenly starts moving, we understand at once that something *is acting* upon it. **9.** This plant *was developing* new types of vehicles such as electromobiles, cars with magnetic suspension and so on. **10.** Various methods *are being used* to atomize liquid gasoline or break it up into small particles by the rush of air through the carburettor mixing chamber. **11.** Many attempts *were being made* in England by the 1830s to develop a practical vehicle that didn't need rails. **12.** The Daimler Motor Company *was producing* petrol engines for tramway cars, carriages, quadracycles, fire engines and boats.

37. Употребите глаголы, данные в скобках, в нужной форме.

1. We (*to receive*) a radio station with a frequency of 1,000,000 oscillations per second. **2.** The material and cultural level of the working people of Russia (*to rise*) steadily. **3.** Changes (*to take place*) continually in the properties of bodies around us. **4.** She (*to leave*) for Moscow. **5.** What time you (*to go*) to start? **6.** I know what I (*to say*). **7.** At that time our troops (*to cross*) the bridge. **8.** The crowd (*to pour*) out into the streets when the horse-police appeared. **9.** When I went out the fog (*to rise*) in little clouds to the sky above. **10.** I came in when he (*to read*). **11.** It (*to rain*) all day yesterday and we had to stay indoors. **12.** They (*to work*) at the laboratory from 10 till 12. **13.** This copper became separated from the solution while, the current (*to pass*) through it. **14.** Note the direction in which the conductor (*to move*) in the magnetic field at that moment. **15.** You will see that lake when the train (*to approach*) the station. **16.** They (*to work*) at the laboratory from 9 till 12 tomorrow. **17.** Scientists (*to study*) the newest properties of substances. **18.** He cut himself while he (*to repair*) his car. **19.** The laboratory assistant (*to write*) down all the data during our experiment. **20.** We (*to wait*) for you at the bus stop at 5 o'clock tomorrow. **21.** Electronics (*to become*) very important in various branches of industry. **22.** Scientists all over the world (*to do*) their best to find answers to numerous yet unknown phenomena. **23.** The experimental flexible line (*to work*) for two hours on Wednesday.

TEXT WORK

38. Read the text and give a brief summary of it:

Text 2C. General Motors

General Motors Corporation

Type	Public (NYSE: GM)
Founded	1908
Headquarters	Detroit, Michigan, USA manufacturing facilities in 30 US states and 33 countries
Key people	Rick Wagoner, Chairman & CEO Robert A. Lutz, Vice Chairman Frederick Henderson, CFO
Industry	Automotive
Products	Automobiles, engines
Revenue	$207.349 Billion USD (2006)
Net income	$529 Million USD (2006)
Employees	326,999 (2006)
Web-site	www.gm.com

General Motors Corporation, also known as GM or GMC, is the world's largest car manufacturer. Founded in 1908, in Flint, Michigan, GM employs approximately 284,000 people around the world. With global headquarters at the Renaissance Center in Detroit, Michigan, USA, GM manufactures its cars and trucks in 33 countries.

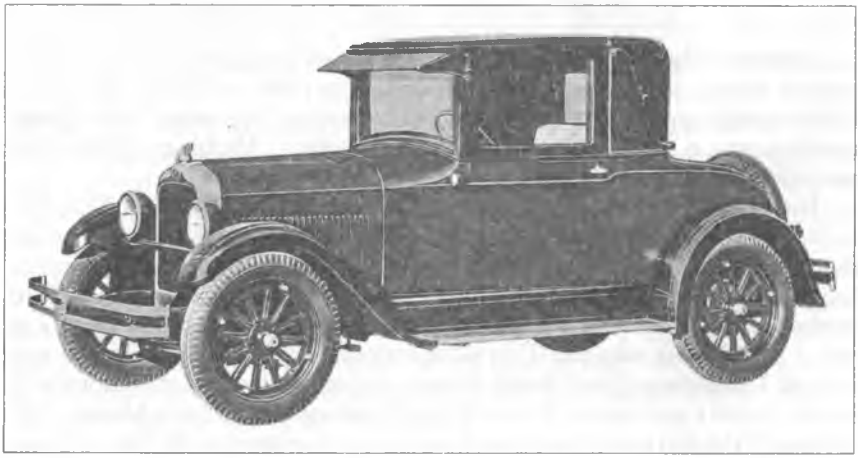
Their European headquarters is based in Zurich, Switzerland. In 2005, 9.17 million GM cars and trucks were sold globally under the following brands: Buick, Cadillac, Chevrolet, GMC, Daewoo, Holden, Hummer, Opel, Pontiac, Saab, Saturn and Vauxhall. Chevrolet outsold its oldest domestic rival Ford Motor Company in 2005 for the first time in over three decades, closing at over a 700,000 unit sales gap. GM is the majority shareholder in GM Daewoo Auto & Technology Co. of South Korea and has product collaborations with Suzuki Motor Corporation, Toyota Motor Corporation and Isuzu Motors, Ltd. of Japan. GM also has advanced technology collaborations with Toyota Motor

Corporation of Japan, DaimlerChrysler AG and BMW AG of Germany and vehicle manufacturing ventures with Shanghai Automotive Industry Corporation of China, AutoVAZ and Avtotor of Russia and Renault of France.

History of the company. General Motors was founded on Wednesday, September 16, 1908, in Flint, Michigan, as a holding company for Buick, then controlled by William C. Durant, and acquired Oldsmobile later that year. The next year, Durant brought in Cadillac, Elmore, Oakland (later known as Pontiac) and several others.

In 1909, General Motors acquired the Reliance Motor Truck Company of Owosso, Michigan, and the Rapid Motor Vehicle Company of Pontiac, Michigan, the predecessors of GMC Truck. A Rapid became the first truck to conquer Pikes Peak in 1909. Durant lost control of GM in 1910 to a bankers trust, because of the large amount of debt taken on in its acquisitions around 1.0 million dollars. Durant left the firm and helped establish the Chevrolet Motor Company in 1911 with brothers Gaston and Louis Chevrolet. After a brilliant stock buy back campaign, he returned to head GM in 1916, with the backing of Pierre S. du Pont. Chevrolet entered the General Motors fold in 1917; its first GM car was 1918's Chevrolet 490. Du Pont removed Durant from management in 1920, and various Du Pont interests held large or controlling share holdings until about 1950.

Marketing. At one time, each of GM's automotive divisions were targeted to specific market segments and despite some shared components, each distinguished itself with unique styling and technology. The shared components and common corporate management created substantial economies of scale, while the distinctions between the divisions created an orderly upgrade path, with an entry-level buyer starting out with a practical and economical Chevrolet and moving through offerings of the different divisions until the purchase of a Cadillac. The divisions were not competing with each other as much as passing along the same customer who would thus



always be buying a GM product. The postwar automobile industry became enamored with the concept of 'planned obsolescence', implemented by both technical and styling innovations with a typical 3-year product cycle. In this cycle, a new basic body shell is introduced and then modified for the next two years with minor styling changes. GM, Ford, and Chrysler competed vigorously in this new restyling environment.

Distinguishing the brands. By 1958, the divisional distinctions within GM began to blur with the availability of high-performance engines in Chevrolets and Pontiacs. The introduction of higher trim models such as the Chevrolet Impala and Pontiac Bonneville priced in line with some Oldsmobile and Buick offerings was also confusing to consumers. By the time Pontiac, Oldsmobile and Buick introduced similarly styled and priced compact models in 1961, the old 'step-up' structure between the divisions was nearly over. The 1960s saw the creation of compact and intermediate classes. The Chevrolet Corvair was a 6-cylinder answer to the Volkswagen Beetle, the Chevy II was created to match Ford's conventional Falcon and the Chevrolet Camaro/ Pontiac Firebird was GMs counter measure to the ford Mustang. Among intermediates, the Oldsmobile Cutlass nameplate became so popular during the 1970s that Oldsmobile applied the Cutlass name to most of its products in the 1980s. By the mid 1960s, most of GM's vehicles were built on a few common platforms and in the 1970s GM began to use nearly identical body panel stampings, differing only in internal and external trim items.

The 1971 Chevrolet Vega was GMs launch into the new subcompact class. Problems associated with its innovative aluminum engines would damage GMs reputation more than perhaps any other vehicle in its history. During the late 1970s, GM would initiate a wave of downsizing starting with the Chevrolet Caprice which was reborn into what was the size of the Chevrolet Chevelle, the Malibu would be the size of the Nova, and the Nova was replaced by the troubled front-wheel drive.

Notes on the text

holding company — холдинговая компания; компания, владеющая акциями других компаний на началах доверительной собственности

subcompact car — автомобиль среднего класса; малолитражный автомобиль

downsizing — уменьшение размеров

obsolescence — устаревание, износ (не в силу физического изнашивания оборудования, но вследствие появления новых технологий)

TEXT AND VOCABULARY EXERCISES

39. Give Russian equivalents to the following words and word combinations:

to conquer
to remove from management
banker trust
specific market segments

high-performance engines	technical and styling innovations
predecessor	to employ
to sell under the brand	to acquire
customer	to distinguish

40. Find in the text above words or phrases which mean the same as:

сотрудничество	приобретение	установить
предшественник	завоевать	существенный
высокоэффективные двигатели	сегмент (сектор) рынка	внутренний конкурент
различить	уникальный	полезность
предложение	покупка	соответствовать
управление	передовая технология	клиент

41. Choose the correct word from text 2C to complete the sentences:

1. General Motors was founded in 1908 in Michigan as a ___ company for Buick, then controlled by William C. Durant.
   a) joint-stock b) holding c) limited
2. Durant left his firm and helped ___ the Chevrolet Motor Company in 1911 with brothers Gaston and Louis Chevrolet.
   a) establish b) reconstruct c) purchase
3. Each of GM's automotive divisions were targeted to specific market __ .
   a) segments b) peculiarities c) department
4. Chevrolet ___ the General Motors fold in 1917; its first GM car was 1918's Chevrolet 490.
   a) began b) attached c) entered
5. The postwar automobile industry became enamored with the concept of "planned ___".
   a) strengthening b) obsolescence c) updating

42. Fill in the gaps with the prepositions from the box:

of	onto	for	by	for	from	to	with

Commercial Vehicles

The new exhibition 1)___ commercial vehicles centres around a 1930s street scene, showing home deliveries, road making, and passenger hire vehicles. The 1930s were a time 2)___ transition in the commercial vehicle world. Mass produced light delivery vans and lorries flooded 3)___ the roads, and the horse was now only used 4)___ local delivery work. Diesel engines were used 5)___ heavy lorries and steam wagons disappeared.

The inter-war years were a boom time 6)___ the bus, coach and charabanc (*автобус*). In the 1920s bus companies leapt 7)___ a few hundred 8)___ four thousand. Bus design developed rapidly 9)___ solid tyres, oil lamps and some open cabs disappearing and double deckers had covered tops. The

charabanc was a favourite 10)___ the company outing or weekend excursion. Chilly and cramped, the charabanc opened up many parts of Britain beyond the reach of railways and created a new leisure 11)___ the working man.

The lorry today carries just about everything we buy, sell, dispose of, or build. Fuel delivery, removals, defence work, containers, supermarket supplies, tipping, mixing, fire fighting; the list of tasks is endless.

WRITING PRACTICE

43. Read the following texts carefully in order to discover the main line of thought. Write short summaries of the texts:

Motor Sport

Ever since the early days of motoring, manufacturers have realized the publicity potential of their products being successful in motoring competitions. The reputation of many companies have been founded on certain races, Bentley and Jaguar at Le Mans for instance. Motor sports became the test-bed for technical development notably in tyres, brakes, lights and engine performance. The world's toughest sports car event is the Le Mans 24 Hour Race. Hours upon hours of sustained high speed strain drivers and cars to the limit. Outstanding cars with numerous victories in this race have included the Bentley 3 litre, Alfa Romeo 8c, Jaguar C and D types, Ford GT 40 and Porsche. Rallies evolved from trials events held in the early 1900s. These long distance trials like the German Herkomer Trophy of 1904 were tests of reliability but they were generally leisurely affairs. The world's toughest rally today is the East Africa Safari. Drivers can experience tropical storms, scorching heat, dust and the roughest tracks. Only a faction of the starting cars survive this punishing event. The once prestigious Monte Carlo Rally began in 1911 and required cars to start from various points in Europe to converge on Monaco. The British R.A.C. Rally is now Europe's toughest rally.

The Grand Prix

The first motor races were held on the open public roads of France. This soon proved to be too dangerous as cars became faster. Brakes were poor, and dogs and children ran freely across the road.

The first Grand Prix was held in 1906 on a 64 mile circuit near Le Mans, France. The race took place over two days in the heat and dust. Racing cars before 1908 had become a type very distinct from touring cars. They were monster machines weighing 1 000 kg with engines up to 20 litres and capable of 90 m.p.h. During races a mechanic rode with the driver for the many repairs and tyre changes which were to be expected. Between 1922 and 1925 power outputs doubled, and with superchargers speeds of 130 m.p.h. could be attained. The great teams of the 1920s were Alfa Romeo, Fiat, Sunbeam,

Delage and Bugatti. 1930s Grand Prix racing was dominated by the Italians and Germans. The mighty Mercedes and Auto-Unions were the most powerful racing cars built and capable of 200 m. p. h. The Italians continued their supremacy in the 1950s but then Britain became a force to be reckoned with. Were British teams such as Cooper and Lotus led others followed, for they revolutionised racing car design. Since the World Championship began in 1950 the drivers have become the focus of public attention. Juan Manuel Fangio was a living legend winning 5 World Championships in the 1950s, and Jackie Stewart won a record 27 Grand Prix. Other great British drivers were Stirling Moss and Graham Hill. The driver today dresses more like an astronaut in his protective suit, helmet and life support attachments. Their cars cost £250,000 and are the product of the latest technology.

UNIT 3

1. Read and remember the following words:

acquisition — приобретение
to adhere to — придерживаться чего-л.; оставаться верным (принципам)
to approve — одобрить
article — (*зд.*) изделие
bodywork — конструкция кузова
to cease — переставать (делать что-л.)
camshaft — распределительный вал, кулачковый вал
to complain — подавать жалобу, делать запрос
to contraven — нарушать; противоречить (закону, праву)
direct injection — прямой впрыск (топлива)
entry-level — начальный уровень
gearbox — коробка передач
hatchback — автомобиль с открывающейся вверх задней дверью
limited company — компания с ограниченной ответственностью
minivan — микроавтобус
miscalculation — просчет
to outsell — продаваться лучше, чем другой товар
profitable — выгодный
to regain — восстанавливать
to relocate — перераспределять; перемещать
renowned — знаменитый, известный
revision — исправление; переработка
sequential — последовательный
shareholder — акционер
sunglass — солнцезащитное стекло
to surpass — превзойти
takeover — поглощение компании, слияние компаний
to team up — объединяться; работать сообща
torsion bar — торсионный вал
top-selling model — самая популярная модель
trademark — торговый знак
underpinning — подкрепление, поддержка
to unveil — раскрывать
workshop — мастерская; цех

PRE-TEXT EXERCISES

2. Look at the following international words, guess their meaning and check the pronunciation:

Sport, component, evolution, model, cylinder, project, styly, calculate, director, memorandum, method, position, individual, history, dominant, region, cycle, form, group, interest, original, discuss, idea, economical, prototype, programme, commercial, personnel, demobilize, era, original, automatic, electronic, popularity, variation, total, reputation, export, element, symbolically, inspection, industry, demonstration, image, revolution, modern, special, stability, practical, import, control, emission, association, economy, liberalization, comfort, public, patriotic, nomenclature, demographic.

3. Translate into Russian the following words and word combinations:

Sports car manufacturer, to locate, to power, to launch, air-cooled, rear-engined, internal problems, to make changes, to be approved by, six-cylinder coupe, cost-reduced model, to private limited company, to be responsible for, to cease, to outlive, to drive your own car, military vehicle, postwar existence, to be captured by, to be placed under the control of, to increase, average motorcar buyer, to be exhibited, to become outdated, innovative advertising, growing reputation, total production, previous models, automatic transmission, electronic fuel injection, to be recognized, gas-electric hybrid powertrain, diesel engine, biodiesel fuel, emissions regulations, venture, world market, domestic brand, to enjoy, logo, to be the first foreign trademark, to enter car market, lack of quality, limited edition, the average price, to remain in operation, off-road use, outdated technology, poor fuel economy, spacious interior, massive boot, to be a victim of the problems, to invest.

4. Give synonyms to the following words:

to establish	consecutive	review	to widen
position	sketch	accountable	outstanding
to contain	to modify	single	appropriate
later	lawful	to stretch	outdated
to escape	big	wealthy	to produce
lucky	to guard	abundant	to renovate
various	similar	chief	to substitute

5. Give antonyms to the following words:

seldom	external	illegal	many
to destroy	inconsequent	irresponsible	unusual
finally	to disapprove	misunderstanding	to narrow
to exclude	to stabilize	to terminate	customary
unimportant	small	to permit	unsuitable

high	unlucky	empty	defective
to encounter	unsuccessful	different	modern

WORD-BUILDING

6. Translate the following compound words:

Gearbox, bodywork, motor-race, workshop, well-known, race-track, chairman, backbone, top-selling, marketplace, automaker, longstanding, purpose-built, headquarter, beet-sugar, bell-jar, bell-shaped, bell-type, beeswax, beeline, benzpyrene, bestseller, blockbuster, beta-radiation, beta-ray, spectrograph, spectrometer, telecast, televise, telechir, telecommunications, speedometer, speed-torque, entry-level, entry-point, newsperson, newsprint, newsstand, nosewheel, open-plan, open-wire, partake, wide-angle, wide-screen, wind-driven, wind-electric, wind-induced, wind-power, windscreen, windfall, windshield, windspeed, windwork, wire-drive, wire-frame, wire-guided, wireframe, wireway.

7. Translate the following words with the suffixes:

-ee assignee, employee, examinee, internee, referee, refugee, degree;

-eer buccaneer, career, engineer, pioneer, veneer.

8. Define to what parts of speech the following words with prefixes refer and translate them:

ante- antecedence, antecede, antecedent, antedate, antemeridian, anteroom, antebrachial, antechamber, antedisplacement, antefebrile, antemortem;

be- besieger, besiege, becloud, bescreen, beset, besetment, beget, begrudge, behoof, beguile, behalf, behold, belated, benighted, below, bereave, bequeath, bewail, bequest, bereave, beseech, bespeak, bespatter, bestow, beware, bewilder, bewilderment, bewitch;

circum- circumgyration, circumgyrate, circumgyratory, circumvolution, circumvolve, circumvoluntary, circumference, circumferential, circumnavigation, circumnavigator, circumnavigate, circumambience, circumcenter, circumcircle, circumduction, circumflex, circumjacent, circumlocution, circumpolar, circumpolarization, circumradius, circumscribe, circumscribed, circumsolar, circumspect, circumspectly, circumvention, circumvent.

9. Give adjectives corresponding to the following nouns:

North, length, strength, height, gold, detail, archaeology, Egypt, Italy.

10. Read the text below to learn about Porsche AG:

Text 3A. Porsche

Dr Ing. h.c. F. Porsche AG

Type	Public (Xetra: POR3) (FWB: POR3)
Founded	1931 by Ferdinand Porsche
Headquarters	Stuttgart, Baden-Württemberg, Germany
Key people	Dr Wendelin Wiedeking, CEO and President
Industry	Automotive
Products	Automobiles
Revenue	€7.273 billion (2006), €6.57 billion (2005)
Employees	11,910 (2005)
Slogan	There Is No Substitute
Website	www.porsche.com

Porsche AG, or just Porsche, is a German sports car manufacturer, founded in 1931 by Austrian Ferdinand Porsche, the engineer who also created the first Volkswagen. The company is located in Zuffenhausen, a city district of Stuttgart, Baden-Württemberg.

History of the company. The first Porsche, the Porsche 64 of 1938, used many components from the Volkswagen Beetle. The second Porsche model and first production automobile, the Porsche 356 sports car of 1948, was built initially in Gmünd, Austria, the location to which the company was evacuated during war times, but after building forty-nine cars the company relocated to Zuffenhausen. Many regard the 356 as the first Porsche simply because it was the first model sold by the fledgling company.

Ferdinand Porsche worked with his son, Ferry Porsche, in designing the 356. Not long afterward, on January 30, 1951, Ferdinand Porsche died from complications following a stroke. The 356 automobile used components from the Beetle including its engine, gearbox, and suspension. The 356, however, had several evolutionary stages, A, B, and C, while in production and many

VW parts were replaced by Porsche-made parts. The last 356s were powered by entirely Porsche-designed engines. The sleek bodywork was designed by Erwin Komenda who also had designed the body of the Beetle.

In 1963, after some success in motor-racing, namely with the Porsche 550 Spyder, the company launched the Porsche 911 another air-cooled, rear-engined sports car, this time with a 6-cylinder 'boxer engine'. The team to lay out the body shell design was led by Ferry Porsche's eldest son, Ferdinand Alexander Porsche (F. A.). The design phase for the 911 caused internal problems with Erwin Komenda who led the body design department until then. F. A. Porsche complained Komenda made changes to the design not being approved by him. Company leader Ferry Porsche took his son's drawings to neighbouring body shell manufacturer Reuter bringing the design to the 1963 state. Reuter's workshop was later acquired by Porsche (so-called Werk II). Afterward Reuter became a seat manufacturer, today known as Keiper-Recaro.

The design group gave sequential numbers to every project (356, 550, etc.) but the designated 901 nomenclature contravened Peugot's commercial rights on all 'x0x' names, so it was adjusted to 911. Racing models adhered to the 'correct' numbering sequence: 904, 906, 908. The 911 has become Porsche's most well-known model, successful on the race-track, in rallies, and in terms of sales. Far more than any other model, the Porsche brand is defined by the 911. It remains in production; however, after several generations of revision, current-model 911s share only the basic mechanical concept of a rear-engined, six-cylinder coupe, and basic styling cues with the original car. A cost-reduced model with the same body, but 356-derived running gear, was sold as the 912.

In 1972, the company's legal form was changed from limited partnership to private limited company (German AG), because Ferry Porsche and his sister, Louise Piëch, felt their generation members did not team up well. This led to the foundation of an executive board whose members came from outside the Porsche family, and a supervisory board consisting mostly of family members. With this change, no family members were in operational charge of the company. F. A. Porsche founded his own design company, Porsche Design, which is renowned for exclusive sunglasses, watches, furniture, and many other luxury articles. Ferdinand Piëch, who was responsible for mechanical development of Porsche's serial and racing cars, formed his own engineering bureau and developed a 5-cylinder-inline diesel engine for Mercedes-Benz. A short time later he moved to Audi and pursued his career through the entire company, up to and including, the Volkswagen Group boards.

The first CEO of Porsche AG was Dr Ernst Fuhrmann who had been working in Porsche's engine development. Fuhrmann was responsible for the so-called Fuhrmann-engine used in the 356 Carrera models, as well as the 550 Spyder, having four over-head camshafts instead of a central camshaft as in the Volkswagen-derived serial engines. He planned to cease the 911 during the 70s and replace it with the V8-front engined grand sportswagon 928.

In 1990, Porsche drew up a memorandum of understanding with Toyota to learn and benefit from Japanese production methods. Currently Toyota is assisting Porsche with Hybrid technology, rumored to be making its way into a Hybrid Cayenne SUV. Following the dismissal of Bonn, an interim CEO was appointed, longtime Porsche employee, Heinz Branitzki, who served in that position until Dr Wendelin Wiedeking became CEO in 1993. Wiedeking took over the chairmanship of the board at a time when Porsche appeared vulnerable to a takeover by a larger company. During his long tenure, Wiedeking has transformed Porsche into a very efficient and profitable company.

Ferdinand Porsche's grandson, Ferdinand Piëch, was chairman and CEO of the Volkswagen Group from 1993 to 2002. Today he is chairman of the supervisory board. With 12.8 per cent of the Porsche voting shares, he also remains the second largest individual shareholder of Porsche AG after his cousin, F. A. Porsche, (13.6 per cent). Porsche's 2002 introduction of the Cayenne also marked the unveiling of a new production facility in Leipzig, Saxony, which once accounted for nearly half of Porsche's annual output. The Cayenne Turbo S has the second most powerful production engine in Porsche's history, with the most powerful belonging to the Carrera GT. In 2004, production of the 605 horsepower Carrera GT commenced in Leipzig, and at €450.000 ($440,000 in the United States) it was the most expensive production model Porsche ever built.

As of 2005, the extended Porsche and Piëch families controlled all of Porsche AG's voting shares. In early October 2005, the company announced acquisition of an 18.53 % stake in Volkswagen AG and disclosed intentions to acquire additional VW shares in the future. In mid-2006, after years of the Boxster (and later the Cayenne) as the dominant Porsche in North America, the 911 regained its position as Porsche's backbone in the region.

Notes on the text

CEO (chief executive officer) — главный администратор фирмы
tenure — срок пребывания
supervisory board — наблюдательный совет
executive board — исполнительный орган
interim — промежуточный период
boxer engine — двигатель с оппозитными цилиндрами

TEXT AND VOCABULARY EXERCISES

11. Choose the right words and fill in the gaps:

1. Porsche AG or just Porsche, is a German ___ manufacturer, founded in 1931.
   a) sports car b) racing car c) estate car
2. The first Porsche, the Porsche 64 of 1938, used many components from the ___.
   a) Peugeot b) Volkswagen c) Mercedes-Benz
3. In 1963, after some success in motor-racing, the company launched the Porsche 911 another ___, rear-engined sports car.
   a) air-conduction b) air-cooled c) air-conditioning
4. The 911 has become Porsche's most ___ model, successful on the race-track, in rallies, and in terms of sales.
   a) well-known b) well-kept c) well-knit
5. In 1972, the company's legal form was changed from limited partnership to private ___ .
   a) joint-stock company b) insurance company c) limited company
6. In 1990, Porsche drew up a ___ of understanding with Toyota to learn and benefit from Japanese production methods.
   a) memorandum b) command c) report
7. In 2004, ___ of the 605 horsepower Carrera commenced in Leipzig, and at €450,000 it was the most expensive production model Porsche ever built.
   a) modernization b) selling c) production
8. In early October 2005, the company announced ___ of an 18.53 % stake in Volkswagen AG and disclosed intentions to acquire additional VW shares in the future.
   a) acquisition b) distribution c) donation

12. Find in the text equivalents to the following phrases:

Расположен; много компонентов; гладкий кузов; заменить; внутренние проблемы; приобрести; определять; коммерческие права; гоночные автомобили; техническое бюро; верхний распредвал; прекращать(ся); приостанавливать; просчеты; долгосрочный; давнишний; служащий; руководство; известная модель; оставаться в производстве; текущая модель; модель, сокращающая стоимость/

издержки; смещение; преобразовать; ежегодная продукция (выпуск); лошадиная сила; объявить о приобретении; посредством чего; восстановить; основа.

13. Find the English equivalents to the following Rusian words:

1) успешный	a) successive	b) succession	c) successful
2) заменять	a) replace	b) displace	c) dispose
3) выгодный	a) profitability	b) profitable	c) profitless
4) технология	a) technician	b) technologist	c) technology
5) оборудование	a) facile	b) facility	c) faculty
6) расширять	a) extensive	b) extend	c) extension
7) приобретение	a) acquiscence	b) acquirement	c) acquisition
8) мощный	a) powerful	b) powerless	c) powering

14. Divide text 3A into logical parts and give each a suitable title.

15. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

German sports car manufacturer	the first Porsche
Porsche-made parts	success in motor-racing
Porsche's engine development	the most expensive mode
acquisition of VW's stake	regaining of Porsche position

16. Fill in the gaps with the words from the box:

higher rival figure firms competition marketplace quite comparable production rivalry expensive compete

Motorsport

In racing, Porsche's main 1) ___ has traditionally been Ferrari, though traditionally their 2) ___ vehicles appeal to 3) ___ different personalities, if similar demographics. Commercially, Ferrari sells far fewer cars at much 4) ___ prices than Porsche (for example, there are no Ferraris under $100,000, while several Porsches are priced below that 5) ___). Porsche's 6) ___ with Ferrari is primarily because of both companies' storied racing heritage and the fact that some of their vehicles are of 7) ___ performance, not because of direct 8) ___ between some models. Porsche has a reputation for offering equal or higher performing cars than the more 9) ___ Ferrari models.

Porsche's traditional rivals for the daily-driver 10) ___ are its fellow German automakers Mercedes-Benz and BMW, who 11) ___ more directly with Porsche (example, the Boxster competes directly with the BMW Z4 and the Mersedes-Benz SLK). Ferrari, on the other hand, competes more directly with 12) ___ such as Lamborghini and Aston Martin (companies Porsche only competes partially with). Porsche also competes with Lotus, Jaguar, and Maserati.

Check your answers on p. 321

17. Fill in the gaps with the prepositions from the box:

in	at	with	under	of	on	to

The Porsche Cayenne, introduced 1)___ 2002, shares its entire chassis 2)___ VW Touareg, which is built 3)___ the Volkswagen factory 4)___ Bratislava. 5)___ late 2005, Porsche took an 18.65 % stake 6)___ VW, further cementing their relationship and preventing a takeover 7)___ Volkswagen, which was rumored 8)___ the time. Speculated suitors included Daimler Chrysler, BMW, and Renault. 9)___ March 26, 2007, Porsche took its holding 10)___ Volkswagen shares 11)___ 30.9 %, triggering a takeover bid 12)___ German law. Porsche formally announced 13)___ a press statement that it did not intend to takeover Volkswagen, but intended the move to avoid a competitor taking a large stake or to stop hedge funds dismantling VW, which is Porsche's most important partner.

SUPPLEMENTARY READING

18. Read the texts 13, 14 to get more information about Porsche.

TEXT WORK

19. Read and translate the text below:

Text 3B. Volkswagen

Volkswagen AG

Type	Marque of Volkswagen Group (ISIN: DE0007664005)
Founded	1937 by German Auto Association
Headquarters	Wolfsburg, Germany
Key people	Martin Winterkorn, Chairman of the Board of Management
Industry	Automotive
Products	Automobile

Revenue	€50,245 billion (2005)
Net income	€741 million (2005)
Employees	344,900
Slogan	Aus Liebe zum Automobil (For the love of the car)
Web-site	Volkswagen International

Volkswagen AG or VW, is an automobile manufacturer based in Wolfsburg, Germany. It forms the core of Volkswagen Group and is the world's fourth largest car producer after Toyota, GM and Ford, respectively. The name means 'people's car' in German. Its tagline is 'For the love of the car'.

History. Adolf Hitler had a keen interest in cars even though he did not drive. In 1933, he demanded that Ferdinand Porsche make changes to his original 1931 design to make it more suited for the working man. Hans Ledwinka discussed his ideas with Ferdinand Porsche who used many Tatra design features in the 1938 Kdf-Wagen, later known as the VW Käfer — or Beetle.

Changes included better fuel efficiency, reliability, ease of use, and economically efficient repairs and parts. The intention was that ordinary Germans would buy the car by means of a savings scheme 'Save five Marks a week, if you want to drive your own car' which around 336,000 people eventually paid into. Prototypes of the car called the 'Kdf-Wagen', appeared from 1936 onwards (the first cars had been produced in Stuttgart). The car already had its distinctive round shape and air-cooled, flat-four, rear-mounted engine. The VW car was just one of many KdF programmes which included things such as tours and outings.

Erwin Komenda, the longstanding AUTO UNION chief designer, developed the car body of the prototype, which was recognizably the Beetle we know today. The new factory in the new town of KdF-Stadt, now called Wolfsburg, purpose-built for the factory workers, only produced a handful of cars by the time war started in 1939. None were actually delivered to holders of the completed saving stamp books, though one Type 1 Cabriolet was presented to Hitler on his birthday in 1938.

War meant production changed to military vehicles, the Type 81 Kübelwagen (Bucket car) utility vehicle. Its post-war existence the company owes largely to one man, British Army officer Major Ivan Hirst. In April 1945, KdF-Stadt and its heavily bombed factory were captured by the Americans, and subsequently handed over to the British, within whose occupation zone the town and factory fell. The factory was placed under the control of Oldham-born Hirst. At first, the plan was to use it for military vehicle maintenance. Since it had been used for military production, and had been in Hirst's words a 'political animal' rather than a commercial enterprise, the equipment was in time intended to be salvaged as war reparations.

Hirst painted one of the factory's cars green and demonstrated it to British Army headquarters. The first few hundred cars went to personnel from the occupying forces. Some UK service personnel were allowed to take their Beetles back to the UK when they were demobilized, and one of the very first Beetles brought back in that way is still owned by the original proprietor of the UK's first official VW Importer.

By 1946, the factory was producing 1,000 cars a month, a remarkable feat considering the factory was still in disrepair: the damaged roof and windows meant rain stopped production; the steel to make the cars had to be bartered for new vehicles. The car and its town changed their Second World War-era

names to Volkswagen and Wolfsburg respectively, and production was increasing. It was still unclear what was to become of the factory. It was offered to representatives from the British, American and French motor industries, but all of them rejected it. After an inspection of the plant, Sir William Rootes, head of the British Rootes Group, told Hirst that the project would fail within two years, and that the car 'is quite unattractive to the average motorcar buyer, is too ugly and too noisy ...'. VW later bought British car makers Bentleys and Rolls Royce, and from 1948, Volkswagen became a very important element, symbolically and economically, of West German regeneration.

Volkswagens were first exhibited and sold in the United States in 1949. It only sold two units in America that first year. On its entry to the US market, the VW was briefly sold as a 'Victory Wagon'. Volkswagen of America was formed in April 1955 to standardize sales and service in the US Production of the Type 1 Volkswagen Beetle increased over the years, the total reaching one million in 1955. During the 1960s and early 1970s, although the car was becoming outdated, American exports, innovative advertising and a growing reputation for reliability helped production figures to surpass the levels of the previous record holder, the Ford Model T. By 1973, total production was over 16 million.

VW expanded their product line in 1961 with the introduction of several Type 3 models, which were essentially body style variations based on Type 1 mechanical underpinnings, and again in 1969 with the relatively unpopular Type 4 models, which differed substantially from previous models with the notable introduction of unibody construction, a fully automatic transmission, electronic fuel injection, and a sturdier powerplant. Volkswagen added a 'Super Beetle' to its lineup in 1971. The Type 113 differed from the standard Beetle in its use of a McPherson strut front suspension instead of the usual torsion bars. Despite the Super Beetle's popularity with Volkswagen customers, purists preferred the standard Beetle with its less pronounced nose and its original torsion bar suspension.

TEXT AND VOCABULARY EXERCISES

20. Answer the following questions:

1. What does the name 'Volkswagen' mean in German? **2.** What is the tagline of Volkswagen? **3.** Who developed the car body of the Volkswagen prototype? **4.** When did car production change to military vehicles? **5.** Who was Ivan Hirst? **6.** How many cars was the factory producing monthly by 1946? **7.** When did Volkswagen become a very important element, a symbol of West Germany regeneration? **8.** When were Volkswagens first exhibited and sold in the United States? **9.** When did VW expand their product line?

21. Read once more the part of text 3B which tells about post-war history of Volkswagen. Work with a partner, take turns to ask and answer the questions. Use the words and word combinations below:

postwar existence	to be captured by
military vehicle maintenance	to increase the production
inspection of the plant	the average motorcar buyer
British car makers	West German regeneration

22. Find in the text the English equivalents to the following Russian words:

изменения	обсуждать	включать	надежность
ремонт	отличительный	намерение	обычный
сбережения	использование	поставить	неясный
спасение	существование	предприятие	владелец
фабрика	замечательный	поврежденный	сталь
увеличение	представитель	оборудование	уродливый
продажа	шумный	выставлять(ся)	вход
превзойти	уровень	расширять(ся)	введение

23. Compose your own sentences with each right English equivalent of the words given in exercise 22. Compare your variants with the sentences of your partner.

24. Work in pairs and decide whether these statements according to text 3B are true or false:

1. Volkswagen AG is an automobile manufacturer based in Sweden. **2.** Adolf Hitler had no interest in cars. **3.** In 1933, Adolf Hitler demanded that Henry Ford make changes to his original 1931 design to make it more suited for the working man. **4.** Car's changes included better fuel efficiency, reliability, ease of use, and economically efficient repairs and parts. **5.** The intention was that ordinary Germans would buy the car by means of a savings. **6.** Erwin Komenda, the longstanding AUTO UNION chief designer, developed the car body of the prototype, which was recognizably the Passat we know today. **7.** Ivan Hirst was an officer of American Army. **8.** Hirst painted one of the factory's cars green and demonstrated it to British Army headquarters. **9.** By 1946 the factory was producing 1,000 cars a year. **10.** After an inspection of the plant, the head of the British Rootes Group told Hirst that the project would fail within two years. **11.** Volkswagens were first sold in the United States in 1949. **12.** VW expanded their product line in 1961 with the introduction of several Type 3 models, which were essentially body style variations based on Type 1 mechanical underpinnings.

25. Translate into Russian the following words and word combinations which will help you to understand the text below:

to introduce	array of new models
to be launched	performance version
direct injection engine	to announce plans
to be recognized	direct injection
to be available for sale	to be powered by

a test vehicle
fine handling vehicle
high vehicle mass
government emissions regulations
poor fuel economy
subcompact car

26. Read the following text and give a brief summary.

Volkswagen in the Twenty-First Century

Volkswagen began introducing an array of new models after Bernd Pischetsrieder became Volkswagen Group CEO in 2002. The fifth generation Volkswagen Golf was launched in 2004, came runner-up to the Fiat Panda in the 2004 European Car of the Year.

The GTI, a 'hot hatchback' performance version of the Golf, boasts a 2.0 L turbocharged direct injection engine. VW began marketing the Golf under the Rabbit name once again in the US and Canada in June 2006.

The fifth-generation Jetta is also available in the United States and Canada. The sixth-generation Passat and the fifth-generation Jetta both debuted in 2005, and VW has announced plans to expand its lineup further by bringing back the Scirocco by 2008. Volkswagen is recognized as one of the leading small diesel engine manufacturers, and is partnering with Mercedes and other companies to market BlueTec clean diesel technology. Volkswagen has offered a number of its vehicles with a TDI (Turbo Direct Injection) engine, which lends class-leading fuel economy to several models. According to the US Environmental Protection Agency, four of the ten most fuel efficient vehicles available for sale in the US in 2004 were powered by Volkswagen diesel engines. They were a three-way tie for 8th (TDI Beetle, TDI Golf, TDI Jetta) and ninth, the TDI Jetta Wagon. As of 2007, VW has

not yet offered a gas-electric hybrid powertrain such as that in the Toyota Prius (though a diesel-electric hybrid 5th generation Jetta was produced as a test vehicle). In addition, all VW AG TDI diesel engines produced since 1996 can be driven on 100 % biodiesel fuel. For the 2007 model year, however, strict US government emissions regulations have forced VW to drop most diesels from their US engine lineup, but a new lineup of diesel engines compatible to US standards are due for 2008.

Volkswagen long resisted adding an utility vehicle to its lineup, but it finally relented with the introduction of the Touareg in the early 2000s, sharing major components with the Porsche Cayenne sport utility vehicle. Though acclaimed as a fine handling vehicle, the Touareg has been a modest seller at best. Some automotive analysts blame the Touraeg's absence of a third-row seat, the relatively poor fuel economy, and the high vehicle mass.

On July 20, 2006, VW announced that the new vehicle would be called the Tiguan. One major irony of Volkswagen's current North American lineup is the absence of a minivan, considering that VW is credited for inventing the minivan with its original Transporter, but the firm is currently developing just such a vehicle for the US and Canadian markets with Daimletr Chrysler, with current plans to introduce it in 2008.

Volkswagen is also considering a new entry-level model for the North American lineup. A venture with DaimlerChrysler to produce such a vehicle was considered but dropped as of September 2006. Due to technical difficulty adapting the Polo to meet North American vehicle regulations, VW presented in 2006 the 'Iroc' as a concept of the proposed 2009 Scirocco as a potential new small model.

In September 2006, Volkswagen began offering the City Golf and City Jetta only for the Canadian market. Both models are basically the Mk IV

Golf and Jetta, making them smaller than the current Rabbit and Jetta and competing directly to the Toyota Yaris and Honda Fit. Volkswagen's introduction of such models is seen as a test of the market for a subcompact and, if successful, may be the beginnings of a thriving subcompact market for Volkswagen.

Notes on the text

Environmental Protection Agency — Управление по охране окружающей среды

entry-level model — модель с минимальной конфигурацией (в серии изделий)

turbocharged — с турбинным двигателем

SUPPLEMENTARY READING

27. Read the texts 15, 16 to get more information about Volkswagen.

28. Translate the following text into English:

В 1934 Фердинанд Порше, известный немецкий конструктор — основатель всемирно известной немецкой автомобильной компании Porsche AG, получил заказ от национал-социалистического правительства Германии на разработку современного легкового автомобиля.

В 1935 году такой автомобиль был сделан. Он получил название «Фольксваген», что в переводе с немецкого значит «народный автомобиль».

После двухлетних испытаний в 1937-м была запущена серия VW 30, а к 1938-му автомобиль обрел знакомый многим поколениям внешний вид. Volkswagen сразу оценили конструкторы, инженеры и водители. О нем заговорили, появились многочисленные публикации, в 1938-м в статье 'New York Times' Volkswagen окрестили за внешнее сходство «жуком». Это прозвище настолько прижилось, что стало визитной карточкой автомобиля.

Для производства «народного автомобиля» 26 мая 1938 года в городе Вольфсбурге началось строительство крупнейшего европейского автозавода Volkswagen. Но война помешала наладить выпуск этого автомобиля. Их была произведена всего дюжина. Автомобиль очень понравился фашистским высшим кругам, на нем с удовольствием разъезжал сам Гитлер. Во время Второй мировой войны работы по строительству Volkswagen были приостановлены, а недостроенный завод перепрофилирован на производство военной продукции.

В настоящее время концерн Volkswagen — один из крупнейших по объемам продаж в мире, имеет свои заводы в 15 странах мира, выпускает продукцию под пятью торговыми марками Volkswagen, Audi, Skoda, SEAT.

С 1998 года концерну принадлежит марка «Роллс-Ройс». Кроме легковых автомобилей, завод также осуществляет выпуск грузовиков, микроавтобусов. В состав концерна Volkswagen входят Volkswagen AG, Audi AG, «CEAT C. A.», «Шкода аутомобилова», «Фольксваген-Саксония ГмбХ».

GRAMMAR

29. Проанализируйте формы глагола Perfect Active и Passive, приведенные в таблице:

Perfect Tenses		
	Active	Passive
Infinitive	to have/has + Ved	to have + been + Ved/3
Present	He has finished the translation.	The translation has been finished.
Past	He had finished the translation by yesterday evening.	The translation had been finished by yesterday evening.
Future	He will have finished the translation by tomorrow.	The translation will have been finished by tomorrow.

30. Сравните следующие пары предложений и переведите их на русский язык:

1. They have finished their work. The work has been finished. **2.** When he came to the laboratory they had finished their experiment. Their experiment had been finished when he entered the laboratory. **3.** By the end of this academic year we shall have finished our research. Our research will have been finished by the end of this academic year. **4.** The students have translated the text. The text has been translated by the students. **5.** They had founded that new research-center by the end of the year. The new research-center had been founded by the end of the year.

31. Переведите следующие предложения, обращая внимание на время и залог сказуемого:

а) 1. In some of the latest self-cooled transformers a large increase in capacity *has been obtained*. **2.** The blast furnace *will have been repaired* by the end of the month. **3.** Various methods *have been used* to atomize liquid gasoline or break it up into small particles by the rush of air through the carburettor mixing chamber. **4.** In recent years many nonmetallic materials *have been* widely *used* in engineering. **5.** This plant *has developed* new types of vehicles such as electromobiles, cars with magnetic suspension

and so on. **6.** Today our knowledge of materials *has been* greatly *extended*. **7.** Our scientists *have developed* many alloys having greater resistance to various loading conditions. **8.** *Have* you *made* up the cyclogram of coordinate work of robots and shop section equipment? **9.** Steel *has* long *been used*, and in great quantities, in structural applications from bridges and buildings to ships, automobiles and household appliances. **10.** Mechanics *has* at all times *been considered* a basic subject in engineering education. **11.** The law of the conservation of matter *had been discovered* by Lomonosov many years before Lavoisier.

b) 1. A Catholic priest named Father Ferdinand Verbiest *has been said* to have built a steam powered vehicle for the Chinese Emperor Chien Lung in about 1678. **2.** Steam cars *had been built* in America since before the Civil War but the early one were like miniature locomotives. **3.** By 1890, Ransom E. Olds *had built* his second steam powered car. **4.** Charles and Frank Duryea *had purchased* a used horse drawn buggy for $70 and installed a 4 HP, single cylinder gasoline engine. **5.** By the end of 1896 Ford *had sold* his first car, which he called a Quadracycle, for $200 and used the money to build another one. **6.** By 1915 racing *had become* a passion all over the United States. **7.** Toyota *had established* a worldwide presence as the company had exported its one-millionth unit.

32. Раскройте скобки, употребляя глаголы в Past Simple или Past Perfect:

1. When the police (*to arrive*), the car (*to go*). **2.** When I (*to get*) to the shop, it (*to close*). **3.** They (*to eat*) everything by the time I (*to arrive*) at the party. **4.** Nobody (*to come*) to the meeting because Ann (*to forget*) to tell people about it. **5.** I (*to try*) to telephone her several times but she (*to leave*) the city. **6.** She couldn't find the book I (*to lend*) her. **7.** He (*to wonder*) why I (*not/to visit*) him. **8.** She (*to wait*) about outside for her friend wondering where he (*to go*). **9.** My friend (*to buy*) a new car as he (*to break*) his old one. **10.** I (*to do*) the homework by 5 o'clock. **11.** He already (*to leave*) by that time. **12.** By the end of the year all the articles (*to be translated*).

33. Употребите глаголы, данные в скобках, в требуемых по смыслу формах:

1. I (*to buy*) a book this week. **2.** He just (*to go*) out. **3.** I (*to buy*) a new car. Come and look at it. **4.** The film just (*to begin*). You are a little late. **5.** ... you ever ... (*to ride*) a bicycle? **6.** Many people never (*to fly*) a plane. **7.** ... you ever ... (*to try*) Chinese food? **8.** I already (*to do*) my homework. Now I can have a rest. **9.** I (*to finish*) my work by the evening yesterday. **10.** I (*to go*) to bed after I (*to have*) a bath. **11.** When I (*to open*) the door of the classroom, I (*to see*) that the teacher already (*to come*). **12.** You (*to finish*) your scientific work by next Monday? If not, tell us the exact date. **13.** ... your friends (*to write*) the test by October? **14.** ... they (*to pass*) their exams by this time next week? **15.** By half past seven we (*to have*) supper. **16.** By this time next week you (*to pass*) all your exams. **17.** Ever

since the early days of motoring, manufacturers (*to realise*) the publicity potential of their products being successful in motoring competitions. **18.** The reputation of many companies (*to be founded*) on certain races, Bentley and Jaguar at Le Mans for instance. **19.** By 1982, Honda (*to find*) its niche in the United States. **20.** By that year Toyota (*to introduce*) new technologies including the first mass-produced hybrid gas-electric vehicle, automatic parking, a four-speed electronically controlled automatic. **21.** The production numbers of the first-generation VW Golf (*to continue*) to grow annually in South Africa with only slight modifications to the interior, engine and chassis. **22.** I just (*to see*) an excellent automobile. **23.** He (*to work*) at this car-building plant since 1990. **24.** Peter (*to learn*) English before he (*to go*) to England. **25.** This car (*to become*) Porsche's most well-known model, successful on the race-track, in rallies, and in terms of sales. **26.** Volkswagen (*to offer*) a number of its vehicles with turbo direct injection engine, which lends class-leading fuel economy to several models. **27.** Russian carmaker Lada AvtoVAZ (*to announce*) plans to participate in next year's FIA World Touring Car Championship. **28.** The price for this new road car (*not to be decided*) yet. **29.** Ford (*to be*) one of the world's ten largest corporations by 1999.

TEXT WORK

34. Read the text and give a brief summary of it:

Text 3C. Export of Lada

Lada is the trademark of AutoVAZ, a Russian car manufacturer located in the city of Toliatti. It was chosen for exports over the domestic Zhiguli brand, but since the 1980s the name has been used in Soviet and later Russian market as well. Lada made its name in Western Europe selling the Lada Riva in large quantities during the 1980s, but subsequent models have not enjoyed the same success as the Riva. Its headquarters are in Toliatti (Samara Region). The logo of the company represents the stylized slavic/viking boat called Ladia. Lada is the name of a slavic divinity (goddes of youth, love and beauty).

Lada cars started being imported to Brazil in 1990, when the Brazilian president Fernando Collor lifted the ban on car imports. In fact, Lada was the first foreign trademark to enter Brazil's car market after Collor's liberalization of 1990. Initially, Lada 2105 (sedan) and 2104 (station wagon) models (badged as Lada Laika) and Lada Niva were very successful models because of their low prices.

Shortly after, the Samara was introduced. The Samara was never successful in Brazil. The Laika and Niva models' popularity began to wane after a few years because of the perceived lack of quality of all Lada car models. However, the Niva continued to be strong in the off-road market, even

having a limited edition exclusively for the Brazilian market. It continued to be sold until 1997. Many of the last Lada Nivas sold in Brazil had diesel engines. Most of the Nivas sold in Brazil remain operational and used cars still command high prices in the used car market. In fact, in Brazil, a 1991 Niva in very good condition can cost as much as R$11,000 or US$5,500, which is far more than the average price in the Brazilian used car market for a car of that year. As many as 30,000 Lada cars were sold in Brazil between 1990 and 1997. Between 1990 and 1993, Lada sold the most cars of any importer to Brazil. Many Nivas remain in operation, mainly for off-road use. The Niva has many followers in Brazil. As many as 7,000 Nivas imported between 1990 and 1997 remain operational today.

Besides AutoVAZ began exporting cars to the United Kingdom in 1974 using the brand name Lada. The Fiat 124-based range was slated for its outdated technology, poor fuel economy and tank-like roadholding, but it gained popularity thanks to its ruggedness, spacious interior, massive boot and low asking price. Many Lada owners swore by their cars. After introduction of the Niva range in 1980, sales through the 1980s were particularly strong, with UK sales peaking in 1988 at 33,000 units (being near 2% of UK car sales). AutoVAZ built up a network of UK Lada dealers through its marketing associate, Satra Motors. Some of the dealerships were owned outright and some were agencies. The Satra-owned dealerships were all sold off in 1987 and 1988.

Lada was a victim of the political and economic problems of Russia in the late 80s and early 90s. It was not possible to invest adequately in product and service development. By the 1990s the age of the basic Niva design was showing more than ever. Not even sub-£5,000 prices on the basement models were enough to disguise the 1966 vintage of the design. UK sales dwindled away to 8,000 units in 1996, the last full year in which Lada cars

were marketed in the UK. During this period, many Lada dealers either went out of business or switched to other makes of car. Confronted with the need to meet new EU emission control requirements and with a shortage of certain imported components, AutoVAZ decided to withdraw from the UK and most other western European markets. Lada cars maintained a presence in a number of African, Caribbean and Latin American markets.

TEXT AND VOCABULARY EXERCISES

35. Give Russian equivalents to the following words and word combinations:

to represent
to begin exporting
spacious interior
to built up a network of dealers
service development
vintage
lack of quality
poor fuel economy
low asking price
dealership
to disguise
to dwindle

36. Find in the text above words or phrases which mean the same as:

внутренний
стилизованный
низкие цены
представительство
сокращаться, уменьшаться, убывать
«держание» автомобилем дороги
встречаться
быть представленным
количество
успех
под маркой
соответственно
изменять облик
оставаться в эксплуатации
удаляться, уходить
автомобиль с кузовом универсал
средняя цена
багажник
максимум продаж
распроданный
вкладывать капитал
для использования по бездорожью
нехватка
на используемом автомобильном рынке

37. Choose the correct word from text 3C to complete the sentences:

1. The logo of Auto VAZ represents the ___ slavic/viking boat called Ladia.
   a) stylized b) decorative c) graphic
2. Lada cars started being ___ to Brasil in 1990.
   a) exported b) imported c) conveyed
3. Many of the last Lada Nivas sold in Brazil had ___ engines.
   a) diesel b) steam c) gas
4. Most of the Nivas sold in Brazil remain ___ .
   a) operational b) inoperative c) defective
5. Between 1990 and 1993, Lada sold the most cars of any importer to ___.

a) the United Kingdom b) Canada c) Brazil

6. Many ___ Nivas remain in operation, mainly for ___ use.
   a) paved road b) trunk road c) off-road
7. Besides AutoVAZ began exporting ___ to the United Kingdom in 1974 using the brand name Lada.
   a) cars b) scooters c) motorcycles
8. AutoVAZ ___ a network of UK Lada dealers through its marketing associate.
   a) built up b) destroyed c) collapsed
9. Lada was a victim of the political and economic ___ of Russia in the late 80s and early 90s.
   a) problems b) advantages c) benefits
10. During the period of the late 80s and early 90s many Lada dealers either ___ business or switched to other makes of car.
    a) go in for b) go in with c) went out of

38. Fill in the gaps with the prepositions from the box:

of	for	on	to	around	with	in	between

AvtoVAZ

AvtoVAZ is a Russian automobile manufacturer. It produces nearly one million cars a year, including the Samara, Lada 110 and the Niva off-roader. The variations 1) ___ their first car, the model VAZ-2101, based 2)___ the 1966 Fiat 124 and introduced 3)___1970, are still the cars most associated 4)___ its Lada brand.

The VAZ factory is one 5)___ the biggest 6)___ the world, has over 90 miles (144 km) 7)___ production lines and is unique 8)___ that most 9)___ the components 10)___ the cars are made in-house.

The original Lada is often thought of as a "rugged" car, lacking 11)___ most modern luxuries expected 12)___ modern cars. While sanctions banned their export 13)___ the United States, Ladas were available 14)___ several Western countries during the 1970's and 1980s, including Canada and the United Kingdom.

The plant was set up as a collaboration 15)___ Italy and the Soviet Union and built 16)___ the banks of the Volga river 17)___ 1966. A new part 18)___ town Togliatti was built ___ the factory. The Lada was envisaged as a 'people's car' like the Citroën 2CV or the VW Beetle.

39. Read the text about Lada Niva. Work with a partner, take turns to ask and answer the questions:

From 1979, Lada produced the Niva four-wheel drive. It competed well with Japanese rivals like the Suzuki SJ in terms of practicality and stability, and above all else, its off-road ability. Also, the Niva was significantly cheaper than its rivals. This was one area where Lada achieved some market

success in the 1990s. The Niva was adopted by several British police forces and attracted something of a cult following within the 4 × 4 enthusiast fraternity in the UK and elsewhere. After the withdrawal of Lada from the UK in 1997, several dealers continued to acquire Nivas by special import for sale in the UK. These required some local modification in order to meet emission control regulations current in the UK. A few Lada enthusiasts make the trip to Tallinn where they can buy new, right hand drive Ladas (made for the West African market) for as little as US $2.500.

Lada's first attempt at a modern car came with the Samara hatchback in 1984 (launched in the UK in 1987), which made use of a completely new mechanical design. But many budget-conscious buyers simply stuck with the old Riva, which many would argue was actually a better car (despite its ancient design) and also sold for significantly less. In 1997, the Lada range was withdrawn from Britain and most other European markets, but it continued to be an enormous success in Russia. Another attempt at a modern car came in 1996 with the 2110, which is similar in size to a Ford Mondeo or Opel Vectra. This model was never sold in the UK. It looked and was far more modern than the rest of the Lada range, but proved disastrously unreliable in its early years, causing the company already in financial difficulty to spend millions ironing out the many faults which had been reported.

After Lada (UK) ceased operations in 1997, the remains of the British network of Lada dealers were serviced by Lada (France). Ladas rapidly disappeared from British roads. They had minimal second-hand value in the UK and a re-export market for Russia developed. Many UK and Irish-registered Ladas were sold back to Russia to be stripped for spare parts or to be sold to Russian buyers who appreciated the superior export-specification cars. There have been several attempts to reintroduce Ladas to the UK market, but these have not produced a result as yet.

SUPPLEMENTARY READING

40. Read the texts 17, 18, 19 to get more information about Lada and other car-models of AvtoVAZ.

41. Using the information you have learned about 'Niva', translate the following sentences into English:

1. ВАЗ 2121 «Нива» — серийный автомобиль повышенной проходимости. **2.** День рождения знаменитого русского внедорожника — 5 апреля 1977 года. **3.** «Нива» открыла новый класс автомобилей — компактный, комфортабельный внедорожник с постоянным полным приводом, с большим количеством новаторских решений. **4.** Главная причина долголетия на автомобильном рынке — доступность, неприхотливость и отсутствие конкурентов. **5.** «Нива» была и остается одним из лидеров экспорта ВАЗа. **6.** Ежегодно тысячи «Нив» экспортируются в страны Латинской Америки, Африки и Среднего Востока,

Европы, в том числе в Германию, Францию и Грецию. **7.** Во многих странах мира существуют клубы любителей «Нивы». **8.** «Нива» достигла успехов в автоспорте, становясь призером престижных ралли-рейдов, таких как Париж — Дакар, Париж — Тунис, Париж — Пекин и других. **9.** «Нива» в течение 12 лет служила на российской полярной станции «Беллинсгаузен» в Антарктиде, где совсем нет дорог. **10.** На полярной станции российский внедорожник использовался во льдах и морозах для перевозки грузов и буксировки судов в диапазоне температур от –54 до +4 градусов.

WRITING PRACTICE

42. Read the article from 'The Irish Times' (Wednesday, June 9, 2004) carefully in order to discover the main line of thought. Write a short summary of the article:

Revolution! Lada Has the Last Laugh

Are the jokes over? Dan McLaughlin in Moscow reports on the sports car that could transform Lada's image. The jokes are myriad, their theme consistent. What do you call a Lada with a sunroof? A skip. With a sunroof and twin exhausts? A wheelbarrow. Why does a Lada have a heated rear window? To warm your hands on when you're pushing it.

And so on. But the latest offering from makers of the cut-price Russian runabout could finally silence a world of witty detractors.

AvtoVAZ, which builds the Lada, hopes the new Revolution sports car will transform its image from that of a purveyor of cheap and nasty transport into the marque of choice for the burgeoning ranks of Russian billionaires. The 1.6 litre, 165 bhp Revolution accelerates to 100 kph in 6.5 secs and can reach 240 kph, insists AvtoVAZ, which has brought together its best engineers to create and develop the car at its base in Togliatti, a city on the southern reaches of the Volga river that proudly calls itself 'Russia's Detroit'.

A faster, 210 bhp racing Revolution is expected next year, along with a road-going, two-seater model. It's not clear how many will be made, but Lada hopes it will become an exclusive sports car for Russia's young, rich and patriotic. 'It's important for Russia that this is our car, built by our own engineers. It's great to show that we make something like this too, not just foreigners,' said former carting ace Kiril Ladygin last month at an airfield-cum-racetrack outside Moscow, where he had just won the first of a season of races between Revolutions.

Work on the car began in autumn 2001 and it made its public debut last summer, drawing admiring glances at the Geneva and Frankfurt motor shows for its complete lack of resemblance to any of the more than 20 million Ladas churned out since 1970. 'It has a Russian chassis and a Russian engine, and very few parts come from elsewhere,' said Ladygin's team boss,

businessman Ruben Shumeyev, who received his Revolution from AvtoVAZ just two days before the race.

'Generally it handles well. It's still raw but we'll work on it from here, of course. This is where it all begins.'

Lada is selling the car at what it calls an introductory offer price of €31,000 — and there's a €7,000 entry fee for each of this season's seven races at airfield circuits outside Moscow and St Petersburg. The firm hopes to have 15 to 20 Revolutions lining up on the grid later in the season.

The price for the road car has not been decided, but it's likely to be tens of thousands of euros less than that for the latest arrivals to Russia's growing fast-car market. Ferrari and Maserati started selling their creations in Moscow last month, finally joining the top-of-the-range Mercedes, BMWs and Audis that already tear around a city which, according to Forbes magazines, is home to more billionaires than any other.

In Moscow to open the city-centre showroom, Ferrari — and now Fiat — boss Luca Di Montezemolo said he expected to sell about 100 cars here this year. He pinned particular hopes on the Maserati Quattroporte to lure customers away from luxury German marques that are already becoming passé among Russia's fickle beau monde.

The Prancing Horse and its Maserati stablemate will be distributed through Mercury, a firm that already panders to most of the whims of Moscow's elite, whether they crave designer jewellery, high fashion or a Lamborghini or Bentley. About the only exclusive toy Mercury can't provide is a Rolls-Royce, which chose another partner with whom to open an official Moscow dealership in April. It has earmarked 24 cars for sale in Russia this year, from showrooms at Number One, Red Square, overlooking St Basil's Cathedral and the tomb of Vladimir Lenin.

Despite his loathing of the aristocracy and his avowedly austere lifestyle, the Communist revolutionary may well have approved. He reputedly owned nine Rolls-Royces during his time in the Kremlin, including one which Russian engineers fitted out with skis at the front and caterpillar tracks at the rear, to allow him to travel in comfort around his snow-bound estate outside the capital.

In an increasingly crowded sports car market, Lada's Revolution faces a battle to turn the heads of Russia's rich. But chief designer Andrei Ruzanov says the car offers something original to a growing band of wealthy — and fickle — young drivers: 'We have two new versions under development and the road car should be ready next year. We are always pushing ahead — if you stand still, you die.' Ruzanov says the Revolution project could transform the unenviable reputation of Russia's best known car maker. It aims to emulate the success of some of the world's finest manufacturers with its own cutting-edge sports car and racing department.

'There shouldn't be any more jokes about us in the West,' he says. 'Mercedes has AMG. Fiat has Ferrari. Now Lada has the Revolution.'

PART II

THE AUTOMOBILE COMPONENTS

UNIT 4

ACTIVE VOCABULARY

1. Read and remember the following words:

break point — предел
cam — кулачок
camshaft — распределительный вал
to cause — вызывать
combustion chamber — камера сгорания
compression — сжатие; **compression stroke** — такт сжатия
current — поток
to deprive of — лишать
detriment — ущерб
displacement — смещение
distinction — различие
enclosed — замкнутый
exhaust — выхлоп, выхлопной
exhaust stroke — такт выхлопа
exhaust valve — выпускной клапан
to exit — выходить, покидать
to expand — расширять
friction — трение
fuel — топливо
to generate — создавать
intake manifold — всасывающий патрубок
intake stroke — такт впуска
intake valve — впускной клапан
in particular — в особенности
performance — производительность
piston — поршень; **piston rod** — шатун
power stroke — рабочий такт, рабочий ход
to pull — тянуть
reciprocating — возвратно-поступательный, поршневой
to reduce — сокращать
to release — выпускать
residual — остаточный
rocker arm — коромысло
to rub — тереть
sequence — последовательность
smooth — плавный
spark plug — свеча зажигания
to suck in — всасывать
sweep — *зд.* прохождение
to tend — иметь тенденцию
torque — крутящий момент
to transfer — передавать
water jacket — водяная рубашка
to yield — предоставлять
to tend — иметь тенденцию

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

Gases of high temperature and pressure, to run on air-fuel mixture, to refer specifically to... , the defining feature is that, in an upward or downward motion, to reduce the volume, to transfer the heat, throw through the plug,

to act on the face of the piston, to convert linear motion, to push past the valve, to yield potential benefits, to generate torque, tend to weigh more, to cause friction, to decrease fuel efficiency.

3. Give antonyms to the following words:

internal	to locate	directly	to expand
continuous	similar	useful	to exit

4. Give synonyms to the following words:

to occur	to close	truck	to cause	to pull	to tend
space	common	to reduce	performance	force	to provide

WORD-BUILDING

5. Translate the following compound words:

Oxidation, combusted, inside, exothermic, mixture, significant, intermittent, forward, movement, repeated, addition, smoother, efficiency, enclosed, exception, displacement, intake, angular, preparation, occupied, decrease, opening, specifically.

6. Translate the following words with suffixes:

-en brighten, darken, worsen, redden, frighten, molten, proven, golden, wooden, forgotten, broken;

-ence consistence, difference, existence, insistence, persistence;

-ent student, ingredient, president, different, efficient, permanent;

-er explorer, arbiter, worker, danger, laser, amplifier.

7. Define to what parts of speech the following words with prefixes refer and translate them:

dia- diachrony, diagonal, diamagnetism, diagnose, diascope;

dis- dissolve, disagreement, discharger, disprove, discontinuous, displace, dissipate;

em- embattle, embroider, embed, embodied, embay;

en- enrich, encircling, encouragement, enlightened, enable, enacting.

TEXT WORK

8. Read the text below to learn the internal combustion engine operation principles:

Text 4A. Internal Combustion Engine

The internal combustion engine is an engine in which the combustion (or rapid oxidation) of gas and air occurs in a confined space called a combus-

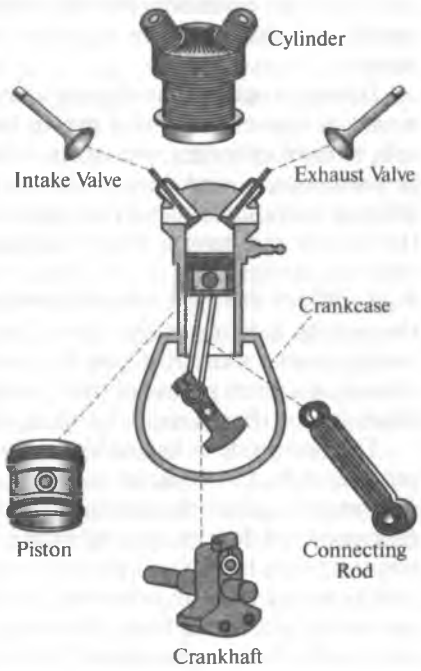
tion chamber. This exothermic reaction of a fuel with an oxidizer creates gases of high temperature and pressure, which are permitted to expand.

The first internal combustion engines did not have compression, but ran on air/fuel mixture sucked or blown in. The most significant distinction between modern internal combustion engines and the early designs is the use of compression and in particular of in-cylinder compression. The term Internal Combustion Engine (ICE) is almost always used to refer specifically to reciprocating engines and similar designs in which combustion is intermittent. However, continuous combustion engines, such as jet engines, most rockets and many gas turbines are also internal combustion engines.

For a typical four-stroke engine, key parts of the engine include the combustion chamber, one or more camshafts, cams and intake and exhaust valves. There are one or more cylinders and for each cylinder there is a spark plug, a piston and a crankshaft. The defining feature of an ICE is that useful work is performed by the expanding hot gases acting directly to cause pressure, further causing movement of the piston inside the cylinder. A single sweep of the cylinder by the piston in an upward or downward motion is known as a stroke. If there are four movements, or strokes, of the piston before the entire engine firing sequence is repeated, we have a typical four-stroke cycle, or Otto cycle.

The cycle begins with the intake stroke as the piston is pulled downward towards the crankshaft. The intake valve is open, and fuel and air are drawn past the valve and into the combustion chamber and cylinder from the intake manifold. At the end of the intake stroke, the piston begins to move back (upward). The cylinder and combustion chamber are full of the low pressure fuel-air mixture and, as the piston begins to move, the intake valve closes. Cams and rocker arms provide control and timing of the valves' opening and closing.

As the piston is pushed downward again, the volume is reduced and the fuel-air mixture is compressed during the compression stroke. During the compression, no heat is transferred to the fuel-air mixture. As the volume is decreased because of the piston's motion, the pressure in the gas is increased. When the volume is the smallest, and the pressure the highest, the contact is closed, and a current of electricity flows through the plug.



At the beginning of the power stroke the spark plug produces a spark in the combustion chamber which ignites the fuel-air mixture. Rapid combustion of the fuel releases heat and produces exhaust gases. Because the intake and exhaust valves are closed, the combustion of the fuel takes place in a totally enclosed and nearly constant volume vessel. The combustion increases the temperature of the exhaust gases, any residual air in the combustion chamber, and the combustion chamber itself.

The high pressure of the gases acting on the face of the piston cause the piston to move downward which initiates the power stroke. Unlike the compression stroke, the hot gas does work on the piston during the power stroke. The force on the piston is transmitted by the piston rod to the crankshaft, where the linear motion of the piston is converted to angular motion of the crankshaft. During the power stroke, the volume occupied by the gases is increased because of the piston's motion and no heat is transferred to the fuel-air mixture. As the volume is increased, the pressure and temperature of the gas are decreased. Heat that is now transferred to the water in the water jacket until the pressure approaches atmospheric pressure. The exhaust valve is then opened by the cam pushing on the rocker arm to begin the exhaust stroke.

The purpose of the exhaust stroke is to clear the cylinder of the spent exhaust in preparation for another ignition cycle. As the exhaust stroke begins, the cylinder and combustion chamber are full of exhaust products at low pressure. As the piston moves upward, the exhaust gas is pushed past the open exhaust valve and exits the engine. At the end of the exhaust stroke, the exhaust valve is closed and the engine begins another intake stroke.

Internal combustion engines can contain any number of cylinders, with numbers between one and twelve being common. Most car engines have four to eight cylinders, with some high performance cars having ten, twelve, or even sixteen, and some very small cars and trucks having two or three. Having more cylinders in an engine yields two potential benefits. First, the engine can have a larger displacement with smaller individual reciprocating masses (that is, the mass of each piston can be less) thus making a smoother running engine since the latter tends to vibrate as a result of the pistons moving up and down. Second, with a greater displacement and more pistons, more fuel can be combusted and there can be more power strokes in a given period of time, meaning that such an engine can generate more torque than a similar engine with fewer cylinders.

The down side to having more pistons is that the engine will tend to weigh more and tend to generate more internal friction as the greater number of pistons rub against the inside of their cylinders. This tends to decrease fuel efficiency and deprive the engine of some of its power. For high performance engines using modern materials and technology there seems to be a break point around 10 or 12 cylinders, after which addition of cylinders becomes an overall detriment to performance and efficiency, although exceptions such as the W16 engine from Volkswagen exist.

Notes on the text

Otto cycle — 4-тактный цикл работы ДВС, предложенный немецким инженером Н. Отто в 1876 г.

TEXT AND VOCABULARY EXERCISES

9. Choose the right word and fill in the gaps:

1. The internal combustion engine is based on the ... of gas and air.
a) ventilation b) oxidation c) absorbtion
2. Gases of high temperature and pressure are permitted ... .
a) to compress b) to vaporize c) to expand
3. A piston is a device designed for ... movements.
a) reciprocating b) rotating c) circulating
4. The Otto cycle comprises ... strokes.
a) two b) four c) five
5. When the ... valve is open fuel is drawn into the combustion chamber.
a) exhaust b) transfer c) intake
6. The hot gas does work on the piston during the ... stroke.
a) power b) compression c) exhaust
7. Having more pistons the engine generates more internal ... .
a) combustion b) friction c) ignition

10. Find in the text equivalents to the following phrases:

Происходить в ограниченном пространстве, наиболее значительное различие, сжатие внутри цилиндра, непрерывное горение, реактивный двигатель, газовая турбина, ключевые компоненты, полезная работа выполняется, единичное продвижение поршня вдоль цилиндра, синхронизация открытия и закрытия клапанов, когда объем становится наименьшим, производить искру, очистить цилиндр от отработанных продуктов горения, снижать эффективность топлива, лишать двигатель некоторой мощности.

11. Find the English equivalents for the following Russian words:

1) камера	a) chandler	b) chamber	c) chamfer
2) выпускной	a) exist	b) exhibit	c) exhaust
3) искра	a) sparkle	b) spark	c) sprinkle
4) сжимать	a) to compress	b) to combine	c) to coincide
5) клапан	a) valve	b) value	c) valet
6) такт	a) strike	b) stroke	c) streak
7) смесь	a) mixing	b) mixible	c) mixture
8) последовательность	a) consequence	b) sequel	c) sequence
9) топливо	a) fuel	b) fume	c) full
10) объем	a) voluble	b) volute	c) volume
11) мощность	a) power	b) powder	c) pouter
12) трение	a) fiction	b) faction	c) friction

12. Divide text 4A into logical parts and give each a suitable title.

13. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

an internal combustion engine	the compression stroke
key parts of the engine	the power stroke
four-stroke cycle	the exhaust stroke
opening and closing of the valves	the number of engine cylinders
the piston's motion	advantages of having more cylinders
the intake stroke	disadvantages of having more cylinders

14. Fill in the gaps with the words from the box:

power	generate	electricity	combustion	outside	meant

The fundamental difference between an engine and a motor is that a motor converts 1) ___ into mechanical energy whereas an engine converts thermal energy into mechanical energy. At one time, the word 'engine' (from Latin *ingenium* — 'ability') 2) ___ any piece of machinery. A 'motor' (from Latin *motor* — 'mover') is any machine that produces mechanical 3) ___. Traditionally electric motors are not referred to as 'engines', but 4) ___ engines are often referred to as 'motors'. However, many people consider engines as those things which 5) ___ their power from within, and motors as requiring an 6) ___ source of energy to perform their work.

Check your answers on p. 321

15. Translate the following sentences into English using the vocabulary of text 4A and a dictionary.

1. В большинстве автомобилей используются ДВС — бензиновые или дизельные двигатели. **2.** Рабочим циклом двигателя называется периодически повторяющийся ряд последовательных процессов, протекающих в каждом цилиндре двигателя и обусловливающих превращение тепловой энергии в механическую работу. **3.** Автомобильные двигатели работают, как правило, по четырехтактному циклу, который совершается за два оборота коленчатого вала или четыре хода поршня и состоит из тактов впуска, сжатия, рабочего хода и выпуска. **4.** В камере сгорания создается однородная горючая смесь топлива и воздуха, затем она сжимается, воспламеняется и сгорает. **5.** Действие ДВС основано на использовании работы теплового расширения нагретых газов во время движения поршня в цилиндре. **6.** Крайнее верхнее положение поршня называется верхней мертвой точкой (top dead center), крайнее нижнее его положение — нижней мертвой точкой. **7.** Возвратно-поступательное движение поршня преобразуется через шатуны во вращательное движение коленчатого вала, который перемещает автомобиль посредством передачи вращательного движения через трансмиссию на колеса.

SUPPLEMENTARY READING

16. Read the texts 20, 21 to get information about the history of internal combustion engines.

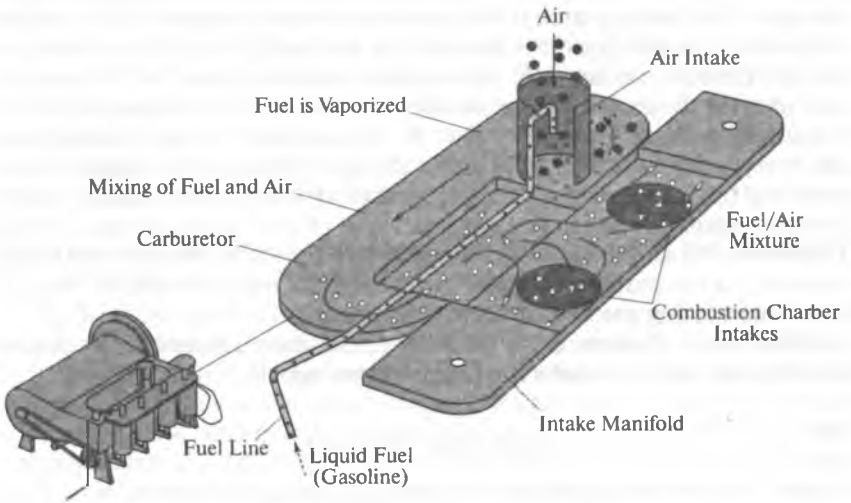
17. Read and translate the text:

Text 4B. The Fuel System

Tank location and design are always a compromise with available space. Most automobiles have a single tank located in the rear of the vehicle. Fuel tanks today have internal baffles to prevent the fuel from sloshing back and forth. If you hear noises from the rear on acceleration and deceleration the baffles could be broken. All tanks have a fuel filler pipe, a fuel outlet line to the engine and a vent system.

The fuel is drawn from the fuel tank by either a mechanical or electric fuel pump. Two types of fuel pumps are used in automobiles; mechanical and electric. All fuel injected cars today use electric fuel pumps, while most carbureted cars use mechanical fuel pumps. Mechanical fuel pumps are diaphragm pumps mounted on the engine and operated by an eccentric cam usually on the camshaft. A rocker arm attached to the eccentric moves up and down flexing the diaphragm and pumping the fuel to the engine. Because electric pumps do not depend on an eccentric for operation, they can be located anywhere on the vehicle. In fact they work best when located near the fuel tank.

While mechanical pumps operate on pressures of 4—6 psi, electric pumps can operate on pressures of 30—40 psi. Current is supplied to the pump immediately when the key is turned. This allows for constant pres-



sure on the system for immediate starting. Electric fuel pumps are rated by pressure and volume. When checking fuel pump operation, both specifications must be checked and met. The fuel pump sends the fuel through steel lines to the fuel filter. The fuel filter removes any particles of dirt or metal that may be in the fuel. Some fuel filters will also remove moisture from the fuel as well.

Fuels burn faster, and more completely when they have lots of surface area in contact with oxygen. In order for an engine to work efficiently the fuel must be vaporized into the incoming air in what is commonly referred to as a fuel-air mixture. There are two commonly used methods of vaporizing fuel into the air, one is the carburetor and the other is fuel injection. That is, from the filter the fuel goes either to the carburetor or the fuel injectors. Carburetors are not as common in automobiles as they were prior to the mid-1980s. Most gasoline engines have moved to fuel injection systems. Diesel engines always use fuel injection. Autogas engines use either fuel injection systems or open or closed loop carburetors.

In the case of the carburetor, the fuel is mixed with air to form the optimum fuel mixture for the current conditions. The ideal fuel mixture is 14.7 parts of air to 1 part of fuel. This is very difficult for a carburetor to do because it has no idea how much air is going into the engine. In order to do it properly, you need a gas emission analyzer to see what per cent of carbon monoxide and how many parts per million of hydrocarbons are being emitted by the engine. By turning the adjuster screws on the carburetor and watching the emissions, you can come pretty close. In some states there are specific levels of CO and HC that must be met or the vehicle is not considered street legal. From the carburettor the fuel mixture travels through the intake manifold and is delivered to each cylinder.

In a fuel-injected engine, fuel is introduced into the engine by the fuel injector which is computer controlled. There are two, basic, types of fuel injection. Port fuel injection (PFI) and throttle body injection (TBI). In TBI there is one or two injectors mounted in a housing similar to a carburetor and the fuel is constantly injected into the air stream. In PFI there is one injector for each cylinder mounted in the intake manifold so that it is pointing towards the intake valve. By opening and closing, the injectors can, very precisely, meter the correct amount of fuel to the engine as determined by the power train control module (PCM). Lastly, there is a fuel pressure regulator that controls the pressure of the fuel in the lines. It has a vacuum line connecting it to the intake manifold to measure manifold vacuum. As the number of engine revolutions increases, manifold vacuum decreases causing the fuel pressure to increase.

Thus, with modern carburetors and fuel injection systems you can throttle the engine to make it run at different speeds.

Note on the text

psi — pounds per square inch — фунтов на квадратный дюйм

TEXT AND VOCABULARY EXERCISES

18. Translate into Russian the following word combinations:

Fuel tank, internal baffles, sloshing, diaphragm pump, eccentric cam, to turn the key, surface area, to vaporize into the incoming air, fuel injection, open or closed loop carburetors, current conditions, emitted by the engine, to turn the adjuster screws, to consider street legal, to mount in a housing, to meter the amount of fuel, pressure regulator, to throttle the engine.

19. Find in the text above the English equivalents for the following words:

доступное пространство
в задней части автомобиля
различаться по давлению и объему
электрический насос
при ускорении
удалять частицы грязи
идеальная топливная смесь
особый уровень углеводорода
проходить через впускной патрубок
топливный инжектор
воздушный поток
указывать в направлении

20. Compose your own sentences with each English equivalent of the words given in exercise 19. Compare your variants with the sentences of your partner.

21. Work in pairs and decide whether these statements according to the text 4B are true or false:

1. Evaporative emission control demands all fuel tanks to be vented through filters. **2.** All cars with electronic fuel injection have an electric fuel pump. **3.** Electric fuel pumps are mounted on the engine block and are driven by the camshaft. **4.** Cars with carburetors, generally, have a mechanical fuel pump. **5.** Mechanical fuel pumps are mounted inside the fuel tank as part of the fuel-sending unit. **6.** Very few cars today locate the fuel pump inside the fuel tank. **7.** Fuel and air are pulled through the carburettor and intake manifold to fill the increased volume. **8.** Gasoline doesn't mix with air as the gases move through the carburetor. **9.** The combination of air being drawn over the fuel and the heat of the floor of the carburetor cause the liquid fuel gasoline to evaporate. **10.** Near the exit of the carburettor, there is uniform gas mixture of fuel and air.

22. Translate the following sentences into English using the vocabulary of the text and a dictionary:

1. По виду применяемого топлива двигатели могут быть бензиновыми, дизельными, газовыми и многотопливными. **2.** У бензиновых и газовых двигателей горючая смесь приготовляется в карбюраторах вне цилиндров, а у дизельных — образуется внутри цилиндров. **3.** При ходе поршня к верхней мертвой точке в цилиндр через форсунку впрыскивается дизельное топливо, подаваемое топливным насосом. **4.** В дизельных двигателях расход топлива снизился на 20—30 % за

счет увеличения массы конструкции и снижения скорости вращения. **5.** Для воспламенения топлива необходимо, чтобы температура сжатого воздуха была выше температуры самовоспламенения топлива.

GRAMMAR

23. Проанализируйте формы глагола, приведенные в таблице и используемые в соответствии с правилом согласования времен.

Sequence of Tenses	
He thinks...	He thought...
that he plays tennis.	that he played tennis.
that he played tennis.	that he had played tennis.
that he will play tennis.	that he would play tennis.

24. Сравните следующие пары предложений и переведите их на русский язык:

1. He *is told* that he *lives* in Moscow. He *was told* that he *lived* in Moscow. **2.** She *knows* that he *is* a student. She *knew* that he *was* a student. **3.** He *thinks* I *prepared* my report. He *thought* I *had prepared* my report. **4.** He *finds* that the article that he *is translating* is difficult. He *found* that the article that he *was translating* was difficult. **5.** Tomorrow I *'ll meet* my friend whom I *haven't seen* for many years. Yesterday I *met* my friend whom I *hadn't seen* for many years. **6.** He *will not come* on Sunday because he *has fallen* ill. He *didn't come* on Sunday because he *had fallen* ill.

25. Переведите предложения, обращая внимание на согласование времен:

1. The students *learnt* that gasoline engines *were used* in most road vehicles including most cars, motorcycles and mopeds. **2.** They *knew* also that diesel engines *were* generally heavier, noisier and more powerful at lower speeds than gasoline engines. **3.** People *began* to use diesel engines in heavy road vehicles and some automobiles as the latter *had proved* to be increasingly more fuel-efficient over gasoline engines in most circumstances. **4.** Until alternative sources of power *are* widely *employed* all internal combustion engines *will depend* on the exothermic chemical process of combustion: the reaction of a fuel, typically with air. **5.** After the new technologies *had been developed* fuel tanks *were vented* not directly to the atmosphere, but through a charcoal canister. **6.** Federal law *required* that all 1976 and newer cars *would have* vehicle rollover protection devices to prevent fuel spills. **7.** Before fuel injectors *were introduced*, automobile engines *had tried* all types of sophisticated carburetors to spray the fuel. **8.** The reason

why the railroads *have* almost universally *adopted* the diesel engine *is* to save money. **9.** When the engine *was running*, air *was moving* constantly through the carburetor air horn and intake manifold to the cylinders.

26. Употребите глаголы, данные в скобках, в соответствующих формах:

1. There were numerous factors the engine designer (*to consider*) before he (*to find*) the best compromise between efficient fuel burning and good breathing. **2.** Five-stroke engines first (*to appear*) when the fifth cycle, called refrigeration, (*to be added*) by Delautour. **3.** When she (to ask) me if I (*to hear*) that noises and rattles, I (*to tell*) her I (*to believe*) it (*to be*) fuel detonation. **4.** It was reported that in order to demonstrate the new model's efficiency the company (*to organize*) a test-drive show. **5.** When my friend (*to inform*) me that he was going to check the engine operation, I asked him if he (*to need*) any help. **6.** On the road we had only a few emergency tools we (*to bring*) in the luggage rack. **7.** When she (to say) she wanted to take part in the races, I (*to wonder*) if she (*to consider*) it to be safe. **8.** The sales agent evidently (*to dislike*) that the customers (*to ask*) him plenty of questions about the car history. **9.** He (*to ask*) me if the driving test (*to be*) difficult I (*to say*) that I (*to think*) so. **10.** Everybody knew that after they (*to improve*) their attitude towards the work, they (*not to fail*) the test. **11.** The air (*to compress*) to such a degree that a temperature far above the ignition point of the fuel (*to obtain*). **12.** He (*to understand*) that he (*to spoil*) the work if he (*to stop*) the spark generation in time.

TEXT WORK

27. Read the text and underline its main idea. Give a brief summary of the text:

Text 4C. Types of Fuels

The most common modern fuels are made up of hydrocarbons and are derived from mostly petroleum. These include the fuels known as gasoline or petrol, diesel, liquified petroleum gas (LPG), and the rarer use of propane gas. Most internal combustion engines designed for gasoline can run on natural gas or liquefied petroleum gases without major modifications except for the fuel delivery components. Liquid and gaseous biofuels, such as ethanol and biodiesel, a form of diesel fuel that is produced from crops that yield triglycerides such as soy bean oil, can also be used. Some can also run on hydrogen gas. Engines that use gases for fuel are called gas engines and those that use liquid hydrocarbons are called oil engines. However, gasoline engines are also often colloquially referred to as 'gas engines'.

Gasoline is a complex blend of carbon and hydrogen compounds. Additives are then added to improve performance. All gasoline is basically the same, but

no two blends are identical. The two most important features of gasoline are volatility and resistance to knock (octane). Volatility is a measurement of how easily the fuel vaporizes. If the gasoline does not vaporize completely, it will not burn properly as liquid fuel will not burn. On the other side, if gasoline vaporizes too easily the mixture will be too lean to burn properly. Since high temperatures increase volatility, it is desirable to have a low volatility fuel for warm temperatures and a high volatility fuel for cold weather.

The blends will be different for summer and winter fuels. Vapour lock which was a persistent problem years ago, exists very rarely today. In today's cars the fuel is constantly circulating from the tank, through the system and back to the tank. The fuel does not stay still long enough to get so hot that it begins to vaporize. Resistance to knock or octane is simply the temperature the gas will burn at. Higher octane fuel requires a higher temperature to burn. As compression ratio or pressure increases so does the need for higher octane fuel. Most engines today are low compression engines therefore requiring a lower octane fuel (87). Other factors that affect the octane requirements of the engine are: air/fuel ratio, ignition timing, engine temperature, and carbon build up in the cylinder. Many automobile manufacturers have installed exhaust gas recirculation systems to reduce cylinder chamber temperature. If these systems are not working properly, the car will have a tendency to knock. Before switching to a higher octane fuel to reduce knock, make sure to have these other causes checked.

Diesel fuel, like gasoline is a complex blend of carbon and hydrogen compounds. It too requires additives for maximum performance. There are two grades of diesel fuel used in automobiles today: 1-D and 2-D. Number 2 diesel fuel has a lower volatility and is blended for higher loads and steady speeds, therefore works best in large truck applications. Because number 2 diesel fuel is less volatile, it tends to create hard starting in cold weather. On the other hand number 1 diesel is more volatile, and therefore more suitable for use in an automobile, where there are constant changes in load and speed. Since diesel fuel vaporizes at a much higher temperature than gasoline, there is no need for a fuel evaporation control system as with gasoline. Diesel fuels are rated with a cetane number rather than an octane number. While a higher octane of gasoline indicates resistance to ignition, the higher cetane rating of diesel fuel indicates the ease at which the fuel will ignite. Most number 1 diesel fuels have a cetane rating of 50, while number 2 diesel fuel have a rating of 45. Diesel fuel emissions are higher in sulphur and lower in carbon monoxide and hydrocarbons than gasoline and are subject to different emission testing standards. Note that in Europe, sophisticated diesel-engined cars have taken over about 40 % of the market since the 1990s.

Hydrogen fuel injection, or HFI, is a system that improves the fuel economy of internal combustion engines by injecting hydrogen as a combustion enhancement into the intake manifold. Fuel economy gains of 15 % to 50 % can be seen. A small amount of hydrogen added to the intake air-fuel charge increases the octane rating of the combined fuel charge and

enhances the flame velocity, thus permitting the engine to operate with more advanced ignition timing, a higher compression ratio, and a leaner air-to-fuel mixture than otherwise possible. The result is lower pollution with more power and increased efficiency. Some HFI systems use an onboard electrolyzer to generate the hydrogen used but this appears to have little credibility at this time given the small amounts of gas produced from them. A small tank of pressurized hydrogen can also be used, but this method necessitates refilling and hydrogen in liquid form is difficult to store in any usable volume.

Notes on the text

octane number — октановое число, характеристика бензинов по детонационной стойкости, т. е. способности противостоять самовоспламенению под действием волны давления в камере сгорания

cetane number — цетановое число, характеристика воспламеняемости дизельных топлив при сжатии

blend — смесь
delivery — подача
enhancement — повышение
to gain — приобретать
lean — ненасыщенный, бедный (о смеси)
to liquify — разжижать
load — нагрузка
resistance — сопротивление
sophisticated — сложный
steady — устойчивый
sulphur — сера
triglycerides — триглицериды
volatility — летучесть

28. Find in the text words or phrases which mean the same as:

углеводород	полностью испаряться
спроектированный для бензина	паровая пробка
соевое масло	гореть при температуре
добавки	применение в грузовиках
важные характеристики	изменение нагрузок и скоростей
мера, измерение	зажигание

29. Work with a partner. Take turns to ask and answer questions to text 4C. Use the words and word combinations below:

fuel delivery components	season blends for fuels
carbon and hydrogen compounds	higher and lower octane fuel
resistance to knock	grades of diesel fuel
to improve performance	cetane number
to burn properly	to improve the fuel economy
onboard electrolyzer	

30. Translate the following sentences into English using the vocabulary of the text and a dictionary:

1. Нефтяные дистилляты (distillates) получают перегонкой и делят на ряд фракций: газы, бензины, дизтопливо и масляные фракции. **2.** С одной стороны, высокое давление паров бензина ведет к образованию паровых пробок и повышенным потерям при хранении, а с другой — от него зависят легкость пуска и быстрый прогрев двигателя. **3.** Промышленность выпускает бензин с минимальной склонностью к образованию паровых пробок летом, но с необходимыми зимой пусковыми свойствами. **4.** Вязкость и температурные свойства бензина характеризуются октановым числом, а дизельного топлива — цетановым числом. **5.** Токсичность отработанных газов ДВС оценивается по выбросу углеводородов и оксидов серы. **6.** Основными причинами повышенной токсичности дизельного топлива являются низкое качество самого топлива и низкий коэффициент избытка воздуха.

SUPPLEMENTARY READING

31. Read the texts 22, 23, 24 to get more information about new ecology engine designs.

32. Think about the pros and cons of the fuel mostly used in your country or in your automobile. Compare it to the other fuels. Try to give as many arguments as you can.

33. Fill in the gaps with the prepositions from the box:

in	of	with	into	for	during	on	by	to	to

Researchers have developed a method to add a compressed air energy storage system 1)___ cars 2)___ a low cost and low weight increase.

Air hybrid cars could bring big fuel savings 3)___city drivers, according 4)___ a recent study released 5)_____ engineers. Experiments based 6)_____ modelling and simulations showed that the air hybrid engine improved fuel efficiency by 64 percent 7)_____ city driving and 12 percent in highway driving. The study also suggested that by adopting the air hybrid approach, carmakers could avoid some 8)_____ the manufacturing costs associated 9)_____ the more common electric hybrid design.

Like its cousin the electric hybrid, air hybrid vehicles are being explored as a more fuel-efficient means 10)___ travelling the nation's roads, especially 11)___ urban areas, where stop-and-go traffic leads 12)___ a wasteful use 13)___ gas. During a typical day of city driving, fuel energy used to accelerate the vehicle is partially wasted 14)___ deceleration, when kinetic energy is converted 15)___ heat in the friction brakes.

WRITING PRACTICE

34. a) Read the following text and mark the differences between Formula One and road engines. Fill in the suggested table.

F1 Engines Specific Characteristics

Volumetric efficiency (VE) is used to describe the amount of fuel/air in the cylinder in relation to regular atmospheric air. If the cylinder is filled with fuel/air at atmospheric pressure, then the engine is said to have 100 % volumetric efficiency. On the other hand, turbo chargers increase the pressure entering the cylinder, giving the engine a volumetric efficiency greater than 100 %. However, if the cylinder is pulling in a vacuum, then the engine has less than 100 % volumetric efficiency. Normally aspirated engines typically run anywhere between 80 % and 100 % VE. So now, when you read that a certain manifold and cam combination tested out to have a 95 % VE, you will know that the higher the number, the more power the engine can produce. Because turbos are not allowed in F1, this item does not differ that much from a normal road engine.

Unfortunately, from the total fuel energy that is put into the cylinders, averagely less than 1/3 ends up as useable horsepower. Ignition timing, thermal coatings, plug location and chamber design all affect the **thermal efficiency** (TE). Low compression street engines may have a TE of approximately 0.26. A racing engine may have a TE of approximately 0.34. This seemingly small difference results in a difference of about 30 % (0.34 — 0.26/0.26) more horsepower than before.

From all that power generated, part of it is used by the engine to run itself. The left over power is what you would measure on a dynamometer. The difference between what you would measure on the dyno and the workable power in the cylinder is the **mechanical efficiency** (ME). Mechanical efficiency is affected by rocker friction, bearing friction, piston skirt area, and other moving parts, but it is also dependent on the engine's RPM. The greater the RPM, the more power it takes to turn the engine. This means limiting internal engine friction can generate a large surplus in horsepower, and where in F1 the stress is on power, on the road it is also on fuel consumption.

Another deciding point trying to reach a maximum of power out of an engine is the exhaust. The minor change of length or form of an exhaust can influence the horse powers drastically. It is both for performance and cost limitations that the FIA do not permit variable outlet systems in Formula One.

These main optimization necessities are what causes the engineer's headaches. At the end of the line, an F1 engine revs (*сокр. от* reverse) much higher than road units, hence limiting the lifetime of such a power source. It is especially the mechanical efficiency that causes Formula One engines

to be made of different materials. These are necessary to decrease internal friction and the overall weight of the engine, but more importantly, limit the weight of internal parts, e.g. of the valves, which should be as light as possible to allow incredibly fast movement of more than 300 movements up and down a second (this at 18,000 rpm).

Characteristics	F1 engines	Road engines	Defining factors
Volumetric			
Thermal			
Mechanical			
Materials used			

b) Offer a written comment on the discovered results. Try to give an enlarged answer to the question: what is the relationship between engine characteristics and the purpose of its employment?

UNIT 5

ACTIVE VOCABULARY

1. Read and remember the following words:

advance — продвижение
alternator — генератор переменного тока
auxiliary — вспомогательный
to buck — дергать (об автомобиле)
distributor — распределитель
distributor cap — колпачок распределителя
distributor rotor — ротор распределителя
entire — целый
glowing — свечение
ignition — зажигание
ignition wires — провода зажигания
inherently — в сущности
issue — вопрос, проблема
maintenance — эксплуатация
piston crown — днище поршня
power train — трансмиссия
primary circuit — первичная цепь
ratio — коэффициент, соотношение
solely — исключительно
to stall — глохнуть (о двигателе)
stratified — чередующийся, слоистый
to surge — резко изменять напряжение
susceptible — подверженный
via — через

PRE-TEXT EXERCISES

2. Look at the following international words, guess their meaning and check the pronunciation:

Patent, battery, method, trigger, component, injector, apparatus, module, management, system, combination, accessories, to spray, control, oxidizer, concentration, resulting, portion, catalytic, operation, to compress, generator, diesel, popular, to recommend, physical, reaction, contact, process, monoxide, to affect, contacts, potential.

3. Translate into Russian the following word combinations:

Leaner mixtures, speed of the flame front, directly affected by, triggering device, to sense engine position and conditions, provide a high-energy spark, at precisely the right instant, lead-acid battery, compressed by the piston head, for ease of, rather than, at the boundary of fuel-air mixing, caused by an injection event, physical understanding of the ignition process.

4. Give antonyms to the following words:

outside	descending	to recharge	front
to mix	widely	to compress	unburned
different	to add	lean	to turn on

5. Give synonyms to the following words:

flame	event	to raise	via
to vary	to allow	peak	advanced
usually	damage	to reduce	precisely

WORD-BUILDING

6. Translate the following compound words:

Output, crankshaft, hot-tube, outside, lead-acid, air-fuel, although, electricity-generating, homogeneous, unaided, simultaneously high-voltage, microprocessors, hydrocarbon, automotive, monoxide, dashboard.

7. Translate the following words with the suffixes:

-fold manifold, twofold, fourfold;
-ful careful, plentiful, roomful, successful;
-fy identify, justify, simplify, clarify, intensify;
-hood falsehood, manhood, likehood, neighbourhood.

8. Define to what parts of speech the following words with prefixes refer and translate them:

equa- equalize, equality, equation, equatorial, equally;
equi- equilibrium, equidistant, equiangular, equipollence, equilibrate;
ex- change, exclusive, exploratory, externalize, expositive;
extra- extrapolate, extraction, extravasate, extraordinary, extranuclear;

fore- foreseeable, foreknowledge, forerunner, foregoing, foregone, forecast, forebrain, forearm.

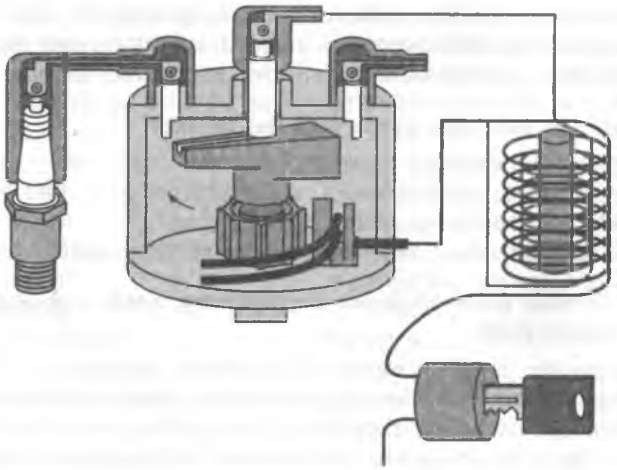
TEXT WORK

9. Read the text below to learn about the ignition system operation:

Text 5A. Ignition System

All internal combustion engines must achieve ignition in their cylinders to create combustion and can be classified by their ignition system. The point in the cycle at which the fuel/oxidizer mixture is ignited has a direct effect on the efficiency and output of the ICE. For a typical 4 stroke automobile engine, the burning mixture has to reach its maximum pressure when the crankshaft is 90 degrees after top dead centre. Leaner mixtures and lower mixture pressures burn more slowly requiring more advanced ignition timing. In the past outside flame and hot-tube systems were used. Nikola Tesla gained one of the first patents on the mechanical ignition system with the US patent, 'Electrical Igniter for Gas Engines', on 16 August, 1898. Today most engines use an electrical or compression heating system for ignition. Typically engines use either a spark ignition (SI) method or a compression ignition (CI) system. Ignition components generally include spark plugs, ignition wires, distributor cap, distributor rotor, distributor, ignition coil, ignition module and primary circuit triggering device.

For ignition management, the system also relies on the power train control module (PCM), which also manages other engine functions. The names and exact use of ignition components varies widely among different makes and models. For example, many ignition systems no longer



use a distributor and consequently do not have any of its related parts. As a team, the ignition components work together to sense engine position and conditions and provide a spark inside the engine's cylinders at precisely the right instant.

Electrical or gasoline-type ignition systems (that can also run on other fuels) generally rely on a combination of a lead-acid battery and an induction coil to generate a high-voltage electrical spark to ignite the air-fuel mix in the engine's cylinders. This battery can be recharged during operation using an electricity-generating device, such as an alternator or generator driven by the engine. Gasoline engines take in a mixture of air and gasoline, compress to less than 185 psi and use a spark plug to ignite the mixture when it is compressed by the piston head in each cylinder.

Compression ignition systems, such as the diesel engine and HCCI engines, rely solely on heat and pressure created by the engine in its compression process for ignition. Compression that occurs is usually more than three times higher than in a gasoline engine. Diesel engines will take in air only, and shortly before peak compression, a small quantity of diesel fuel is sprayed into the cylinder via a fuel injector that allows the fuel to instantly ignite. HCCI type engines will take in both air and fuel but will continue to rely on an unaided auto-combustion process due to higher pressures and heat. This is also why diesel and HCCI engines are also more susceptible to cold starting issues though they will run just as well in cold weather once started. Most diesels also have battery and charging systems however this system is secondary and is added by manufacturers as luxury for ease of starting, turning fuel on and off which can also be done via a switch or mechanical apparatus, and for running auxiliary electrical components and accessories. Most old engines, however, rely on electrical systems that also control the combustion process to increase efficiency and reduce emissions.

HCCI has characteristics of the two most popular forms of combustion used in IC engines: homogeneous charge spark ignition (gasoline engines) and stratified charge compression ignition (diesel engines). As in homogeneous charge spark ignition, the fuel and oxidizer are mixed together.

However, rather than using an electric discharge to ignite a portion of the mixture, the concentration and temperature of the mixture are raised by compression until the entire mixture reacts simultaneously. Stratified charge compression ignition also relies on temperature increase and concentration resulting from compression, but combustion occurs at the boundary of fuel-air mixing, caused by injection.

The defining characteristic of HCCI is that the ignition occurs at several places at a time which makes the fuel/air mixture burn nearly simultaneously. There is no direct initiator of combustion. This makes the process inherently challenging to control. However, with advances in microprocessors and a physical understanding of the ignition process, HCCI can be controlled to achieve gasoline engine like emissions along with diesel engine like efficiency. In fact, HCCI engines have been shown to achieve extremely

low levels of nitrogen oxide emissions (NOx) without treatment by catalytic converter. The unburned hydrocarbon and carbon monoxide emissions are still high due to lower peak temperatures, as in gasoline engines, and must still be treated to meet automotive emission regulations.

Refer to your maintenance suggestions for recommended service for the ignition system. The speed of the flame front is directly affected by compression ratio, fuel mixture temperature and octane or cetane rating of the fuel. Modern ignition systems are designed to ignite the mixture at the right time to ensure the flame front doesn't contact the descending piston crown. If the flame front contacts the piston, pinking or knocking results. An engine that runs rough, bucks, surges, stalls, gets poor fuel economy or fails an emissions test are all signs of a potential ignition system problem. Although some cars now use platinum spark plugs with 100,000-mile service life, other parts such as ignition wires still need attention and periodic replacement. If your car exhibits any symptoms such as those mentioned here, be alert. If the glowing or light appears on the dashboard, you should have its cause investigated by a professional technician at your earliest opportunity. If the light flashes, the condition is more severe and must be checked out immediately to prevent damage to the catalytic converter.

Note on the text

HCCI — homogeneous charge compression ignition — компрессионное воспламенение однородной смеси, характеризуемое высокой мощностью и низкой эмиссией

TEXT AND VOCABULARY EXERCISES

10. Choose the right word and fill in the gaps:

1. Nikola Tesla ... the mechanical ignition system in 1898.
   a) invented b) patented c) modernized
2. For process regulation the system relies on the power train control module, which also ... other engine functions.
   a) manages b) fulfils c) varies
3. As a team, the ignition components work together ... engine position and the necessary conditions.
   a) to change b) to select c) to sense
4. It is important to provide a high-energy spark inside the engine's cylinders at precisely the right ... .
   a) place b) speed c) instant
5. A lead-acid battery can be ... during operation using an alternator or generator driven by the engine.
   a) discharged b) recharged c) charged
6. Before ignition gasolines engines ... a mixture of air and gasoline and compress it to less than 185 psi.
   a) take in b) prepare c) emit

7. Compression that occurs in diesel engines is usually more than ... times higher than in gasoline engines.
   a) two b) three c) several
8. Shortly before peak compression, a small quantity of diesel fuel is ... into the cylinder via a fuel injector.
   a) poured b) leaked c) sprayed
9. Diesel engines are also more ... to cold starting issues though they will run just as well in cold weather once started.
   a) resistive b) susceptible c) indifferent
10. In fact, HCCI engines have been shown to achieve extremely low levels of nitrogen oxide emissions without ... by catalytic converter.
   a) filtering b) refining c) treatment

11. Find in the text equivalents to the following phrases:

Получить патент, больше не использовать распределитель, оказывать непосредственное воздействие, горючая смесь, максимальное давление, индукционная катушка, в три раза выше, реагировать одновременно, определяющая характеристика, с трудом поддающийся управлению, обработка в каталитическом конвертере, соответствовать нормам автомобильных выбросов, опускающееся днище поршня, не выдержать тестирование выбросов, при первой возможности.

12. Find the English equivalents to the following Russian words:

1) точка	a) paint	b) point	c) pint
2) смысл	a) sense	b) since	c) essence
3) достигнуть	a) achieve	b) archive	c) active
4) мертвый	a) deed	b) dead	c) deal
5) трубка	a) tub	b) tube	c) tune
6) провод	a) wire	b) wear	c) wipe
7) эл. цепь	a) circle	b) circus	c) circuit
8) исключительно	a) silly	b) solely	c) soily
9) изменяться	a) vary	b) very	c) value
10) полагаться	a) relate	b) rely	c) relieve
11) точный	a) exact	b) extract	c) extant
12) высший	a) peek	b) pick	c) peak

13. Divide text 5A into logical parts and give each a suitable title.

14. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

to initiate combustion	compression ignition system
spark ignition method	to spray into the cylinder via a fuel injector
ignite the air-fuel mix	cold starting
peak compression	battery and charging systems
to provide a high voltage electrical spark	to achieve low levels of nitrogen oxide emissions

15. Fill in the gaps with the words from the box:

octane	calibrated	useless	closed	system	air-fuel
correct	sacrifice	distributor	coolant		

The spark, no matter how adequate, is in itself 1) ___ unless it is produced at the appropriate time. The appropriate time depends upon many variables such as engine design, engine speed and load, 2) ___ mixture, atmospheric pressure, mixture turbulence, temperature and the 3) ___ rating of the fuel. The manufacturer determines the 4) ___ timing by running the engine on a dynamometer. The engine is run at both full load and road load through the speed range, and at fixed points in the range the 5) ___ is moved by hand to obtain the timing point for maximum output. The production distributor is then 6) ___ to give this timing. Exhaust emission controls require an even finer tailoring of spark timing, in some cases at the cost of a small 7) ___ in power and economy. General Motors, for example, uses a control device outside the distributor with its Transmission Control Spark 8) ___. This switches off the vacuum advance at idle and during first and second gear operation, except when the 9) ___ temperature is higher than 220 degrees. Other makers use a double diaphragm vacuum advance unit on the distributor. This device retards the timing at idle and during coast-down with a 10) ___ throttle, but retains normal vacuum advance when cruising with the throttle open.

Check your answers on p. 321

16. a) Translate the following abstract into English using the vocabulary of the text and a dictionary:

Детонация представляет собой неконтролируемое самовоспламенение части горючей смеси, сопровождающееся горением взрывного характера, при котором скорость распространения фронта пламени возрастает с 15 — 20 до 1 500 — 2 500 м/с. Ее признаками являются характерные металлические стуки, вибрация и снижение мощности двигателя, увеличение расхода топлива, повышение дымообразования отработанных газов. Причинами детонации может являться превышение допустимого сжатия топливно-воздушной смеси в камере сгорания, использование бензина с октановым числом ниже того, на которое рассчитан двигатель, неправильное калийное число установленной свечи. Детонация может привести к порче двигателя, так как момент возгорания топлива непредсказуем. Если топливо поджигается в момент, когда поршень не дошел до верхней мертвой точки, произойдет его толчок в обратную сторону, что может вызвать поломки. Возможны перегрев и оплавление поршней, разрушение поршневых колец, износ подшипников коленвала. Также детонация повышает токсичность отработанных газов.

b) Answer the following question as fully as possible:

What factors should be considered to avoid detonation?

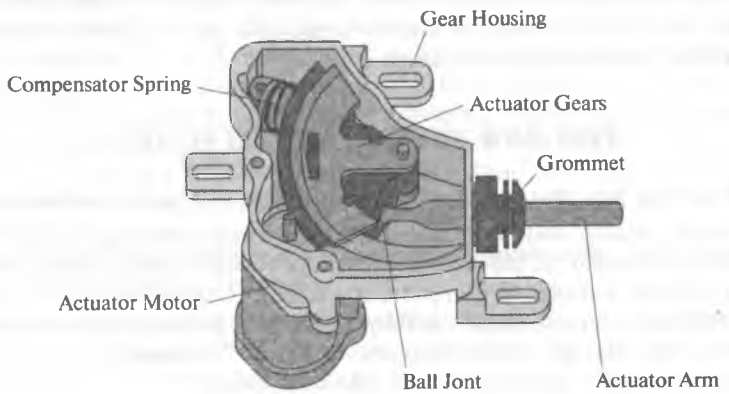
TEXT WORK

17. Read and translate the following text:

Text 5B. The Clutch

In a car we need a clutch because the engine spins all the time, but the car wheels don't. In order for a car to stop without damaging the engine, the wheels need to be disconnected from the engine somehow. Three basic components constitute the clutch system — the primary pulley, the secondary pulley and the belt. The system's primary pulley is located on the engine crankshaft and serves as the clutch and engine rpm controlling device via centrifugal weights. The secondary pulley has a torque-sensing capability allowing the belt to shift automatically to an appropriate ratio. As the connection by which the two pulleys 'communicate' with each other, the belt must slip compliantly and transmit full engine power with virtually no slippage from the primary pulley to the secondary pulley.

The clutch allows us to smoothly engage a spinning engine to a non-spinning transmission by controlling the linkage between them. In a car it is operated by the left-most pedal using hydraulics or a cable connection from the pedal to the clutch mechanism. Even though the clutch may physically be located very close to the pedal, such remote means of actuation are necessary to eliminate the effect of slight engine movement, engine mountings being flexible by design. With a rigid mechanical linkage, smooth engagement would be near-impossible, because engine movement inevitably occurs as the drive is 'taken up'. No pressure on the pedal means that the clutch plates are engaged in driving, while depressing the pedal will disengage the clutch plates, allowing the driver to shift gears.



A clutch works because of friction between a clutch plate and a flywheel. There are many different vehicle clutch designs but most are based on one or more friction discs, pressed tightly together or against a flywheel using springs. The friction material is very similar to the material used in brake shoes and pads and contained asbestos in the past. Also, clutches found in heavy duty applications such as trucks and competition cars use ceramic clutches that have a greatly increased friction coefficient, however these have a 'grabby' action and are unsuitable for road cars. The spring pressure is released when the clutch pedal is depressed thus either pushing or pulling the diaphragm of the pressure plate, depending on type, and the friction plate is released and allowed to rotate freely. A 'wet clutch' is immersed in a cooling lubricating fluid, which also keeps the surfaces clean and gives smoother performance and longer life. Since the surfaces of a wet clutch can be slippery, stacking multiple clutch disks can compensate for slippage. A 'dry clutch', as the name implies, is not bathed in fluid that robs it of some energy. Nevertheless, most companies typically use a dry clutch.

A manual transmission contains cogs for selecting gears. These cogs have matching teeth, called dog teeth, which means that the rotation speeds of the two parts have to match for engagement. This speed matching is achieved by a secondary clutch called a synchronizer, a device that uses frictional contact to bring the two parts to the same speed, and a locking mechanism called a blocker ring to prevent engagement of the teeth (full movement of the shift lever into gear) until the speeds are synchronized.

There are other clutches found in a car which are not power-train. For example, the radiator fan may have a clutch that is heat-activated. The driving and driven elements are separated by a silicone-based fluid. When the temperature is low, the fluid is thin and so the clutch slips. When the temperature is high, the fluid thickens, causing the fan to spin.

While engaging the clutch, the engine speed may need to be increased from idle, using the manual throttle, so that the engine does not stall. Though in most cars, especially diesels, there is enough power at idling speed, so that the car can move while fine movements with the clutch are needed. However, raising the engine speed too high will cause excessive clutch plate wear and cause a harsh, jerky start.

TEXT AND VOCABULARY EXERCISES

18. Translate into Russian the following words and word combinations:

To spin, pulley, belt, centrifugal weights, torque-sensing capability, to an appropriate ratio, to slip compliantly, cable connection, linkage, vehicle clutch designs, remote, to eliminate the effect, to occur inevitably, clutch plate, flywheel, to press tightly, grabby, pushing or pulling, to give smoother performance, cogs for selecting gears, to match for engagement, to bring to the same speed, not power-train, the thin fluid.

19. Find in the text the English equivalents to the following words:

расположенный на коленчатом вале
обороты двигателя в минуту
скользкий
блокирующий механизм
тормозные колодки и накладки
гибкая конструкция
средство активизации
грузовики и гоночные автомобили
фрикционный коэффициент
свободно вращаться
погружать в охлаждающую смазку
поддерживать поверхность в чистоте
передать полную мощность двигателя
лишать некоторой энергии
тем не менее
подогнанные зубцы
крайняя слева педаль
жидкость на силиконовой основе
заставлять вентилятор вращаться
увеличивать скорость двигателя
износ диска фрикционной муфты

20. Skip the text and keep in mind the main theoretical points. Work with a partner, take turns to ask and answer the questions. Use the words and word combinations below:

to disconnect wheels from the engine
the primary and secondary pulley
to engage to a non-spinning transmission
a synchronizer
clutches in heavy duty applications
a 'wet clutch' and a 'dry clutch'
pressure on the pedal
a blocker ring
a heat-activated clutch
a manual throttle
power at idling speed
to cause a harsh start

21. Work in pairs and decide whether these statements according to the text above are true or false:

1. The front and rear wheels are constantly spinning during the ride of an automobile. **2.** The primary and the secondary pulley perform different functions. **3.** The belt serves as a connection by which the two pulleys "communicate" with each other. **4.** In a car the clutch is operated manually via a right-hand lever. **5.** Remote means of clutch actuation are necessary to eliminate the effect of slight engine movement. **6.** Pressure on the pedal means that the clutch plates are engaged in driving and the driver may shift gears. **7.** Vehicle clutches have many different designs but most are based on one or more friction discs coming in contact with a flywheel. **8.** A 'wet clutch' is immersed in a cooling lubricating fluid, which gives smoother performance and longer life but robs it of some energy.

22. Translate the following sentences into English using the vocabulary of text 5B and a dictionary:

1. Как известно, сцепление отвечает за передачу крутящего момента от двигателя, позволяет без треска и опасности поломки переключать передачи и просто двигаться. **2.** От того, насколько четко и надежно

работает сцепление, зависит, как автомобиль будет начинать движение, а при неисправном сцеплении вряд ли можно куда-либо уехать. **3.** Если при трогании автомобиль дернулся с места — сцепление было отпущено слишком резко. **4.** Если двигатель «заглох» — при отпускании сцепления обороты были недостаточны, а если «ревет» — обороты слишком большие и добавлены раньше, чем сработало сцепление. **5.** Для остановки автомобиля водитель выжимает педаль сцепления, что исключает дальнейшее принудительное перемещение автомобиля двигателем. **6.** В большинстве случаев обычное сцепление хорошо функционирует при условии хорошего качества ведомого и нажимного дисков, малой изношенности фрикционных накладок, достаточного опыта водителя. **7.** Модернизация и форма демпферной пластины в ведомом диске сцепления позволяет улучшить функциональные характеристики диска — сделать работу сцепления более мягким, исключить рывки и толчки при движении автомобиля с места. **8.** Если избавить нажимной диск сцепления от пресловутого «паука» — фланца нажимной пружины, можно не только уменьшить вес, но и значительно повысить надежность работы сцепления.

GRAMMAR

23. Проанализируйте примеры косвенной речи, приведенные в таблице:

Judy says that...	Judy said that...
her parents are very well.	her parents were very well.
she is going to learn to drive.	she was going to learn to drive.
John has given up his job.	John had given up his job.
she wants to go away for a holiday.	she wanted to go away for a holiday.
will phone you when she gets back.	would phone you when she got back.

24. Сравните следующие пары предложений и переведите их на русский язык:

1. She *says* that she is living in London now. She *said* that she was living in London that time. **2.** He *says* that his father is a well-known inventor. He *said* that his father was a well-known inventor. **3.** Charlie *says* Sharon and Paul are working for their Master's degree. Charlie *said* Sharon and Paul were working for their Master's degree. **4.** She *says* Margaret has won a grant in chemistry. She *said* Margaret had won a grant in chemistry. **5.** He *asks* where the conference is. He *asked* where the conference was. **6.** They *want* to know who is to make a report. They *wanted* to know who was to

make a report. **7.** They *ask* not to disturb them during the experiment. They *asked* not to disturb them during the experiment.

25. Преобразуйте следующие предложения в косвенную речь:

1. The minister said, 'We've been working on the transport policy for our country.'
2. The reporter asked, 'Can you explain what is special there about automobiles?'
3. The lector said, 'If you drive a manual transmission car, you may be surprised to find out that your car has more than one clutch in it.'
4. 'And it turns out that cars with automatic transmission have clutches, too,' he added.
5. 'Clutches are useful in devices that have two rotating shafts,' the textbook read, 'where one of the shafts is typically driven by a motor or pulley, and the other shaft drives another device.'
6. 'However, this kind of harsh start is desired in drag racing and other competitions,' the driver remarked.
7. I wondered, 'Is it important to consider friction speaking about the clutch operation?'
8. 'Friction is a measure of how hard it is to slide one object over another,' the mechanic explained. 'Friction is caused by the peaks and valleys that are part of even very smooth surface.'
9. 'The larger the surface peaks and valleys are, the harder it is to slide the object,' my friend commented.
10. 'We can learn more about clutch system in practice. Let's go to the garage,' I offered to my companions.

26. Прочитайте диалоги, преобразуйте их в косвенную речь:

Dialogue 1

Raimundo is talking to Fred at a soccer game. Raimundo and his family need to buy a car.

Raimundo: My wife and I decided we have to buy a car. I can ride the bus but having a car can help me get a better job.

Fred: That sounds like a good idea. What kind of car do you want?

Raimundo: I want a truck, but my wife says it will be too small for times when we travel with our two kids.

Fred: She is probably right. What does she want to buy?

Raimundo: Well, she wants a Mercedes convertible. We cannot pay that much for a car.

Fred: She likes expensive cars! Maybe you can find a car that you both like.

Raimundo: That is what we will have to do. We will go talk with different car dealers tomorrow.

Fred: Tell me what you find out next week.

Dialogue 2

Raimundo: Fred, we found some great cars this weekend. There are three different cars that we like.

Fred: That is great. How are you going to decide which one is the best for you?

Raimundo: I do not know. The three of them are very good cars.

Fred: Find out which ones are safe to drive. That is important for your family.

Raimundo: You are right. We also want to get a car that gets good gas mileage. I do not want to spend a lot of money on gas every week.

Fred: The dealer can give you that information. You also do not want to spend a lot of money on maintenance and repairs. Some cars are easier to repair than others.

Raimundo: Yes. I am comparing the warranties for each car. Some new cars have warranties that cover basic repairs for 60 months or 60,000 miles. Other warranties only cover the car for 36 months or 36,000 miles.

Fred: Someone told me that the insurance payments for some trucks or sports utility vehicles are more expensive.

Raimundo: I will ask about that. I am going to have a test drive. Do you want to come?

Fred: Sure. Let's go.

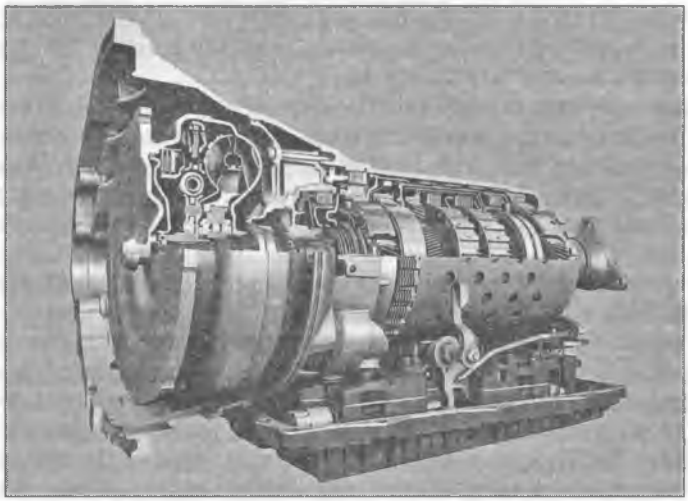
TEXT WORK

27. Read the text and underline its main idea. Give a brief summary of the text:

Text 5C. Transmission

The need for a transmission in an automobile is a consequence of the characteristics of the internal combustion engine. Engines typically operate over a range of 600 to about 7 000 revolutions per minute (this is typically less for diesel engines), while the car's wheels rotate between 0 rpm and around 2 500 rpm. Furthermore, the engine provides its highest torque outputs approximately in the middle of its range, while often the greatest torque is required when the vehicle is moving from rest or travelling slowly. Therefore, a system that transforms the engine's output so that it can supply high torque at low speeds, but also operate at highway speeds with the motor still operating within its limits, is required. Transmissions perform this transformation.

Most transmissions and gears used in automotive and truck applications are contained in a cast iron case, though sometimes aluminum is used for lower weight. There are several shafts working as a team. The mainshaft extends outside the case in both directions: the input shaft towards the engine, and the output shaft towards the rear axle (on rear wheel drive



cars). The shaft is suspended by the main bearings, and is split towards the input end. At the point of the split, a pilot bearing holds the shafts together. The gears and clutches ride on the mainshaft, the gears being free to turn relative to the mainshaft except when engaged by the clutches. Also there exist a countershaft and an idler shaft.

An automobile includes manual, automatic or semi-automatic transmission. Manual transmissions come in two basic types: a simple unsynchronized system where gears are spinning freely and must be synchronized by the operator to avoid noisy and damaging 'gear clash', and synchronized systems that will automatically 'mesh' while changing gears. The former type is only used on some rally cars and heavy-duty trucks nowadays. They still dominate the car market outside North America. Manual transmissions are cheaper, lighter, usually give better performance, and fuel efficiency.

Most modern North American cars have an automatic transmission that will select an appropriate gear ratio without any operator intervention. They primarily use hydraulics to select gears, depending on pressure exerted by fluid within the transmission assembly. Rather than using a clutch to engage the transmission, a torque converter is put in between the engine and transmission. It is possible for the driver to control the number of gears in use or select reverse, though precise control of which gear is in use is usually not possible.

In the past, automatic transmissions of this type have had a number of problems. They were complex and expensive, sometimes had reliability problems which sometimes caused more expenses in repair. They have often been less fuel-efficient than their manual counterparts and their shift time was slower making them uncompetitive for racing. With the advancement of modern automatic transmissions the situation has changed. With computer technology, considerable effort has been put into designing gearboxes based

on the simpler manual systems that use electronically-controlled actuators to shift gears and manipulate the clutch, resolving many of the drawbacks of a hydraulic automatic transmission.

Attempts to improve the fuel efficiency of automatic transmissions include the use of torque converters which lock-up beyond a certain speed eliminating power loss, and overdrive gears which automatically actuate above certain speeds; in older transmissions both technologies could sometimes become intrusive, when conditions are such that they repeatedly cut in and out as speed and such load factors as grade or wind vary slightly. Current computerized transmissions possess very complex programming to both maximize fuel efficiency and eliminate any intrusiveness.

For certain applications, the slippage inherent in automatic transmissions can be advantageous; for instance, in drag racing, the automatic transmission allows the car to be stopped with the engine at a high rpm (the 'stall speed') to allow for a very quick launch when the brakes are released. In fact, a common modification is to increase the stall speed of the transmission. This is even more advantageous for turbocharged engines, where the turbocharger needs to be kept spinning at high rpm by a large flow of exhaust in order to keep the boost pressure up and eliminate the turbo lag that occurs when the engine is idling and the throttle is suddenly opened.

Since their inception, automatic transmissions have been very popular in the United States, and some vehicles are not available with manual gearboxes anymore. In Europe automatic transmissions are gaining popularity as well.

TEXT AND VOCABULARY EXERCISES

28. Find in the text words or phrases which mean the same as:

являться следствием	сцепляться (зубцами)
приблизительно	недостатки
надежность	значительные усилия
чугунный корпус	коробка передач
подшипники	преобразователи крутящего момента
избегать	принудительный
оказывать давление	быстрый запуск
ручные аналоги	поддерживать вращение

29. Work with a partner. Take turns to ask and answer questions to text 5C. Use the words and word combinations below:

revolutions per minute	automatic transmissions problems
to supply high torque	to improve the fuel efficiency
shafts working as a team	advantageous slippage
types of transmission	electronically-controlled actuators
operator intervention	turbocharged engines
a torque converter	to be very popular

30. Fill in the gaps with the prepositions from the box:

on	by	of	before	for	in	to	with

Manual transmissions are much more common than automatic transmissions 1)___ most countries. Alongside with their technical characteristics, it is customary 2)___ new drivers to learn, and be tested, 3)___ a car 4)___ a manual gear change. In Japan, Philippines, Germany, the Netherlands, Austria, the UK, Ireland, Sweden, France, Australia and Finland, a test pass using an automatic car does not entitle the driver to use a manual car 5)___ the public road 6)___ a second manual test is taken.

The creation of computer control also allowed 7)___ a sort of semi-automatic transmission where the car handles manipulation 8)___ the clutch automatically, but the driver can still select the gear manually if desired. This is sometimes referred 9)___ as 'clutchless manual', or 'robotized'. Many 10)___ these transmissions allow the driver to give full control 11)___ the computer. The latest sophisticated semi-automatic and automatic transmissions may yield results slightly closer 12)___ the ones yielded 13)___ manual transmissions.

SUPPLEMENTARY READING

31. Read the texts 25, 26 to get a deeper understanding of its operation and specific features.

32. Speak about the types of transmissions used in automobiles. Have you ever driven a car with a manual (automatic) transmission? Which do you prefer?

WRITING PRACTICE

33. Read the following dialogue and underline its main ideas. Compose an essay covering the contents of the conversation using such verbs and expressions as *to discuss*, *to argue*, *to state*, *to suppose*, *to agree*, *to believe*, *to express ideas*, *to formulate*, *to comment*, *to be of the opinion*, *to come to a conclusion*, etc.

David Gergen speaks with Robert Pool, the author of the book 'Beyond Engineering: How Society Shapes Technology'.

David: Robert, most of the time when we talk about technology and society, it's about the impact of the first on the second, the invention of the printing press leading to the reformation, the invention of the compass leading to the age of exploration, but you've written and taken a very different kind of approach toward technology and society.

Robert: Exactly. I turn the question on its head, and instead of asking how technology pushes and shapes society, I asked how society changes

technology, how society shapes technology. The idea here is that normally when we think about technology, we assume that it's the product of engineers sitting in their labs, working with calculators or slide rules or whatever, and coming up with some rational reasons for why a technology should be this way or that. But if you look at it closely, what you find is that it's not the case at all; that certainly engineers play a large role in shaping technology, but other forces from larger society also play a large role.

David: Yes. The typewriter, that's a low-tech piece of equipment, obviously, but it was a fascinating example.

Robert: Yes. This is something that most people don't stop to think about, but the keyboard that we use on the typewriter right now, the QWERTY keyboard, is the product of the late 1800s from an early typewriter design. And the reason that the keys are laid out as they were is that at the time the technology was so primitive that if you typed too quickly, the keys would stick together, and so they decided to lay out the keys in a rather inefficient way so that you couldn't type so quickly, and the typewriter would, in essence, work much better. But that inefficient layout got locked in to our system. Once everybody had learned how to type on QWERTY and everybody was buying QWERTY typewriters, it became impossible to actually get a better typewriter even when a better typewriter came along. And such a typewriter does exist right now. It's called a Dvorak keyboard and you can type anywhere from 10 to 40 percent faster on it, depending on who you believe. But there seems to be no way we can actually more QWERTY to Dvorak because it would just involve too great an effort.

David: I also found that the example about the automobile — the diesel engine versus a Stanley steamer-to be an interesting illustration of your point.

Robert: Exactly. Most people driving around in their internal combustion engine cars today assume that the reason that we have internal combustion engines is because at some point engineers decided that was the best technology. But that's actually not quite the case. Back at the turn of the century we had actually three options. There were the internal combustion engine, the steam-powered cars, and the electric-powered cars. Now, the electric-powered cars had the same trouble as they have now. Batteries just didn't last long enough. So, in essence, they weren't an option at the time. But the steam-powered car and the internal combustion car seemed to be pretty equally matched. They each had some advantages and some disadvantages, but some people preferred the steam-powered cars, some people preferred the internal combustions. And there was no engineering consensus on what the best technology was.

David: I suppose, there were a number of factors that pushed the internal combustion out in front.

Robert: Indeed. One of those was people like Henry Ford and Ransom Olds set up shop in Detroit, with their mass production of automobiles and made hundreds of thousands of these things so they could sell them very cheaply and flood the market; whereas, the people who are making the

steam-powered cars, like the Stanley Brothers, were much more interested in making very high-end cars for the aficionados. So they made custom cars actually. You could order your car custom-made from the factory, and so they made very few. As a matter of fact, toward the beginning of the First World War the Stanley Brothers were making about as many cars in a year as Ford was turning out in a single day. That was part of the reason. But there were a number of other factors along the way, one of which was an outbreak of hoof and mouth disease in New England. And the reason that played a role is this-the steam-powered car was originally built with an open boiler so that the water would boil off and create steam. Well, that was not a problem in New England because there were all these public horse troughs around, so you drive for twenty or thirty miles, stop, and fill up your water tank at a horse trough. But with this outbreak of hoof and mouth disease they closed the public horse troughs in New England, and all of a sudden you couldn't drive wherever you wanted because you would run out of water for your steam engine.

David: Bye-bye Stanley Steamer. Let me ask you about the technology today. You say it is changed dramatically from the 19th century. We're living in a new age — much more complex machines, and the engineering, which has much more of an impact on society. It's changed society's attitudes toward technology a lot.

Robert: Exactly. There are a couple of things where technology is extremely different than it was a hundred years ago. One of them is a power of technology. A hundred years ago a technological accident might kill a few people at most. Now, a technological accident in a nuclear power plant could conceivably kill thousands or even millions of people, so the power of technology is something that we've never experienced before. As I said in the book, it's like having a Great Dane in the room. It may be friendly, but you've got to be very careful to put your breakables out of reach. Another major change in technology is the complexity. A hundred years ago, two hundred years ago technology was a relatively simple thing. A single person could understand the entire workings of a steam engine or a telegraph. Today technology has gotten to the point where it's so complex that no single person can understand the workings of something like a Boeing 747. And with that complexity comes an uncertainty in how technology is going to behave. When you start to build something, you can never quite be sure how it's going to act. You have to try it and see what happens, and even after five or 10 years with a particular machine, you can't always be sure what's going to happen. So that risk, coupled with the complexity, makes technology a very different sort of creature.

David: With the boom in the Internet and all the publicity that's attended that, many argue we're living through the greatest age of technological change in history. Is that true?

Robert: I think it is. You can look back at the end of the 19th century where there was also an age of tremendous technological change with the things like the telephone and the telegraph before that-electricity-Thomas

Edison and his lightbulb and so on. And if you go back and look at the newspapers of the time, you see the people realized they were living in a golden age, so to speak, where things were changing much more rapidly than they had ever been before. What's happened is over the last hundred years we've gotten used to that. We've grown up in a society where technology is constantly changing and pushing our society in different directions, and so somehow we've become enured to that change, and it may not seem that we're living in an age of so much change as the people were a hundred years ago, but, indeed, we're moving actually much faster than we were then.

David: Final question. Are you an optimist about the future of technology in society?

Robert: I am. And the reason is that there are people out there who are asking the right questions. One of the questions is: How do we start thinking about designing technology with humans in mind? A hundred, 200 years ago when people designed machines, the designs came about through the needs of the machine. They asked, what is going to make the best machine, and then they let people worry about how they were going to run it. That doesn't work so well anymore. When you have something like a nuclear power plant, you can't just say we're going to make the best nuclear power plant we can and then figure out how to run it later. It gets too complex; you can't figure out exactly how it's going to behave in certain situations, and so people have come to realize that we have to start thinking about technological design with humans and organizations in mind. And when we do that, it's going to completely change how we think about technology and probably make technology a better servant of people.

David: Robert, thank you for that final note in particular.

UNIT 6

ACTIVE VOCABULARY

1. Read and remember the following words:

backlash — скольжение (винта)
ball bearings — шарикоподшипники
bump — бугор, выпуклость
to deviate — отклоняться
feedback — обратная связь, отдача
to intersect — пересекать
kingpin — шкворень
lever arm — плечо рычага
nut — гайка
pitman — соединительная тяга
rack — стойка, рейка
rack-and-pinion — реечная передача
rim — обод, край
robustness — жесткость, прочность
screw — винт
slack — зазор, провес
steering — рулевое управление
steering arm — рулевая сошка

steering wheel — рулевое колесо
tie rod — поперечная рулевая тяга
tight turn — тугой поворот
worm-and-sector — с червяком и сектором

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

To follow the desired course, steering arrangement, in front of the driver, universal joints, to turn smoothly, a different circle, the center point of the turn, to mesh with the pinion, to apply steering torque, utility vehicles, attached to the axis, steering box, a large degree of feedback, the only cure, introduction of power steering, adjustable via a screw, to account for, to hit a bump, to kick to one side, to wrap around.

3. Give antonyms to the following words:

direct	straight	front	rapidly
to limit	perpendicular	inside	advantage
common	to attach	motion	to tie

4. Give synonyms to the following words:

component	due to	conventional	to position
to contain	linkage	circumstances	perceptible
mechanism	entirely	to cause	originally

WORD-BUILDING

5. Translate the following compound words:

Hand-operated, recirculating ball-and-nut, pitman, rack-and-pinion, maintainability, dead-spot, backlash, feedback, worm-and-sector, four-wheel.

6. Translate the following words with the suffixes:

-ian mathematician, technician, musician, physician, politician, tactician;

-ible combustible, divisible, reducible, responsible, possible, invisible;

-ity audacity, certainty, relativity, viscosity, equality, curiosity, density, capacity, porosity, creativity, reality, humanity, variety, commodity.

7. Define to what parts of speech the following words with prefixes refer and translate them:

hemi- hemicyclic, hemimorphism, hemisphere, hemihedral, hemicellulose;

hydro- hydrolyse, hydrodynamics, hydroelectric, hydrographer, hydropower;

hyper- hyperbolism, hypertensive, hyperkinetics, hypersonic;

hypo- hypofunction, hypotensive, hypopotension, hypotoxic, hypoactive, hypothermal.

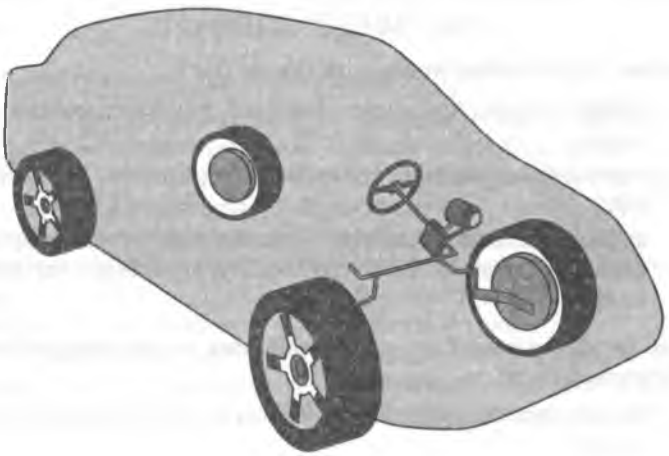
TEXT WORK

8. Read the text below to learn the steering operation principles.

Text 6A. Steering

Steering is the term applied to the collection of components and linkages which allow for a car to follow the desired course. The most conventional steering arrangement is to turn the front wheels using a hand-operated steering wheel which is positioned in front of the driver, via the steering column, which may contain universal joints to allow it to deviate somewhat from a straight line. You might be surprised to learn that when you turn your car, your front wheels are not pointing in the same direction. For a car to turn smoothly, each wheel must follow a different circle. Since the inside wheel is following a circle with a smaller radius, it is actually making a tighter turn than the outside wheel. If you draw a line perpendicular to each wheel, the lines will intersect at the center point of the turn. The geometry of the steering linkage makes the inside wheel turn more than the outside wheel. There are two most common types of steering gears: rack-and-pinion and recirculating ball-and-nut which is practically the same as worm-and-sector.

Many modern cars use rack and pinion steering mechanisms the major components of which constitute tie rod, steering arm and kingpin. When



the steering wheel turns the pinion gear, the pinion moves the rack, which is a sort of linear gear which meshes with the pinion, from side to side. This motion applies steering torque to the kingpins of the steered wheels via tie rods and a short lever arm called the steering arm.

Older designs often use the recirculating ball mechanism, which is still found on trucks and utility vehicles. This is a variation of the worm-and-sector design, where the steering column turns a large screw (the 'worm gear') which meshes with a sector of a gear, causing it to rotate about its axis as the worm gear is turned; an arm attached to the axis of the sector moves the pitman arm, which is connected to the steering linkage and thus steers the wheels. The recirculating ball version of this apparatus reduces the considerable friction by placing large ball bearings between the teeth of the worm and those of the screw; at either end of the apparatus the balls exit from between the two pieces into a channel internal to the box which connects them with the other end of the apparatus, thus they are 'recirculated'.

The rack and pinion design has the advantages of a large degree of feedback and direct steering 'feel', it also does not normally have any backlash, or slack. A disadvantage is that it is not adjustable, so that when it does wear and develop lash, the only cure is replacement.

The recirculating ball mechanism has the advantage of a much greater mechanical perfection, so that it was found on larger, heavier vehicles while the rack and pinion was originally limited to smaller and lighter ones. Due to the introduction of power steering, however, this is no longer an important advantage, leading to the increasing use of rack and pinion on newer cars. The recirculating ball design also has a perceptible lash, or 'dead-spot' on center, where a minute turn of the steering wheel in either direction does not move the steering apparatus; this is easily adjustable via a screw on the end of the steering box to account for wear, but it cannot be entirely eliminated or the mechanism begins to wear very rapidly.

This design is still in use in trucks and other large vehicles, where rapidity of steering and direct feel are less important than robustness, maintainability, and mechanical advantage. The much smaller degree of feedback with this design can also sometimes be an advantage; drivers of vehicles with rack and pinion steering can have their thumbs broken when a front wheel hits a bump, causing the steering wheel to kick to one side suddenly. These factors motivate the driving instructors telling students to keep their thumbs on the front of the steering wheel, rather than wrap around the inside of the rim. This effect is even stronger with a heavy vehicle like a truck; recirculating ball steering prevents this degree of feedback, just as it prevents desirable feedback under normal circumstances.

Various developments in steering systems like power steering, speed adjustable steering, four-wheel steering have appeared which are driven mostly by the need to increase the stability, safety and also the fuel efficiency of cars.

TEXT AND VOCABULARY EXERCISES

9. Choose the right word and fill in the gaps:

1. Conventional steering arrangement supposes turning the ... wheels using a hand-operated steering wheel positioned in front of the driver.
   a) rear b) front c) all
2. While a car is turning smoothly, each wheel follows a ... circle.
   a) different b) full c) complete
3. Recirculating ball-and-nut type of steering is practically ... worm-and-sector one.
   a) counterpart to b) the same as c) much alike
4. The rack is a sort of linear gear which ... with the pinion from side to side.
   a) turns b) sways c) meshes
5. The recirculating ball mechanism ... the considerable friction by placing large ball bearings between the teeth of the worm and those of the screw.
   a) reduces b) causes c) increases
6. The rack-and-pinion's disadvantage is that it is not adjustable, so when it does ... and develop lash, the only cure is replacement.
   a) wear b) breaks c) rotate
7. The driving instructors advice students to keep their thumbs ... the steering wheel,
   a) under b) on the front of c) away from

10. Find in the text equivalents to the following words and word combinations:

Применять термин, передние колеса, допускать, указывать в том же направлении, составлять, рулевая колонка, червячная передача, вращаться вокруг своей оси, износ, замена, первоначально ограниченный, ведущий, в любом направлении, сломать большие пальцы, инструкторы по вождению, при нормальных условиях, новые разработки.

11. Find the English equivalents to the following Russian words:

1) следовать	a) fellow	b) follow	c) fallow
2) колесо	a) weel	b) whale	c) wheel
3) линия	a) line	b) lane	c) lain
4) червяк	a) worn	b) worm	c) warm
5) цепляться	a) mash	b) mess	c) mesh
6) винт	a) crew	b) screw	c) screen
7) передача	a) gear	b) geat	c) germ
8) выходить	a) exist	b) exit	c) exact
9) градус	a) decree	b) degree	c) degrade
10) лечение	a) care	b) curve	c) cure

12. Divide text 6A into logical parts and give each a suitable title.

13. Work in pairs, think of some questions to review the contents of the text and ask each other. Use the word combinations below:

advantages and disadvantages of gear types
universal joints
to deviate from a straight line
turns of inside and outside wheels
operation of the rack-and-pinion
operation of the recirculating ball
to turn the front wheels
the degree of feedback
to hit a bump
driving instructions

14. Fill in the gaps with the words from the box:

survival	reduction	mechanical	road	characteristics
conventional	utilization			

The aim of steer-by-wire technology is to completely do away with as many 1) _____ components as possible. They include the steering shaft, the steering column, gear reduction mechanism and other elements.

Completely replacing 2) _____ steering system with steer-by-wire holds several advantages. The absence of steering column simplifies the car interior design. The absence of steering shaft, column and gear 3) _____ mechanism allows much better space 4) _____ in the engine compartment. The steering mechanism can be designed and installed as a modular unit. Without mechanical connection between the steering wheel and the 5) _____ wheel, it is less likely that the impact of a frontal crash will force the steering wheel to intrude into the driver's 6) _____ space. Steering system 7) _____ can easily and infinitely be adjusted to optimize the steering response and feel.

Check your answers on p. 321

SUPPLEMENTARY READING

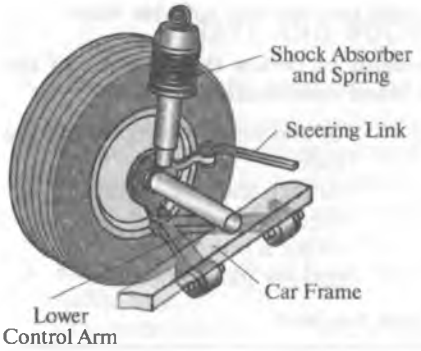
15. Read the texts 27, 28, 29 and compare their operation principles. What type is most suitable for world-wide usage? Why?

16. Read and translate the text to learn about types of suspension:

Text 6B. Suspension

The steering and suspension systems of a car are not only important for safety reasons but also enhance the comfort level of the vehicle. Being directly related to each other, the two systems are always referred to together.

Suspension implies the system of springs, shock absorbers and linkages that connects a vehicle to its wheels. Suspension systems serve a dual



purpose — contributing to the car's handling and braking for good active safety and driving pleasure, and keeping vehicle occupants comfortable and reasonably well isolated from road noise, bumps, and vibrations. These goals are generally at odds, so the tuning of suspensions involves finding the right compromise. The suspension also protects the vehicle itself and any cargo or luggage from damage and wear.

Shock absorbers can rely on several different designs to minimize noise and vibration, including hysteresis, hydraulics, and pneumatics. Some shock absorbers use the elasticity of rubber and springs to cushion the shock. Hydraulics, often used in automobiles, employs water to absorb the shock, while pneumatic shock absorbers compress gas in place of a spring-mounted design. Although they use different means of absorption, all forms of shock absorbers are used to dampen vibrations caused by sudden motion and mechanical shocks. By these actions and reactions, the shock absorbers permit a soft ride over small bumps and provide firm control over spring action for cushioning large bumps. The double-acting units must be effective in both directions because spring rebound can be almost as violent as the original action that compressed the shock absorber. Then there are the control arms. The primary job of the control arms is to mount the suspension to the frame or body of the vehicle and to allow the suspension to move and keep it in its proper place. They come in all shapes and sizes and are specifically designed to maintain the geometry of the suspension in a wide range of movement. The common problem is that the bushings at the body mounting points wear out causing unwanted movement at worst and produce a terrible squeaking noise at best.

Another important part of the suspension is the spring. The three types of springs used are the coil spring, leaf spring and torsion bar. Coil springs and torsion bars are generally used in the front whereas leaf springs are generally used in the rear. Coil springs are generally installed between the upper and lower control arms with the shock absorber mounted inside the spring. In some cases the coil spring is mounted on top of the upper control arm and a spring tower formed in the front-end sheet metal. Coil springs come in many 'rates' and can be used to change the handling and ride characteristics of a vehicle.

Leaf springs are made from layers of spring steel bolted together through the center. This center bolt locates the spring to the axle housing and is attached to the housing with large U bolts. The ends of the leaf spring are attached to the frame or body through a shackle that allows the spring to flex without tearing out. The leaf spring also acts as control arms to keep

the axle housing in proper position. Most trucks with a solid beam front end still use leaf springs on the front. Some cars, most notably the Chevrolet Corvette, use a single leaf spring, front and rear, transversely mounted. The springs are mounted 90° to the center of the car.

In the technical sense a torsion bar is also a spring. The torsion bar provides its spring action by the twisting of a flexible steel bar. This twisting of a steel bar provides the resistance to the up and down movement of the front end. There are two torsion bars, one for each front wheel. The rear of the torsion bar is mounted on the frame of the vehicle and the front is bolted the lower control arms.

The big advantage of a torsion bar is that it is easily adjustable. By turning the tensioning bolts you can adjust the ride height very easily. Another component of the suspension system is the sway bar. Some cars require stabilizers to steady the chassis against front-end roll and sway on turns. Stabilizers are designed to control this centrifugal tendency that forces a rising action on the side toward the inside of the turn. When the car turns and begins to lean over, the sway bar uses the upward force on the outer wheel to lift on the inner wheel, thus keeping the car more level.

There is a lot of math going into the suspension of a car, there are many forces and angles that have to be acted upon and maintained. If you notice any problems in the way your car steers or rides or you feel any body or steering wheel vibrations, you should have it checked out as soon as possible.

Notes on the text

U bolt — U-образный болт, скоба с четырьмя гайками и двумя крепежными пластинами

coil spring — спиральная рессора

leaf spring — листовая рессора

solid beam — жесткая балка

the axle housing — 1) кожух полуоси; 2) картер ведущего моста

hysteresis — гистерезис, отставание реакции системы от вызывающего ее внешнего воздействия

control arm — управляющий рычаг

shock absorber — амортизатор

torsion bar — торсионный вал

sway bar — поперечная реактивная штанга

TEXT AND VOCABULARY EXERCISES

17. Translate into Russian the following words and word combinations:

To enhance the comfort level, vehicle occupants, at odds, to cushion the shock, means of absorption, to dampen vibrations, to permit a soft ride, unwanted movement, in the rear, mounted inside the spring, layers of steel, to allow the spring to flex, twisting of a flexible bar, by turning the

tensioning bolts, to adjust the ride height, to steady the chassis, to have it checked.

18. Find in the text the English equivalents to the following words:

по причинам безопасности	нахождение верного компромисса	поперечно установленный
подвески	применять воду	накреняться
сжимать газ	скрипящий звук	на раме машины
защищать от повреждений и износа	между верхним и нижним рычагом	управлять центробежной тенденцией
удерживать на месте	посредством соединительных скоб	обеспечивать сопротивление

19. Compose your own sentences with each English equivalent of the words given in exercise 18. Compare your variants with the sentences of your partner.

20. Work in pairs and decide whether these statements according to text 6B are true or false:

1. Shock absorbers isolate the equipment to which they are attached, preventing the spread of vibrations throughout the equipment components caused by the shocks. **2.** Shock absorbers often take the form of pistons, which use hydraulic and pneumatic designs to intensify mechanical shocks. **3.** The operating principle of hydraulic shock absorbers is fluid displacement, which is forcing fluid through restricting openings in the valves. **4.** The restricted flow serves to slow down and control rapid movement in the car springs as they react to road irregularities. **5.** Auto coil springs are the foundation of any suspension system. **6.** A control arm is a bar with a pivot at each end, used to isolate suspension members from the chassis. **7.** When coil springs are used in both front and rear suspension, three or four control arms are placed between the rear axle housing and the frame to carry driving and brake torque. **8.** Once maintained, suspension elements never cause any problems.

SUPPLEMENTARY READING

21. Read the text 30 and give a brief description of their development.

22. Read the text about McPherson suspension system and explain its wide popularity among drivers:

Rack and pinion steering is almost always used with a McPherson suspension system. The bottom of the steering knuckle still pivots on a lower ball joint, but the top of the knuckle is connected to the McPherson strut. In this system the outer tie rod end is connected to an arm on the strut housing itself.

The McPherson strut assembly replaces the upper control arm, front shock absorber and ball joint, increasing handling and responsiveness. It controls ride much the same way as a standard hydraulic shock absorber. It also keeps the front end aligned and eliminates, in some cases, the need for caster and camber adjustments. In most cases it also contains the front coil springs so care must be taken when you are replacing them.

The down side is that they will eventually start to leak and will require replacement. They generally last longer than a conventional shock absorber and that may offset the greater cost of the McPherson strut assembly. As far as replacement goes, some struts have an internal shock assembly that can be replaced separate from the rest of the housing and others have to be replaced as a unit.

23. Translate the following sentences into English using the vocabulary of text 6B and a dictionary:

1. В гидравлических амортизаторах гашение колебаний упругих элементов подвески происходит просто за счет перетекания жидкости (чаще всего вязкого масла) из одного резервуара в другой и обратно через систему клапанов. **2.** При неизбежной тряске воздух вспенивает масло гидравлических амортизаторов и создает «воздушные ямы» в их работе, что особенно ярко проявляется на российских дорогах. **3.** Газонаполненные амортизаторы высокого давления появились как ответ на необходимость решения проблемы образования пузырьков. **4.** Газ, обычно азот, находится под давлением около 25 атмосфер. **5.** Чем выше давление газа, подпирающего масло, тем выше «быстрота реакции» амортизатора. **6.** В амортизаторах высокого давления и масло, и газ расположены последовательно в одном цилиндре и разделены плавающим поршнем. **7.** Именно поэтому амортизаторы высокого давления можно переворачивать «вниз головой», например в стойках Макферсона, а гидравлические — нет.

GRAMMAR

24. Проанализируйте формы причастий, приведенные в таблице.

<table>
<tr><th colspan="4">Participle</th></tr>
<tr><th colspan="3">Participle I</th><th colspan="2">Participle II</th></tr>
<tr><td rowspan="2">Indefinite</td><td>Active</td><td>Passive</td><td rowspan="3">основа стандартного глагола + ed</td><td rowspan="3">asked</td></tr>
<tr><td>asking</td><td>being asked</td></tr>
<tr><td>Perfect</td><td>having asked</td><td>having been asked</td></tr>
</table>

25. Прочитайте предложения и переведите их на русский язык. Найдите и назовите формы причастий:

1. The man delivering a lecture is a famous scientist. **2.** The lecture delivered by this scientist was interesting. **3.** The student studying at a college will gain a Bachelor's degree in three years. **4.** The problem studied by these advanced students is very important for their research. **5.** The idea advanced by the tutor will help our group to carry out experiments. **6.** The research carried on at our university is headed by experienced specialists. **7.** The lecture attended by the students of our group was on the latest discoveries in the field of electronics. **8.** The machines used showed good results. **9.** The theory formulated is of great importance for mechanics. **10.** The substance formed had all the necessary properties.

26. Прочитайте и переведите на русский язык следующие словосочетания, обращая внимание на причастия:

Outstanding achievements, the increased speed of the car, written by a famous physicist, dealing with atoms, based on the attraction and repulsion, originating in the universe, working in the field of mechanics, the man arrested, being extremely busy, having packed the things, randomly selected, as mentioned above, generating electrical energy, passed through a motor, in the molten state, starting at a zero value, setting up its own force, having a high power, considering the means for ignition, altered in relative performance.

27. Образуйте причастия от приведенных глаголов и переведите их:

a) Participle I:

To build, to grow, to think, to bring, to determine, to follow, to move, to refuse, to obtain, to contain, to produce, to use, to enter, to get, to happen, to carry, to teach, to tell, to make, to begin, to keep, to divide, to save, to develop, to return, to offer, to enter.

b) Participle II:

To find, to send, to add, to change, to achieve, to write, to read, to develop, to make, to see, to speak, to divide, to give, to leave, to decide, to consider, to burn, to show, to throw, to keep, to take, to maintain, to install.

28. Переведите словосочетания на английский язык:

Сделанное открытие, проходя по виткам катушки, рекламируемые образцы, испытываемая модель, изменяя траекторию движения, имеющие одинаковую массу, несущий электрический заряд, не зная данного закона, проведя тщательное исследование, будучи приглашенным, неизвестное вещество, содержащий медь, двигаясь по кругу, используемые человеком, определив относительный вес, потеряв отрицательный заряд, соединяя конденсаторы параллельно, будучи полностью изолированным, вызываемая сгоранием топлива, принятый в серийное производство.

29. Переведите следующие предложения на русский язык, обращая внимание на причастия и причастные обороты:

1. The control systems being applied nowadays will be discussed at the conference to be held at our university next month. **2.** We watched the mechanic change the tyre with great skill. **3.** The technologies introduced received general recognition. **4.** Having been constructed recently a new electronic device has important applications in automatic transmission. **5.** The results obtained differed depending on the substance. **6.** One might use this motor at high speed as well as at low speed, if desired. **7.** Unless treated properly, this material will not be a good lining. **8.** Expressing velocity the unit of time must be given as well as the number denoting the velocity. **9.** The collar thus serves as a valve, allowing the air to flow one way, but not the other. **10.** The safety valve for steam boiler should have a relieving capacity at least as great as the evaporative capacity of the boiler when operating at maximum capacity. **11.** At the same temperature the coefficient for the mixture is lower than that of the pure liquid indicating an influence of dioxine, differing from that on water and alcohol.

30. Переведите следующие предложения, обращая внимание на независимые причастные обороты:

1. *The mechanic repairing the engine at that time*, I went to the chief instead of him. **2.** *The engine being repaired*, we will soon be able to get it for installation. **3.** *The mechanic having repaired the engine*, the engineer examined it. **4.** *The engine having been repaired*, we could start it immediately. **5.** The car stopped, *there being no fuel in the tank*. **6.** *The intensity of the current being unchanged*, the parameters of the system didn't change either. **7.** *The new devices showing promise*, scientists began to develop them at a rapid pace. **8.** *With friction eliminated*, no force at all would be necessary to keep mechanisms in motion. **9.** *No more time left*, we had to enhance the experimental work. **10.** The mixture would not be combustible, *the fuel uniformly mixed with the air.* **11.** *The driver having repaired the engine*, we could go further.

31. Образуйте соответствующие формы причастий от приведенных в скобках глаголов. Переведите предложения на русский язык:

а) 1. The students (*to attend*) these lectures are from various departments. **2.** The slide show (*to demonstrate*) to these students was on the history of mechanics. **3.** The research work (*to carry out*) at the laboratory is of importance for our university. **4.** The students (*to live*) in this college attend tutorials. **5.** The students' studies (*to watch*) by tutors are in close connection with the general plan of work. **6.** The engineer (*to conduct*) this research is greatly respected by co-workers. **7.** A great part of university training consists of lectures (*to deliver*) to audiences (*to vary*) from a few to a large number of students.

б) 1. If two pulleys (*to connect*) by a band are to rotate in the same direction, the open belt arrangement is used. **2.** The (*to describe*) method

is widely used in automotive industry. **3.** As I turned my head, I glimpsed a car (*to race*) past me. **4.** If (*to break*) anywhere, the electric circuit will immediately stop carrying current. **5.** The compressed air is forced through the tube (*to form*) the piston rod and the check valve in the tire inlet prevents its return. **6.** If a (*to drive*) gear has 40 teeth and the follower gear has 20 teeth, one revolution of the former will revolve the latter two revolutions. **7.** Engines are also built to operate on a cycle (*to complete*) in two strokes. **8.** The purpose of lubrication is to reduce the friction between (*to move*) surfaces. **9.** We employ gear trains (*to divide*) into simple and compound trains. **10.** The succession of operations in the engine cylinder (*to call*) by a cycle repeats itself constantly. **11.** Smooth wheels can also be driven while (*to hold*) them tight together and (*to let*) one drive the other by means of friction between their own surfaces. **12.** Badly (*to wear*) engines, imperfect carburetion and faulty ignition will add to the losses and decrease the engine efficiency.

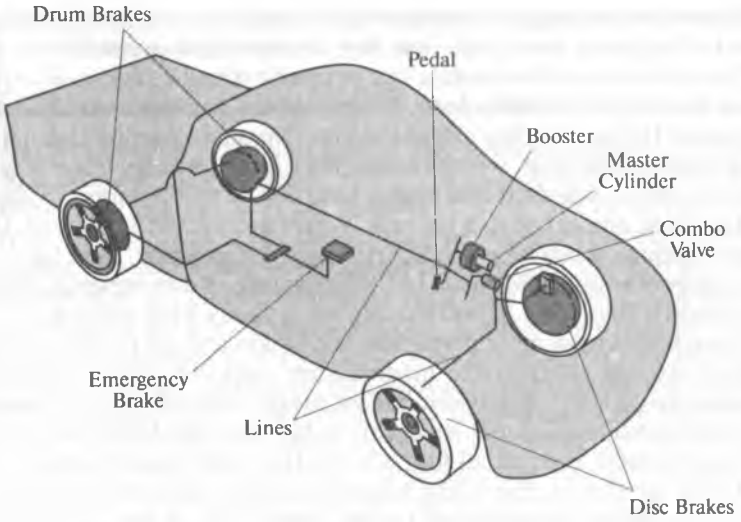
TEXT WORK

32. Read the text and underline its main idea. Give a brief summary of the text:

Text 6C. The Brake System

Brakes are designed to slow the vehicle down but probably not by the means that most people think. The common misconception is that brakes squeeze against a drum or disc, while the pressure of the squeezing action is only part of the reason you slow down. Brakes are essentially a mechanism to change energy types. When you are travelling at speed, your vehicle has kinetic energy. When you apply the brakes, the pads or shoes that press against the brake drum or rotor convert that energy into thermal energy. The cooling of the brakes dissipates the heat and the vehicle slows down. This is all to do with the first law of thermodynamics, sometimes known as the law of conservation of energy. This states that energy cannot be created or destroyed; it can only be converted from one form to another. In the case of brakes, it is converted from kinetic energy to thermal energy. The brakes transmit the force to the tires using friction, and the tires transmit that force to the road using friction also. Friction causes heat which is part of the kinetic energy conversion process. In what way they create friction is down to the various designs.

One of the brake types is a drum brake. The concept here is simple. Two semi-circular brake shoes sit inside a spinning drum which is attached to the wheel. When the brakes are applied, the shoes are expanded outwards to press against the inside of the drum. This creates friction, which creates heat, which transfers kinetic energy, which slows you down. The example to the right shows a simple model. The actuator in this case is the elliptical



object. As that is twisted, it forces against the brake shoes and in turn forces them to expand outwards. The return spring pulls the shoes back away from the surface of the brake drum when the brakes are released.

The 'single leading edge' refers to the number of parts of the brake shoe which actually contact the spinning drum. Because the brake shoe pivots at one end, simple geometry means that the entire brake pad cannot contact the brake drum. The leading edge is the term given to the part of the brake pad which does contact the drum, and in the case of a single leading edge system, it's the part of the pad closest to the actuator. As the brakes are applied, the shoes are pressed outwards and the part of the brake pad which first contacts the drum is the leading edge. The action of the drum spinning actually helps to draw the brake pad outwards because of friction, which causes the brakes to 'bite'. The trailing edge of the brake shoe makes virtually no contact with the drum at all. This simple geometry explains why it's really difficult to stop a vehicle rolling backwards if it's equipped only with single leading edge drum brakes. As the drum spins backwards, the leading edge of the shoe becomes the trailing edge and thus doesn't bite.

The drawbacks of the single leading edge style of drum brake can be eliminated by adding a second return spring and turning the pivot point into a second actuator. Now when the brakes are applied, the shoes are pressed outwards at two points. So each brake pad now has one leading and one trailing edge. The name is double leading edge as there are two brake shoes and two brake pads, which means there are two leading edges.

Disc brakes are an order of magnitude better at stopping vehicles than drum brakes, which is why you'll find disc brakes on the front of almost every car built today. Sportier vehicles with higher speeds need better brakes to slow them down, so you'll likely see disc brakes on the rear of those too. Disc brakes

are again a two-part system. Instead of the drum, there is a disc or rotor, and instead of the brake shoes, you now have brake caliper assemblies.

The caliper assemblies contain one or more hydraulic pistons which push against the back of the brake pads, clamping them together around the spinning rotor. The harder they clamp together, the more friction is generated, which means more heat, which means more kinetic energy transfer, which slows you down. Standard disc brakes have one or two cylinders in them — also known as one or two-pot calipers. Where more force is required, three, or more cylinders can be used. Sports bikes, for instance, may have 4- or 6-pot calipers arranged in pairs. The disadvantage of disc brakes is that they are extremely intolerant of bad machining or faulty workmanship.

Drum brakes have more parts than disc brakes and are harder to service, but they are less expensive to manufacture, and they easily incorporate an emergency brake mechanism. Drum brakes naturally provide some of their own power assist. Since most cars today have disc brakes on the front wheels, and some even on all four wheels, they need power brakes. In the hood of a car there is the brake booster, a round canister located at the back of the engine compartment on the driver's side of the car. The brake booster uses vacuum from the engine to multiply the force that a human foot applies to the master cylinder and in this way provides power braking. Without this device, a lot of drivers would have very tired legs.

TEXT AND VOCABULARY EXERCISES

33. Find in the text above words or phrases which mean the same as:

тормоза	оттягивать
сжимать, сдавливать	стержень
тормозная накладка	замыкающий край
барабан	устранять недостатки
сохранение энергии	на порядок величин
преобразовывать	гидравлический поршень
полукруглый тормозной башмак	тормозная колодка
создавать тепло	ускоритель тормоза
привод	умножать силу

34. Work with a partner. Take turns to ask and answer questions to text 6C. Use the words and word combinations below:

to slow the vehicle down	to stop rolling backwards
energy types change	adding a second return spring
to dissipate the heat	brake caliper assemblies
transmit the force	to push against the brake pads
a spinning drum	to clamp together
expanded outwards	faulty workmanship
single leading edge	power brakes
to causes the brakes to 'bite'	back of the engine compartment

35. Speak about the necessity of the brake system proper function. Try to give as many arguments as you can.

36. a) Read the following text and mind the handbrake functions:

It's worth spending a moment here to talk about handbrakes. Or parking brakes, e-brakes, or emergency brakes, depending on where you come from. Whilst they're good for doing handbrake turns, they're not especially effective at actually slowing you down. They will — don't get me wrong — but you won't be seeing any stellar performance out of them so the term 'emergency brake' is a bit of a misnomer. So why is this? Well, handbrakes are cable-actuated for a start so the amount of power they have is wholly dependent on the amount of tug you have in your arm. There's no hydraulic system to help you out. Apart from that, they only work on the rear wheels, so you're not getting four-wheel braking. On drum-brakes, the handbrake is connected to a small lever that pivots against the end of one of the brake actuating pistons. When you pull the handbrake, the lever gets pulled and the brake shoes are pressed out against the inside of the drum. On disc brakes, the handbrake normally works a second set of brake pads in the rear caliper. They're little spots, about the size of a grown man's thumbprint and they're clamped mechanically against the brake rotor. These pads never need changing because they're normally only used at standstill so generally don't wear much. Their small size is the other reason you shouldn't expect stellar stopping performance if you yank on the handbrake. That being said, there are derivatives of disc-based handbrakes that use a mechanical arm to press the main brake pads against the rotor although these are less common.

b) Try to formulate the principles of handbrake usage on the basis of the given words and word combinations:

Cable freezing, to park, to use the footbrake, to wait at traffic lights, in cars with automatic gearbox, in post-snow conditions, going at any speed, to cover with slush.

When to use handbrakes	
When not to use handbrakes	

SUPPLEMENTARY READING

37. Read the texts 31, 32, 33 and describe the rules of brake maintenance.

38. Fill in the gaps with the prepositions from the box:

until	in	with	of	by	on

Disc brakes were invented 1)___ 1902 and patented 2)___ Birmingham car maker Frederick William Lanchester. His original design consisted 3)____ two discs pressed against each other to generate friction and slow his car down. It wasn't 4)____ 1949 that disc brakes appeared 5)___ a production car. The obscure American car builder Crosley made a vehicle called the Hotshot which used the more familiar brake rotor and calipers that we all know and love today. His original design was a bit crap though — the brakes had the service life 6)____ less than a year each. Finally 7)____ 1954 Citroën launched the way-ahead- 8)____ — its-time DS which had the first modern incarnation 9)___ disc brakes along 10)____ other nifty stuff like self-levelling suspension, semi-automatic gearbox, active headlights and composite body panels. All the things were later re-introduced as 'new' 11)___ car makers 12)____ the 90s.

39. Read and translate the tollowing text to learn what happens with rubber tyres. Exchange your opinions with a partner using the following expressions:

What do you think of; I think; It goes without saying; I'd like to say a few words; On the contrary; I think I can add; As far as I know; You didn't mention the fact that; To sum it up; It is necessary to say that.

Rubber Tyre Dust

As tyres gradually wear down, where does the rubber dust go?

Most of tyre dust supposedly settles onto the ground near the roadway. And there it makes up a few percent of the road dust. Your average new tyre weighs around 11.5 kilograms, but when it's used, it's down to 9 kilograms. If you have a busy road with 25,000 vehicles travelling on it each day, it will generate around three kilograms of tyre dust, per kilometre off road, per day.

In America, about 600,000 tonnes of tyre dust come off vehicles every year. Some of the tyre dust settles on the road, and gets mashed into the road. Most of it gets blown off away from the road by the air turbulence of the vehicles. Some of the rubber vanishes through oxidation, and bacteria might eat some of the tiny particles as well. But most of it just hangs around. Robert Pitt from the University of Alabama has been studying highway runoff for the last 20 years. He reckons that tyre dust makes up about 2 per cent of highway runoff. He also says that there are heavy metals (such as lead and zinc) in tyre dust, but that these heavy metals are tightly bound to the rubber, and probably are not a major problem. Now we're not really sure of the health hazards of the rubber from the tread of tyres. But certainly, there's so much being dumped into the environment, and we seem to see so few diseases from it, that it's probably OK.

WRITING PRACTICE

40. a) Read the following text carefully in order to discover the main lines of ideas:

Things to Consider when Buying a Car

Past maintenance. Ask if you can see the records of the car. Take the car to a mechanic you trust to find any problems.

History of the car. Search for sources such as the US company called Carfax which can give you information on the car you want to buy, including accidents, flood damage and how the car was used (for example, as a taxi or rental). Call reference numbers or visit web sites. It costs not much to find information about each car. You can ask the car dealer selling the car for a copy of a reference report. The dealer may charge you a fee for this information. Does the car have a warranty? In some states, used cars have to have a sign that says 'AS IS' if they don't have a warranty. Ask about cars used by rental agencies or by the dealer that are for sale. Sometimes these cars are almost new but are much less expensive. Ask about used cars sold by dealers as certified vehicles. Certified vehicles are inspected and they have a warranty.

Find out about the dealer selling the car. Do you know anyone who bought a car there? Did they have a good experience? Ask for a lower price and negotiate. Find out how that model has maintained its value through the years. At the end of the month and at the end of the year, dealers try to sell cars, to reach their sales goals and introduce new models. This is the best time to look for your vehicle. Go for a test drive. Ask for copies of all the documents and contracts (including the warranty). Read the contract very carefully. Verify the interest rate they are charging you. Do not sign any papers or give any money until you are absolutely sure you want to buy the car.

b) Read the list and mark the things that: *you have to have* in a car with a 1, *would be nice to have* with a 2, *you do not need* with an X:

Leather seats ___ Good safety record __ Air conditioner ___ Automatic transmission ___ Standard transmission ___ 4-wheel drive ___ Convertible roof ___ Cassette player ___ CD player ___ AM/FM radio ___ Driver side airbag ___ Passenger side airbag ___ Alarm ___ Extended warranty ___ Power windows ___ Sunroof ___ Good gas mileage ___ Cruise control ___ Tinted windows___ Other___ .

c) Write a brief composition about the advantages and disadvantages of buying the kind of car you want (or already have). Use the following prompts:

1. What are the advantages/disadvantages of buying a new car? (Low maintenance and repair costs, warranty, could possibly find a lower interest rate if financing the car/More expensive, depreciates in value.)

2. What are the advantages/disadvantages of buying a used car? (Less expensive, may be able to pay in cash./Don't know how it was cared for, repairs, could possibly have to pay a higher interest rate if financing the car.)

PART III

ACCESSORIES

UNIT 7

ACTIVE VOCABULARY

1. Read and remember the following words:

actuator — приводной механизм
brake booster — усилитель тормоза
dashboard — приборная панель
deal with — иметь дело с
derivative — производный, вторичный
deviation — отклонение от нормы, девиация
distance error — ошибка в определении расстояния
hood — (*амер*) капот
input — входное устройство
integral factor — неотъемлемый фактор
instead of — вместо
invaluable — неоценимый
lead-foot — имеющий привычку водить автомобиль на большой скорости
output — выходное устройство автомобиля
overshooting — переход за установленный предел, отклонение
pivot — стержень
provide — обеспечивать, снабжать
resume button — кнопка возобновления действия
sensor — датчик
to shut off — выключить электропитание
to tap — стучать
throttle valve — дроссельная заслонка
to turn on — включить
to turn off — выключить

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

Lead-foot syndrome, speeding tickets, to be equipped with, continually adjusting speed, to maintain a safe distance, safety features, manual transmission, a light tap, the same way, a cable connected to an actuator, an invaluable feature, actuators powered by engine vacuum, electronically-controlled valve, the throttle position, under the hood, behind the dashboard, inputs and outputs, with little deviation, time integral of the vehicle error.

3. Give antonyms to the following words:

long	continually	useful	similar
tiring	increasing	to slow down	normal
far	safe	light	manual

4. Give synonyms to the following words:

several	individually	correct	tapping
probably	error	acceleration	adjusting
steep	speed	common	deal with

WORD-BUILDING

5. Translate the following nouns with the prefixes:

ill- illegality, illimitability, illiteracy, illogicality, illegitimacy, illumination, illusion, illustration, illuviation;

im- immaturity, impurity, immunity, immanency, immediacy, immersion, immigration, immobilizer, immobility, immunity;

in- incapability, incautiousness, incapacity, indivisibility, inactivation, inaccuracy, inaction, inadmissibility, inadvertence, inanition, inaptitude;

inter- interaction, interchange, interconnectivity, intermixture, intersection, intercept, intercomparison, intercondenser.

6. Translate the following nouns and adjectives with the suffixes:

-ics acoustics, energetics, genetics, mechanics, physics;

-ing engineering, greeting, meeting, reading, turning, writing, controlling, hitting, holding, calculating;

-ion adoption, invention, transition, confession, division, conclusion, function, transmission.

7. Form words using the prefixes and suffixes above:

possible	direct	build	cultural
dependent	moral	omit	active
visible	continental	discuss	formal
mobile	national	impress	disappoint
logical	draw	confess	

TEXT WORK

8. Read the text below to learn about cruise control systems:

Text 7A. Cruise Control System

by Karim Nice

Cruise control is an invaluable feature on American cars. Without cruise control, long road trips would be more tiring, for the driver at least, and those of us suffering from lead-foot syndrome would probably get a lot more speeding tickets. Cruise control is far more common on American cars than European cars, because the roads in America are generally bigger

and straighter, and destinations are farther apart. With traffic continually increasing, basic cruise control is becoming less useful, but instead of becoming obsolete, cruise control systems are adapting to this new reality — soon, cars will be equipped with adaptive cruise control, which will allow your car to follow the car in front of it while continually adjusting speed to maintain a safe distance.

What It Does? The cruise control system actually has a lot of functions other than controlling the speed of your car. For instance, the cruise control can accelerate or decelerate the car by 1 mph with the tap of a button. Hit the button five times to go 5 mph faster.

There are also several important safety features — the cruise control will disengage as soon as you hit the brake pedal, and it won't engage at speeds less than 25 mph (40 kph). The system has five buttons: On, Off, Set/Accel, Resume and Coast. It also has a sixth control — the brake pedal, and if your car has a manual transmission the clutch pedal is also hooked up to the cruise control.

The **on** and **off** buttons don't actually do much. Hitting the 'on' button does not do anything except telling the car that you might be hitting another button soon. The off button turns the cruise control off even if it is engaged. Some cruise controls don't have these buttons; instead, they turn off when the driver hits the brakes, and turn on when the driver hits the set button.

The **set/accel** button tells the car to maintain the speed you are currently driving. If you hit the set button at 45 mph, the car will maintain your speed at 45 mph. Holding down the set/accel button will make the car accelerate; and on this car, tapping it once will make the car go 1 mph faster.

If you recently disengaged the cruise control by hitting the brake pedal, hitting the **resume** button will command the car to accelerate back to the most recent speed setting.

Holding down the **coast** button will cause the car to decelerate, just as if you took your foot completely off the gas. On this car, tapping the coast button once will cause the car to slow down by 1 mph.

The **brake** pedal and **clutch** pedal each have a switch that disengages the cruise control as soon as the pedal is pressed, so you can shut off the cruise control with a light tap on the brake or clutch.

How It's Hooked Up. The cruise control system controls the speed of your car the same way you do — by adjusting the throttle position. But cruise control actuates the throttle valve by a cable connected to an actuator, instead of pressing a pedal. The throttle valve controls the power and speed of the engine by limiting how much air the engine takes in. Two cables connected to a pivot that moves the throttle valve. One cable comes from the accelerator pedal, and one from the actuator.

When the cruise control is engaged, the actuator moves the cable connected to the pivot, which adjusts the throttle; but it also pulls on the cable that is connected to the gas pedal — this is why your pedal moves up and down when the cruise control is engaged.

Many cars use actuators powered by engine vacuum to open and close the throttle. These systems use a small, electronically-controlled valve to regulate the vacuum in a diaphragm. This works in a similar way to the brake booster, which provides power to your brake system.

Controlling the Cruise Control. The brain of a cruise control system is a small computer that is normally found under the hood or behind the dashboard. It is connected to the throttle control, as well as several sensors. The diagram below shows the inputs and outputs of a typical cruise control system. A good cruise control system accelerates aggressively to the desired speed without overshooting, and then maintains that speed with little deviation no matter how much weight is in the car, or how steep the hill you drive up. Controlling the speed of a car is a classic application of control system theory. The cruise control system controls the speed of the car by adjusting the throttle position, so it needs sensors to tell it the speed and throttle position. It also needs to monitor the controls so it can tell what the desired speed is and when to disengage. The most important input is the speed signal; the cruise control system does a lot with this signal. First, let's start with one of the most basic control systems you could have — a proportional control.

Proportional Control. In a proportional control system, the cruise control adjusts the throttle proportional to the error, the error being the difference between the desired speed and the actual speed. So, if the cruise control is set at 60 mph and the car is going 50 mph, the throttle position will be open quite far. When the car is going 55 mph, the throttle position opening will be only half of what it was before. The result is that the closer the car gets to the desired speed, the slower it accelerates. Also, if you were on a steep enough hill, the car might not accelerate at all.

PID Control. Most cruise control systems use a control scheme called PID control. Don't worry, you don't need to know any calculus to make it through this explanation — just remember that:

— The integral of speed is distance.

— The derivative of speed is acceleration.

A PID control system uses these three factors — proportional, integral and derivative, calculating each individually and adding them to get the throttle position.

We've already discussed the proportional factor. The integral factor is based on the time integral of the vehicle speed error. Translation: the difference between the distance your car actually travelled and the distance it would have travelled if it were going at the desired speed, calculated over a set period of time. This factor helps the car deal with hills, and also helps it settle into the correct speed and stay there. Let's say your car starts to go up a hill and slows down. The proportional control increases the throttle a little, but you may still slow down. After a little while, the integral control will start to increase the throttle, opening it more and more, because the longer the car maintains a speed slower than the desired speed, the larger the distance error gets.

Now let's add in the final factor, the derivative. Remember that the derivative of speed is acceleration. This factor helps the cruise control respond quickly to changes, such as hills. If the car starts to slow down, the cruise control can see this acceleration (slowing down and speeding up are both acceleration) before the speed can actually change much, and respond by increasing the throttle position.

Note on the text

PID control — proportional-integral-derivative control

TEXT AND VOCABULARY EXERCISES

9. Work in pairs. Ask each other the following questions:

1. What is cruise control? **2.** What does it serve for? **3.** Why is it more common on American cars? **4.** What does adaptive cruise control allow you to do? **5.** What are the functions of the cruise control? **6.** What are the important safety features of cruise control? **7.** What kind of actuators do many cars use? **8.** What is the brain of a cruise control system and where is it situated? **9.** How does cruise control system control the speed of a car? **10.** What factors does PID control use? **11.** What is the vehicle speed error? **12.** What does the final factor, the derivative, do?

10. Find the Russian equivalent for the following English words:

1) to shut off	a) закрыть	b) отключить	c) подключить
2) valve	a) рычаг	b) кнопка	c) клапан
3) dashboard	a) прибор	b) капот	c) панель управления
4) to monitor	a) управлять	b) ускорять	c) выключать
5) to adjust	a) удерживать	b) подгонять	c) соединять
6) throttle	a) привод	b) сцепление	c) дроссель
7) to increase	a) увеличивать	b) снижать	c) изменять
8) acceleration	a) замедление	b) ускорение	c) связанность
9) to suffer	a) использовать	b) страдать	c) изнашивать
10) obsolete	a) современный	b) устарелый	c) измененный
11) straight	a) широкий	b) узкий	c) прямой

11. Choose the right word and fill in the gaps:

1. Without cruise control, long road trips would be more ....
a) safe b) tiring c) funny
2. Cruise control is far more common on ... cars than on European cars.
a) Japanese b) German c) American
3. The cruise control system actually has a lot of ... other than controlling the speed of your car.
a) features b) applications c) functions

4. Cars will be equipped with ... cruise control.
   a) adaptive b) basic c) conventional
5. Holding down the set/accel button will make the car...
   a) slow down b) accelerate c) stop
6. The throttle valve ... power and speed of the engine by limiting how much air the engine takes in.
   a) switches b) increases c) controls
7. The brain of a cruise control system is a ... that is normally found under the hood or behind the dashboard.
   a) small computer b) electrical device c) engine
8. The proportional control ... the throttle a little, but you may still slow down.
   a) decreases b) opens c) increases

12. Fill in the gaps with the words from the box:

up without under at least with behind for instead of

Without cruise control, long road trips would be more tiring, 1)__ the driver 2)_____, and those of us suffering from lead-foot syndrome would probably get a lot more speeding tickets. With traffic continually increasing, basic cruise control is becoming less useful, but 3)_____ becoming obsolete, cruise control systems are adapting to this new reality. The brain of a cruise control system is a small computer that is normally found 4)____ the hood or 5)____ the dashboard. A good cruise control system accelerates aggressively to the desired speed 6)____ overshooting, and then maintains that speed 7)____ little deviation no matter how much weight is in the car, or how steep the hill you drive 8)____.

Check your answers on p. 321

13. Read and translate the text, discuss the advantages and disadvantages of Cruise control using the following expressions:

What do you think of	I think
It goes without saying	
I'd like to say a few words in favour of	On the contrary
I think I can add some more information	As far as I know
You didn't mention the fact that	To sum it up
It is necessary to say that	

Advantages and Disadvantages

Cruise control has many advantages but also some serious vices. Some of those advantages include:

— Its usefulness for long drives across sparsely populated roads. This usually results in better fuel efficiency.

— Some drivers use it to avoid unconsciously violating speed limits. A driver who otherwise tends to unconsciously increase speed over the course of a highway journey may avoid a speeding ticket. Such drivers should note, however, that a cruise control may go over its setting on a downhill which is steep enough to accelerate with an idling engine.

However, cruise control can also lead to accidents due to several factors, such as:

— The lack of need to maintain constant pedal pressure, which can lead to accidents caused by highway hypnosis or incapacitated drivers; future systems may include a penalty switch to avoid this.

— When used during inclement weather or while driving on wet or snow- and/or ice-covered roads, the vehicle could go into a skid. Stepping on the brake — such as to disengage the cruise control — often results in the driver losing control of the vehicle.

Driving over 'rolling' terrain, with gentle up and down portions, can usually be done more economically (using less fuel) by a skilled driver viewing the approaching terrain, by maintaining a relatively constant throttle position and allowing the vehicle to accelerate on the downgrades and decelerate on upgrades, while reducing power when cresting a rise and adding a bit before an upgrade is reached.

Cruise control will tend to overthrottle on the upgrades and retard on the downgrades, wasting the energy storage capabilities available from the inertia of the vehicle. The inefficiencies from cruise control can be even greater relative to skilled driving in hybrid vehicles such as the Toyota Prius.

Many countries establish that it is illegal to drive within city limits with the cruise control feature activated.

SUPPLEMENTARY READING

14. Read the text 34 to get more information about Adaptive cruise control.

State the difference between Adaptive cruise control and Conventional cruise control.

How does Adaptive cruise control work?

15. Read the text 35 to get more information about Global positioning system. Answer the following questions.

1. What does the GPS serve for?
2. How does it work?

Get ready to speak about:

a) Calculating positions
b) Accuracy and error sources
c) Atmospheric effects
d) Multipath effects
e) Ephemeris and clock errors

TEXT WORK

16. Read the text below to learn about climate control.

7B. Climate Control

The idea behind Climate Control is to maintain a steady preset temperature which is controlled by the occupants of the car, it's a bit like setting the thermostat on your home central heating system to maintain a set temperature in your house but this one is more sophisticated.

The CC system has a central processor located immediately behind the front display panel connected to the display by a ribbon that can be detached if the dash needs to be removed. This processor receives inputs from:

— a temperature sensor mounted on top of the evaporator housing measuring external ambient temperatures;

— a temperature sensor located in the middle of the CC control panel measuring internal ambient levels;

— two temperature sensors located in the right and left front air ducts;

— a U/V photoelectric sensor located on top of the dash on the far right;

— a speed sensor measuring the car's velocity.

These sensors are checked and monitored four times every second.

The unit also controls the air distribution motors and the air temperature blend doors as well as processing signals and controlling the other components of the air conditioning system such as the compressor and HBC. The HBC is mounted on the blower plenum and is a solid state variable resistance.

The fins are to cool down the electronics as it's resistance increases to slow down the blower motor. Early versions of the HBC tend to overheat and cause problems so later ones are fitted with a larger (thicker) heatsink.

The whole system is designed to achieve the desired internal preset temperature as quickly as possible and then to maintain that temperature irrespective of the external ambient conditions.

The temperature controls of the cc unit can be set between 17 and 29 centigrade with additional settings of 'Lo' achieving maximum cooling and 'Hi' for maximum heating. As a matter of interest the Lo setting has a value of 15c and the Hi setting a value of 32c.

Passenger temperature set at low. There has in the past been confusion over the operation of the cc system so we will run through a few of the basics.

Firstly don't confuse the temperature of the air coming out of the vents with the temperature that you have set in the temperature windows on the control panel, they will rarely be the same nor should they be. A good example of this would be setting in a nominal setting of 21c/70f, on a cold day with an external ambient temperature of say 4c, the temperature coming out of the vents at least to start with can be in the region of 38c. On a scorcher in summer with the outside temperature of say 28c and with the temp setting on the cc unit still set at 21c the vent temps may only be 5 or

6c. You can now see the logic behind the unit. Basically the set temperature is the temperature inside the car that the system will attempt to achieve and to do this it will pump in cold or hot air as required.

The system also has some clever features to achieve the desired temperature as quickly as possible, when the 'Auto' setting is selected the system really comes into its own and should be left in this position at all times if you are going to get the best out of it. This not only controls the temperature of the air coming out of the vents but also the speed of the fans and under certain conditions the recirculated air function and the air distribution. For example if high cooling power is required when the ac is first switched on then the system will automatically switch to recirculated air to achieve maximum cooling even though the LED in the recirc switch will not illuminate. At the other extreme when the outside air temperature is very low the system will automatically go to the defrost setting for up to five minutes and will override the manual setting of the air distribution flaps pushing the air towards the front windscreen and it will set the air speed fans to low speed to avoid blowing cold air into the interior.

Note: When the system is set to AUTO and the Air Distribution control is set at Defrost the cc system will put the fan on as soon as the engine starts and run the air conditioning pump in order to demist the front screen — this can be disconcerting. If the Air Distribution control is set on any other position then the fan will not start to operate until the coolant temperature exceeds the interior temperature.

As has been said earlier the system also receives speed pulses from the speed sensor to tell the cc module what velocity the car is travelling at. This is used to control the speed of the fans to the air vents, for example if you are sitting in traffic in hot weather then it will instruct the fans to speed up, however if you are on the open highway doing 70 mph then the air being forced naturally into the cabin makes high fan speed unnecessary and it will lower the fan speed accordingly.

Note on the text

HBC — Heater Blower Controller

TEXT AND VOCABULARY EXERCISES

17. Find in the text the English equivalents to the following words:

Поддерживать заранее установленную постоянную температуру, домашняя система центрального отопления, мудреный, получать сигналы, корпус испарителя, воздуховод, смесительный проем, воздухозаборник, охлаждать, иметь склонность к перегреву, оснащенный, достигать желаемой заранее установленной внутренней температуры, независимая от внешних окружающих условий температура, выходящий из вентиляционных отверстий воздух, нагнетать холодный или горячий воздух, достичь наилучшего результата, скорость вентилятора, не принимая во

внимание действие настроенных вручную воздухораспределительных заслонок, не допускать подачи холодного воздуха в салон.

18. Translate into Russian the following words:

a ribbon	air ducts	resistance	an attempt	to demist
detached	a dash	a heatsink	a feature	velocity
ambient	variable	a scorcher	the defrost	
housing	a fin	basically	flap	

19. Compose your own sentences with each English equivalent of the words given in exercise 18. Compare your variants with the sentences of your partner.

20. Work in pairs and decide whether these statements according to text 7B are true or false, correct the false ones:

1. The idea behind Climate Control is to maintain a steady preset temperature. **2.** The cc system has a central processor located on the front display panel connected to the display by a ribbon that can't be detached. **3.** These sensors are checked and monitored four times every hour. **4.** The unit also controls the air distribution motors and the air temperature blend doors but neither processes signals nor controls the other components of the air conditioning system. **5.** The whole system is designed to change internal temperature as quickly as possible. **6.** The temperature controls of the cc unit can be set between 17 and 29 centigrade with additional settings of 'Lo' achieving maximum cooling and 'Hi' for maximum heating. **7.** The temperature of the air coming out of the vents and the temperature that you have set in the temperature windows on the control panel are always the same. **8.** Basically the set temperature is the temperature inside the car that the system will attempt to achieve.

21. Explain in English the meaning of these words and expressions:

the desired internal temperature	tend to overheat
the occupants of the car	settings of 'Lo' and 'Hi'
to maintain	clever features
a scorcher	automatically
sophisticated	

22. Translate the article from Russian into English.

Вентиляция

Вентиляция и отопление салона регулируются в зависимости от температуры наружного воздуха за счет смешивания холодного и нагретого воздуха и поддерживаются практически на постоянном уровне при любых скоростях автомобиля. Вентилятор обдува позволяет увеличить объем поступающего воздуха, благодаря чему обеспечивается дополнительный комфорт при движении и ускоренное устранение обледенения стекол и прогрев салона.

Воздухозаборник отопителя находится перед лобовым окном и частично прикрыт капотом. Воздухозаборные отверстия должны быть свободны для поступления воздуха, необходимо своевременно удалять листву и снег.

Воздушный фильтр, установленный в коробке воздухозаборника отопителя, очищает поступающий в салон воздух от пыли, копоти, пыльцы и т. д.

Наружный воздух поступает в салон автомобиля: через верхние сопла и сопла обдува стекол передних дверей; через боковые и центральные сопла.

Регуляторами интенсивности подачи воздуха через боковые и центральные сопла регулируется подача воздуха путем изменения положения заслонок вплоть до полного их закрытия. В данном положении при открытой заслонке регулятором дополнительной подачи воздуха через верхние сопла обеспечивается дополнительная подача воздуха, через нижние сопла — в зону ног водителя и пассажиров.

Воздух удаляется из салона в багажное отделение через вентиляционные прорези, расположенные на полке багажника возле заднего стекла. Из багажного отделения воздух удаляется через вытяжные дефлекторы, размещенные на задней панели багажного отделения.

SUPPLEMENTARY READING

23. Read the text 37 to get more information about UV Sensor. Speak about UV Sensor and the way it works.

24. Read the text 38 to get more information about CC servicing. Say what you have to do to make your climate control work better.

GRAMMAR

25. Проанализируйте формы герундия, приведенные в таблице:

Gerund		
	Active	**Passive**
Indefinite	asking	being asked
Perfect	having asked	having been asked

26. Прочтитайте предложения, найдите герундий и проанализируйте случаи его употребления:

1. Tom likes reading such scientific books. **2.** He is fond of walking quickly. **3.** She has no hope of being invited there. **4.** I remember having seen this film. **5.** We knew nothing of her having been sent to Moscow. **6.** Measuring distances to the planets and stars has a lot of difficulties. **7.** She remembers having been told about this scientific article.

27. Измените следующие предложения, употребив герундий:

Model I: He will switch off the lights **before he leaves**. — He will switch off the lights **before leaving**.

1. We shall discuss this plan before we begin our work. **2.** Before I translate this article I shall read it thoroughly. **3.** Before he leaves he will clean his working place. **4.** Before they arrive they will phone us.

Model II: After school he began **to attend** high courses. — After school he began **attending** high courses.

1. As he was tired he stopped to read the report and left home. **2.** They started to make experiments in second year. **3.** They finished to look through the papers as soon as they had found the article concerned. **4.** As I am very busy I can't continue to attend these lectures.

Model III: **When he came** into the classroom he came up to me. (on) — **On coming** into the classroom he came up to me.

1. You can get better results if you repeat the material. (by) **2.** He will be able to translate the article after he repeats all the words. (after) **3.** When he leaves the office he usually locks the door. (on) **4.** Excuse me that I came so late. (for)

28. Запомните глаголы, после которых употребляется герундий, и составьте с ними свои предложения:

like	I *like walking* very much.
love	I *love* chatting with my friends.
enjoy	I don't *enjoy* writing letters.
hate	I *hate* waiting for somebody too long.
finish	I *have finished* reading this book.
stop	*Stop* arguing!
go	I *go* skiing next week.
mind	I *don't mind* inviting them to the party.
suggest	She *suggested* going to the cinema.
fancy	I *don't fancy* going out this evening.
imagine	I can't *imagine* going there without you.
admit	He *admitted* stealing money.
deny	She *denied* mentioning it.
avoid	I *avoid* travelling during rush-hour.
consider	Have you ever *considered* living abroad?
involve	Does this job *involve* speaking foreign language?
practice	He *practices* playing the piano every day.
risk	She *risks* taking part in this competition.

29. Запомните предлоги и выражения, после которых употребляется герундий, и составьте с ними свои предложения:

about	I'm thinking *about* taking my car to the garage.
in	I'm interested *in* improving my driving skills.
of	I take care *of* washing the car.
at	I'm not very good *at* driving.
look forward to	I'm looking *forward to* buying a new car.
with	I'm fed up *with* his being late.
for	I'm *for* leaving this place.
in spite of	*In spite of* being late she didn't hurry.
instead of	He walked there *instead of* going by car.

30. Прочитайте и переведите текст, озаглавьте его. Найдите в тексте герундий и объясните случаи его употребления:

Speed control with a centrifugal governor was used in automobiles as early as *the 1910s*, notably by *Peerless*. Peerless advertised that their system would 'maintain speed whether up hill or down'. The technology was invented by *James Watt* and *Matthew Boulton* in 1788 *for use in locomotives*. It uses centrifugal force to adjust throttle position as the speed of the engine changes with different loads (e.g. when going up a hill).

Modern cruise control (also known as a speedostat) was invented *in 1945* by the *blind inventor* and mechanical engineer Ralph Teetor. His idea was born out *of the frustration of riding in a car driven by his lawyer*, who kept speeding up and slowing down as he talked. The first car with Teetor's system was the Chrysler Corporation Imperial in 1958. This system calculated ground speed based on driveshaft rotations and used a solenoid to vary throttle position as needed.

In modern designs, the cruise control may or may not need *to be turned on before use* — in some designs it is always 'on' but not always enabled, others have a separate 'on/off' switch, while still others just have an 'on' switch that must be pressed after the vehicle has been started. Most designs have buttons for '*set*', '*resume*', '*accelerate*', and '*coast*' functions. Some also have a 'cancel' button. Alternatively, *tapping the brake* will disable the system, a required feature to prevent the vehicle from accelerating against braking as it attempts to maintain speed. The system is operated with controls easily within the driver's reach, usually with two or more buttons *on the steering wheel spokes* or *on the edge of the hub* like those on Honda vehicles, on the turn signal stalk like in some General Motors vehicles or *on a dedicated stalk* like those found in Toyota and Mercedes-Benz vehicles. Early designs used a dial to set speed choice.

The driver must bring the car up to speed *manually* and use a button to set the cruise control to the current speed. The cruise control takes its speed signal *from a rotating driveshaft, speedometer cable, speed sensor* (found on the wheels) or from the engine's RPM. Most systems do not allow the use of the cruise control below a certain speed (normally 35 mph/55 km/h) *to discourage use in city driving*. The car will maintain that speed by pulling the throttle cable with a solenoid or a vacuum driven servomechanism. On the latest vehicles fitted with electronic throttle control, cruise control can be easily integrated into the vehicle's engine management system.

Most systems can be turned off both *explicitly* and *automatically*, when the driver hits the brake or clutch. Cruise control often includes *a memory feature* to resume the set speed after braking and a coast feature to reset the speed lower without braking. When the cruise control is in effect, the throttle can still be used *to accelerate the car*, but once it is released the car will then slow down until it reaches the previously set speed.

Cruise controls currently being developed include *the ability to automatically reduce speed* when the speed limit decreases. This is an advantage for those driving in unfamiliar areas.

31. Work in pairs. Make up questions to which the italicized words are the answers. Using your questions role-play the dialogue.

TEXT WORK

32. Read the text and underline its main idea. Give a brief summary of the text:

Text 7C. 'Caesar' with a Mobile Phone?

When looking carefully at the cars moving along the road, you will notice that every fourth driver is using a mobile phone. One is probably giving valuable instructions to his subordinates, the other is talking to his wife explaining his being late, another one is reprimanding his son for some fault...

Everybody seems to know that the famous Roman emperor could do many things simultaneously. But what about us? ...

Hear or see — it's up to you to decide... We receive most part of the information through the visual and sound perceptions. For instance: noticing slight fume a turner reduces the stepover of a cutter, hearing particular sound he realizes that the cutter must be changed. And what does driver do?

We're fed up with comparing a driver and a pilot. That might be very similar, but nobody ever heard of buying flying license. Meanwhile, the number of people dead and injured in traffic accidents is growing every

year and has already overcome the losses in men in military conflicts and technogeneous disasters taken together.

The authorities of car-building enterprises have been working on improving safety measures for a long time, but what do we have to do with the accessories, like mobile phones?

The fact that they worsen your driving is obvious. Realizing this problem perfectly well, mobile-phone producers have developed a "hands-free" system. However that hasn't decreased the number of traffic accidents.

Table 1

<table>
<tr><th>Research center</th><th>Physical and psychological activity of a driver using a mobile phone</th><th colspan="2">Physical and psychological activity of a driver using 'hands-free' system</th></tr>
<tr><td>Toronto University, Canada</td><td>Accident risk increases — 5 times</td><td colspan="2">Accident risk increases — 5 times</td></tr>
<tr><td rowspan="2">University of Florida, USA</td><td rowspan="2">—</td><td>26—36 years old</td><td>55—65 years old</td></tr>
<tr><td>Response time increases — 1.21 times</td><td>Response time increases — 1.6 times</td></tr>
<tr><td>Transport Research Institute, Swiss</td><td>Accident risk increases — 4 times</td><td colspan="2">Accident risk increases — 4 times</td></tr>
<tr><td>Royal British Scientific Society, GB</td><td>Accident risk increases</td><td colspan="2">Accident risk increases against mobile-phone users</td></tr>
</table>

These results have been obtained after numerous experiments were carried out in laboratories. However, there are some 'vivid' data received by scientists of West Australian University. They have questioned 456 drivers injured in traffic accidents! The result is the same: Accident risk increases 4 times!

It is clear that our brain can't process the information coming through the sound and visual perceptions simultaneously that's why the former worsens the last.

Shall we ban it? The main question is: 'Can we use a mobile phone while driving without risking our and other people's life?'

You may admit that an excellent experienced driver may use a mobile phone in the situations when the beginner can't even think about it. But

rules must be common for everybody, as traffic accidents can happen to any driver. The only thing to be done is to ban!

Table 2

Country	Punishment/fine
United Kingdom	Fine £1000
France	Fine €100
Belgium	Driving ban for 6 months
Holland	Fine €100 and driving ban for 6 months
USA	Fine $100*
Russia	Fine 300 rubles (less than €10)

* Applying in New York, this law brings 6 million dollars p.a. to the city treasury.

What do we have to do in Russia? We have already had an experience with the ban on drinking alcohol and smoking and it's better not to recall. Anyway, taking into account present critical situation we desperately need big fines for using mobile phones while driving!

Meanwhile every driver must realize that using mobile phones while driving is really dangerous and not only for you.

TEXT AND VOCABULARY EXERCISES

33. Explain in English the meaning of these words and expressions:

to be fed up with
'hands-free' system
response time
the former worsens the last
p.a.
visual and sound perceptions

34. Work with a partner. Take turns to ask and answer questions to text 7C. Use the words and word combinations below:

a mobile phone
valuable instructions
famous Roman emperor
visual and sound perceptions
flying license
traffic accidents
to overcome
military conflicts
authorities of car-building enterprises
safety measures
accessories
'hands-free' system
numerous experiments
the beginner
critical situation
fines

WRITING PRACTICE

Writing the CV

Resume

Name: JASON DAWSON
Date of birth: 20 October 1971
Address: 235 White Road
San-Francisco, California 029992
+ 01 (245) 987-6543
OBJECTIVE:
To obtain an administrative assistant position which would utilize my clerical and administrative skills and offer opportunity for growth.
EDUCATION:
Technical College of San-Francisco
September 1988 — May 1991
EMPLOYMENT: 6/94 to present
The Institute of Medical Care, San-Francisco
Unit Secretary, Child and Adolescent Unit
Responsible for maintaining patient charts, entering patient data on database, transcribing medication orders, tracking and paging medical personnel. Relaying patient records to other treatment facilities and fielding incoming phone calls.
10/91 to 5/94
University of National Law, San-Francisco
Administrator, Registrar's Office
Answered telephones, filed documents, produced letters for certification and deferment, proctored exams. Registered students for courses, proofread grade sheets, registration materials, exams and course schedules, computed grade point average. Interacted with students, faculty and staff.
SPECIAL SKILLS:
Languages: English — mother tongue, German — beginning
Computer literate: word-processing (Word Perfect & Word for Windows), Spreadsheet (Lotus 1-2-3)
Excellent interpersonal and communications skills, well-organized, punctual, responsible.
REFERENCES:
Available upon request

35. Compose your own CV. The phrases below will help you:

Sir ... or Madam...

1. I'd like to apply for a position as a ... **2.** I've been interested in working in ... **3.** I can offer many skills, for example ... **4.** I'm available for interview from ... **5.** communicative **6.** hand-working **7.** strong academical qualifications **8.** enthusiastic **9.** team-player **10.** leading qualities **11.** com-

petence **12.** flexibility **13.** receptive **14.** a strong command of (language) **15.** acquired **16.** achieved **17.** established **18.** assisted **19.** coordinated (a project) **20.** developed (a new way of working) **21.** delivered (the project on time) **22.** initiated (a new system)

UNIT 8

ACTIVE VOCABULARY

1. Read and remember the following words:

aftermarket — рынок запасных частей
to alert — предостерегать, оповещать
to be aware — знать, быть осведомленным
to be concealed — быть скрытым, потайным
to be numbed — быть неподвижным
to be triggered — быть приведенным в действие
to breach — нарушать, повреждать
to defeat — не позволять
to deter — удерживать, не допускать
to discourage — мешать, препятствовать
to emit — излучать
to flash — мигать
flick — легкий удар, щелчок
hazard light — световая сигнализация
hijacking — нападение, похищение
the ignition key — ключ зажигания
in the vicinity of — поблизости, около
mandatory — обязательный
paging controller — пейджинговое устройство управления
to pinpoint — точно указывать
a recurring fee — периодическая оплата
a set time limit — определенный промежуток времени
stationary — неподвижный
subsequent — последующий, являющийся результатом
theft — кража
to tilt — наклонять, опрокидывать
towing — буксирование
to trace — идти по следу
traffic light — светофор
transponder — ретранслятор
the vehicle's horn — автомобильный сигнал
vehicle tracking system — система слежения за автомобилем
yaw angle — угол наклона в поперечном направлении

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

An electronic device, an attempt to discourage theft, may be caused by, pre-recorded verbal warning, to be triggered by vibrations, the ignition circuit

being activated, rapid changes in battery voltage, to prevent false alarms, simple noise-making alarms, an aftermarket vehicle tracking system, to trace stolen vehicles, included in the purchase price, to disable the starter of the vehicle, to deter someone from taking the vehicle without consent, to alert the user with beeps or silent vibration, an Anti-Hijack System, widely known, the ignition key, pedestrian crossing, a central locking system, in the time window, the vehicles hazard lights, every subsequent attempt, technical troubleshooting.

3. Give antonyms to the following words:

long	continually	useful	similar
tiring	increasing	to slow down	normal
far	safe	light	manual
emitting	interior	accidentally	rapid

4. Give synonyms to the following words:

several	individually	correct	tapping
probably	error	acceleration	adjusting
steep	speed	common	deal with
receive	deter	continue	running

WORD-BUILDING

5. Translate the following nouns and adjectives with the prefixes:

ir- irrational, irregular, irresistible, irradiance, irrebuttable, irreconcilable, irrecusable, irredeemable;

macro- macroclimate, macro-cosmic, macro-graphy, macro-spore, macro-block, macro-circuit, macrocode;

meta- metabolism, meta-galaxy, meta-plasm, meta-centric, meta-cyclic, meta-inference;

micro- microcosmic, microorganic, microphone, microdetector.

6. Translate the following nouns and adjectives with the suffixes:

-ist journalist, physicist, realist, formalist, scientist, pianist, typist;

-ism irrationalism, metachromatism, humanism, realism, cataclysm, Darwinism;

-ish boyish, fortyish, purplish, reddish, stylish.

7. Form words using the prefixes and suffixes above:

relevant	baby	hero
chip	economics	self
capital	novel	biology
responsible	fool	social
piano	electronics	sheep

TEXT WORK

8. Read the text below to learn about car alarm:

Text 8A. Car Alarm

A **car Alarm** is an electronic device installed in a vehicle in an attempt to discourage theft. Car alarms work by emitting high-volume sound (usually a siren, klaxon, pre-recorded verbal warning, the vehicle's own horn, or a combination thereof) when triggered or when circuit is breached.

Car alarms can be designed to be triggered by vibrations, tilting of the car (to prevent unauthorized towing), touching the car, the opening or closing of special switches (e.g. door contacts), sensing small but rapid changes in battery voltage (which might indicate an interior light going on, or the ignition circuit being activated), or using volumetric sensors such as ultrasound, infrared or microwave.

Many times a car alarm can be triggered accidentally. This may be caused by the passing of large trucks, the vibration of thunder or people coming into contact with the vehicle, triggering the alarm sensors. Some sensors may need adjustment in order to prevent false alarms.

Because of the large number of false alarms with car alarms, many vehicle manufacturers no longer factory fit simple noise-making alarms, instead offering silent — but effective — immobilizers. Alternatively, an aftermarket vehicle tracking system can enable the police to trace stolen vehicles. Most police tracking systems require the user to pay a recurring fee, whereas factory immobilizers are included in the purchase price of the vehicle. GPS locating systems enable the owner of the vehicle to lock and unlock, track, and disable the starter of the vehicle online. Other additional options allow the user to receive messages if the alarm is set off or if the vehicle breaches a specified speed or boundary. GPS systems are usually not paid monthly but locates are purchased. Both classes of devices deter someone from taking the vehicle without consent but do not cover theft from, or vandalism of the vehicle.

Yet another class of security covers aftermarket car alarms that include 2-way paging controllers. Two-way pagers have remote control functions built-in, allowing the user to arm and disarm the alarm while informing the user of threats made to the vehicle. Some 2-way systems have an LCD (*Liquid crystal display*) icon display that can pinpoint the actual part of the vehicle being threatened. Many two-way pagers can also alert the user with beeps or silent vibration.

An **Anti-Hijack System** is an electronic system fitted to motor vehicles to deter criminals from hijacking them. Although these types of systems are becoming more common on newer cars, they have not caused a decrease in insurance prices as they are not as widely known about as other more common anti-theft systems such as alarms or steering locks. It can also be a part of an alarm or immobiliser system.

There are three basic principles on which the systems work on.

A **Lockout** system is armed when the driver turns the ignition key to the *on* position and carries out a specified action, usually flicking a hidden switch or depressing the brake pedal twice. It is activated when the vehicle drops below a certain speed or becomes stationary, and will cause all of the vehicles doors to automatically lock, to prevent against thieves stealing the vehicle when it is stopped, for example at a traffic light or pedestrian crossing.

A **Transponder** system is a system which is always armed until a device, usually a small RFID transponder, enters the vehicles transmitter radius. Since the device is carried by the driver, usually in their wallet or pocket, if the driver leaves the immediate vicinity of the vehicle, so will the transponder, causing the system to assume the vehicle has been hijacked and disable it. As the transponder itself is concealed, the thief would not be aware that such a system is active on a vehicle until they had ejected the driver and moved the vehicle out of range of the driver (usually only a couple of metres). This is probably the most common anti-hijack system and a central locking system.

A **Microswitch** system is always armed and is usually activated if one of the vehicle doors is opened and closed again whilst the vehicle's engine is running. Once the system has been activated, the driver will have a set time limit to disarm it by entering a code before the vehicle takes measures. If the system is not disarmed in the time window, it will warn the driver by sounding the vehicle's horn once every 10 seconds for 30 seconds, at which point the system will start sounding the horn at much shorter intervals and will usually activate the vehicle's hazard lights. At this point the immobiliser circuit will also start rapidly pulsing for 40 seconds, completely disabling the engine and eventually bringing the vehicle to a stop. If the thief switches the ignition to the *off* position and back to the *on* position again, the horn will restart and operate constantly and the hazard lights will flash for 60 seconds.

The immobiliser circuit will close for 15 seconds and will rapidly pulse for 15 seconds before re-opening the circuit, allowing the vehicle to be driven to a safe location before once again being immobilised. The hazard lights will continue to flash, and on every subsequent attempt to start the vehicle will cause the horn to operate for 30 seconds, but the immobiliser circuit will not open, so the vehicle will not start and the hazard lights will keep flashing until the vehicles battery is drained or the system is disarmed.

An **immobiliser** or **immobilizer** is an electronic device fitted to an automobile which prevents the engine from running unless the correct key (or other token) is present. This prevents the car from being "hot wired" after entry has been achieved.

Immobilisers have been mandatory in all new cars sold in the United Kingdom since 1997 and in Australia since 2001. Early models used a static code in the ignition key (or key fob) which was recognised by an RFID loop around the lock barrel and checked against the vehicle's ECU for a match. If the code is unrecognised, the ECU will not allow fuel to flow and ignition to take place. Later models use rolling codes or advanced cryptography to defeat copying of the code from the key or ECU.

The microcircuit inside the key is activated by a small electromagnetic field which induces current to flow inside the key body, which in turn broadcasts a unique binary code which is read by the automobile's ECU. When the ECU determines that the coded key is both current and valid, the ECU activates the fuel-injection sequence.

In some vehicles, attempts to use an unauthorized or 'non-sequenced' key cause the vehicle to activate a timed no-start condition and in some highly advanced systems, even use satellite or mobile phone communication to alert a security firm that an unauthorized attempt was made to code a key.

Coincidentally, this information is often recorded in modern automobile ECUs, which may record many other variables including speed, temperature, driver weight, geographic location, throttle position and yaw angle. This information can be used during insurance investigations, warranty claims or technical troubleshooting.

Notes on the text

RFID — radio-frequency identification
ECU — engine control unit

TEXT AND VOCABULARY EXERCISES

9. Work in pairs. Ask each other the following questions:

1. What is a car alarm? **2.** How does it work? **3.** What can car alarm be triggered by? **4.** What do vehicle manufactures use to avoid false alarms? **5.** What is the advantage of GPS locating system? **6.** Does it have any other additional options? **7.** What other anti-theft systems do you know? **8.** What are three basic principles which these systems work on? Speak about: a) a lockout system; b) a transponder system; c) a microswitch system. **9.** What is immobilizer? **10.** How does it work? **11.** What will happen if you use an unauthorized or "non-sequenced" key?

10. Choose the right word or word combination and fill the gap:

1. A car alarm is an electronic device installed in a vehicle in an attempt ...
   a) to start the car quickly b) to lock the car automatically
   c) to discourage theft
2. Car alarms work by ...
   a) locking the car-doors b) emitting high-volume sound
   c) discharging the battery
3. Car alarms can be designed to be triggered by ...
   a) vibrations b) opening the door
   c) starting the car
4. Alternatively, an aftermarket vehicle tracking system can enable the police.
   a) to find a thief b) to prevent a theft
   c) to trace stolen vehicles

5. ...enable the owner of the vehicle to lock and unlock, track, and disable the starter of the vehicle online.
a) Immobilizer b) GPS locating systems
c) a Transponder system

6. Many two-way pagers can also alert the user with ...
a) beeps or silent vibration b) noise-making sound
c) automatically locking the car

7. A Lockout system is armed when the driver ...
a) turns the ignition key to the on position
b) carries out a specified action
c) turns the ignition key to the on position and carries out a specified action

8. Once the system has been activated, the driver will have a set time limit to disarm it by ... before the vehicle takes measures.
a) turning the ignition key b) opening the door
c) entering a code

9. If the thief switches the ignition to the *off* position and back to the *on* position again, the horn will ... and the hazard lights will flash for 60 seconds.
a) restart and operate constantly b) stop sounding
c) be disconnected

10. The microcircuit inside the key is activated by ...
a) vibration b) a small electromagnetic field
c) entering a special code

11. When the ECU determines that the coded key is both current and valid, the ECU ...
a) switches the ignition b) activates the fuel-injection sequence
c) disconnects the alarm system

11. Fill in the gaps with the words from the box:

although		from	if	in	order to
because	of	since	in	by	without

Car alarms can be designed to be triggered 1) ___ vibrations, tilting of the car (to prevent unauthorized towing), touching the car, the opening or closing of special switches. Some sensors may need adjustment 2) ____ prevent false alarms. 3) _____ the large number of false alarms with car alarms, many vehicle manufacturers no longer factory fit simple noise-making alarms. Both classes of devices deter someone 4) _____ taking the vehicle 5) ___ consent but do not cover theft from, or vandalism of the vehicle. 6) _____ these types of systems are becoming more common on newer cars, they have not caused a decrease 7) _____ insurance prices.

8) _____ the device is carried by the driver, usually in their wallet or pocket, 9) _____ the driver leaves the immediate vicinity of the vehicle, so will the transponder, causing the system to assume the vehicle has been hijacked and disable it.

Check your answers on p. 321

12. Translate the following article from Russian into English using following expressions:

to know much	to dial the number	alarm systems	to hijack
moreover	at breakneck speed	locus delicti	in Bluetooth mode
communication channel/path	trinket	commercially available	

Автомобилисты, которые хорошо разбираются в электронике, уже давно используют мобильную связь в целях охраны. Открыл дверь — мобильник звонит на номер хозяина. Рынок отреагировал быстро: в продаже появились фирменные GSM-охранные системы.

При покушении на автомобиль система звонит или передает SMS на заданный номер. Мало того, при этом она еще пользуется миниатюрными фотокамерами!

Представьте: стоит машина в гараже, где нормально работает сотовый телефон. В это время злоумышленник открывает дверь. Секунд через десять ваш телефон звонит, и система сообщает: «Была открыта дверь». В тот же момент по GPRS в Интернет передается информация с камер, отслеживающих местоположение автомобиля. Поэтому, прежде чем бросаться куда-либо сломя голову, можно посмотреть при помощи интернет-сервиса car-online фото с «места преступления». А затем, набрав SMS с того же мобильника, легко дать команду, например, заблокировать двигатель.

Еще одна опция — устройство работает в режиме Bluetooth. Это значит, что сигнализацией можно управлять с сотового телефона именно по этому каналу связи. Телефон будет функционировать как брелок — открывать и закрывать двери, включать сирену, блокировать двигатель, показывать фото с камер. Если есть выход с мобильника в Интернет (через GPRS), то можно за секунды посмотреть фото как внутри автомобиля, так и вокруг него.

TEXT WORK

13. Read the text below to learn about power steering:

Text 8B. Power Steering

Power steering is a system for reducing the steering effort on cars by using an external power source to assist in turning the wheels. Power steering was invented in the 1920s by Francis W. Davis and George Jessup in Waltham, Massachusetts. Chrysler Corporation introduced the first commercially available power steering system on the 1951 Chrysler Imperial under the name Hydraguide. Most new vehicles now have power steering, although in the 1970s and 1980s it was the exception rather than the rule, at least on European cars. The trend to front wheel drive, greater vehicle mass

and wider tires means that modern vehicles would be extremely difficult to manœuvre at low speeds (e.g. when parking) without assistance.

Most power steering systems work by using a belt driven pump to provide **hydraulic pressure** to the system. This hydraulic pressure is generated by a rotary-vane pump which is driven by the vehicle's engine. As the speed of the engine increases, the pressure in the hydraulic fluid also increases, hence a relief valve is incorporated into the system to allow excess pressure to be bled away. While the power steering is not being used, i.e. driving in a straight line, twin hydraulic lines provide equal pressure to both sides of the steering wheel gear. When torque is applied to the steering wheel, the hydraulic lines provide unequal pressures and hence assist in turning the wheels in the intended direction. Some more modern implementations of hydraulic systems also include an electronic pressure valve which can reduce the hydraulic pressure of the power steering lines as the vehicle's speed increases (Variable assist power steering).

In the **DIRAVI** system invented by Citroën, the force turning the wheels comes from the car's high pressure hydraulic system and is always the same no matter what the road speed is. As the steering wheel is turned, the wheels are turned simultaneously to a corresponding angle by a hydraulic ram. In order to give some artificial steering feel, there is a separate hydraulically operated system that tries to turn the steering wheel back to center position. As long as there is pressure in the car's hydraulic system, there is no mechanical connection between the steering wheel and the road wheels. While DIRAVI is not the mechanical template for all modern power steering arrangements, it did innovate the now common benefit of speed adjustable steering. The force of the centering device increases as the car's road speed increases. This allows the steering to offer very high levels of assist while parking, but lower assist at highway speeds, when 'light' steering would be dangerous.

Electric Power Steering, such as those found on the Chevrolet Cobalt, Acura NSX, Saturn VUE V6, 2nd gen Toyota MR2 and on most FIAT and Lancia cars, uses electric components. Sensors detect the motion and torque of the steering column and a computer module applies assistive power via an electric motor. This allows varying amounts of assistance to be applied depending on driving conditions. Most notably on FIAT group cars the amount of assistance can be regulated using a button named 'CITY' that switches between two different assist curves (boost curve), while on Volkswagen/Audi group cars, the amount of assistance is automatically regulated depending on vehicle speed. In the event of component failure, a mechanical linkage such as a rack and pinion serves as a back-up in a manner similar to that of hydraulic systems. The software in the computer module enables the flexibility of 'tuning' the characteristics of the electric power steering system to suit the preference of the vehicle designers. The 'feel' is often set a bit on the light side so a criticism commonly expressed is a lack of steering 'feel'.

Electric power steering is limited to smaller vehicles. This is because the 12 volt electrical system is limited to 80 amps of current which, in turn, limits the size of the motor to less than 1 kilowatt. (12.5 volts times 80 amps equals

1000 watts) Vehicles such as trucks require a larger power output. A new 42 volt electrical system standard may enable use of electric power steering on larger vehicles. Electric systems have a slight advantage in fuel efficiency (almost 1 MPG) because there is no hydraulic pump constantly running, whether assistance is required or not, and this is the main reason for their introduction.

Servotronic offers speed-dependent power steering, in which the amount of servo assist depends on road speed and thus provides even more comfort and convenience for the driver. The amount of power assist is greatest at low speeds, for example when parking the car. The greater assist makes it easier to maneuver the car. At higher speeds, an electronic sensing system gradually reduces the level of power assist. In this way, the driver can control the car even more precisely than with conventional power steering. Servotronic is used by a number of automakers including Audi, BMW, and Porsche. Servotronic is a trademark of AM General.

Electro-Hydraulic or so called 'hybrid', systems use the same hydraulic assist technology as standard systems, with the hydraulic pressure being provided by an electric motor instead of a belt driven one. Those systems can be found in Volkswagen, Audi, Peugeot, SEAT, Skoda, Suzuki, MINI and some Mazda cars.

Notes on the text

DIRAVI — is an acronym for 'Direction à rappel asservi' literally meaning 'steering with controlled return' more accurately described in English as 'power steering with power assisted return'. In the UK, it was marketed as VariPower and in the US as SpeedFeel.

14. Match a line in A with a line in B:

A	B
a) the steering	1) под названием
b) commercially available	2) ременно-приводной
c) under the name	3) избыточное давление
d) a belt driven pump	4) вращающий момент; крутящий момент
e) to provide hydraulic pressure	5) планируемое направление
f) relief valve	6) рулевое управление
g) excess pressure	7) серийно выпускаемый, имеющийся в продаже
h) torque	8) обеспечить гидравлическое давление
i) intended direction	9) воздушный клапан; выпускной клапан
j) modern implementations	10) сервомеханизм
k) hydraulic ram	11) современные разработки
l) a rack and pinion	12) гидроцилиндр, гидроподъемник
m) to reduce gradually	13) гидравлический насос
n) servo	14) механизм реечной передачи
o) hydraulic pump	15) постепенно снижать

15. Work in pairs and decide whether these statements according to text 8B true or false, correct the false ones:

1. Power steering is a system for increasing the steering effort on cars by using an external power source to assist in turning the wheels. **2.** Chrysler Corporation introduced the first commercially available power steering system on the 1951 Chrysler Imperial under the name Hydraguide. **3.** The trend to front wheel drive, greater vehicle mass and wider tires means that modern vehicles would be extremely easy to manoeuvre at high speeds without assistance. **4.** All power steering systems work by using a belt driven pump to provide hydraulic pressure to the system. **5.** This hydraulic pressure is generated by a rotary-vane pump which is driven by the vehicle's engine. **6.** When torque is applied to the steering wheel, the hydraulic lines provide unequal pressures and hence assist in turning the wheels in the intended direction. **7.** In the DIRAVI system invented by Chrysler Corporation, the force turning the wheels comes from the car's high pressure hydraulic system and is always different no matter what the road speed is. **8.** As long as there isn't any pressure in the car's hydraulic system, there is no mechanical connection between the steering wheel and the road wheels. **9.** This allows the steering to offer very low levels of assist while parking, but higher assist at highway speeds.

16. Take turns to speak about different types of power steering:

a) Hydraulic systems
b) DIRAVI
c) Electric systems
d) Servotronic
e) Electro-hydraulic systems

17. Read the text carefully. Fill in the gaps with the words from the box:

decreases	an intermittent warning tone		approximately
continuous	ultrasonic	sensors	nearby objects
a parking-assistance system		how far	be switched off

Parktronic

Parktronic, also called Acoustic Parking System (APS) or Park sensor (Park radar), is 1) ___ installed on some Audi & Mercedes vehicles, and new BMW vehicles as well.

Parktronic uses 2) ___ embedded in the front and rear bumpers to measure distance to 3) ___. The system emits 4) ___ (and in some other luxury marques, it offers visual signals through LCDs on the dashboard and above the rear window) to indicate 5) ____ the car is from an obstacle.

As the distance 6) ___, the warning tone becomes faster. It first sounds when the car is 7) ___ 5 feet from the obstacle and is operating in speeds less than 9 mph, and the tone becomes 8) ___ when only 8 inches remain. Parktronic can 9) ___ for situations such as stop-and-go traffic. Mercedes-

Benz and BMW also use the Parktronic name. Parktronic is a registered trademark of Audi AG.

Check your answers on p. 321

18. Translate this article from Russian into English using the expressions from the text above:

На современных автомобилях применяется иммобилайзер, совмещенный с контроллером электропакета, обеспечивающий их дополнительную защиту от неразрешенного использования за счет запрета запуска двигателя.

Автомобили комплектуются двумя ключами зажигания. Один ключ зажигания с пультом дистанционного управления — рабочий ключ. Он служит для снятия запрета запуска двигателя, для дистанционного управления блокировкой (разблокировкой) дверей, для дистанционного поднятия (опускания) стекол и для включения (выключения) режима охраны. Этим ключом рекомендуется пользоваться для повседневных поездок. Второй ключ зажигания без пульта дистанционного управления, со вставкой красного цвета на торце — обучающий ключ. Он служит для снятия запрета запуска двигателя, а также для активации (обучения, переобучения) системы иммобилизации и системы дистанционного управления блокировкой (разблокировкой) дверей. В случае замены неисправного контроллера электропакета или контроллера управления двигателем при помощи обучающего ключа восстанавливается работоспособность систем. Обучающий ключ используется также при обучении или переобучении рабочих ключей.

GRAMMAR

19. Проанализируйте формы инфинитива, приведенные в таблице:

Infinitive		
Active		**Passive**
Indefinite	to send	to be sent
Continuous	to be sending	—
Perfect	to have sent	to have been sent

20. Прочитайте предложения, найдите в них и проанализируйте случаи употребления инфинитива:

1. It is necessary for you to know all the material. **2.** The gas to be used must be purified. **3.** He was happy to be working with the famous scientist. **4.** To operate the complex device is rather difficult. **5.** The metal to be used in our experiment is to be hard. **6.** Someone must have repaired this machine,

it's working again. **7.** She wouldn't have been injured if she had been wearing a seat-belt. **8.** Your car might have been stolen if you had left the keys in it.

21. Прочитайте и переведите предложения на русский язык, обращая внимание на инфинитив:

1. To define force, the value of mass which undergoes the change should be determined. **2.** The function of ignition contacts is to make and break the primary ignition circuit. **3.** To deal with such accurate measurements is extremely difficult. **4.** The problem to be solved was to make the wheels lighter and at the same time keep them strong. **5.** The stability of an object is measured by the amount of work to be required to make it take a new position. **6.** The task of mechanics is to explain and predict physical phenomena and thus to lay the foundations for engineering applications. **7.** To use computers in automatic control means to considerably speed up the manufacturing process. **8.** The road surface to be repaired was destroyed many years ago by heavy vehicles. **9.** The data to be obtained from the experiment are very important. **10.** To prevent unnecessary waste of lubricating oil is the main object of the experiments. **11.** The word 'transport' means to carry people or goods from place to place. **12.** A new comfortable coach was developed to transport people over long distances.

22. Запомните глаголы, после которых следует инфинитив + *to*, и закончите данные предложения:

refuse	I *refuse* to go there ...
offer	I *offered to* help them but ...
pretend	I *pretended not to* see him ...
fail	I *failed to* pass my exam because ...
appear	The project *appears to* be difficult, we must ...
dare	I wouldn't *dare to* ...
tend	Sometimes I *tend to* ...
arrange	We *arranged to* ...
threaten	They *threaten to* call the police if ...
choose	I *chose to* study at this department because ...
want	I *want to* get the higher education because ...
agree	I *agreed to* do this translation but ...
ask	I *asked to* help me with English grammar because ...
expect	I *expected to* be invited but ...
decide	I *decided to* go abroad because ...
forget	I *forgot to* call you because ...
promise	I *promised not to* be late but ...
manage	I *managed to* complete the work because ...
need	I *need to* prepare my report but ...
help	I *helped to* carry this briefcase because ...
hope	One day I *hope to* ...
try	I *tried to* do my best but ...
would like	I *wouldn't like* to learn ...
would love	I *would love to* move there because ...

TEXT WORK

23. Read the text carefully. Fill in the gaps with the following words:

the only easily installed accessory
first trip computers
the quality of the oil
the 'car calculator'
display the diagnostic codes
the dashboard or navigation system screen
upscale cars
advanced trip computers
an onboard computer device
basic varieties

Text 8C. A Trip Computer

A trip computer is 1)___ fitted to cars which can generally record distance travelled, average speed, average fuel consumption, and display real time fuel consumption information. This computer can be found in various vehicles. Thus sometimes called 2)___, it can be very handy on long trips.

The 3) ___ were installed in late 1970's General Motors products and are still usually reserved for more 4) ___ although some lower-end models are fitted with them, often as an option. They can range from basic to complex. The most 5)___ of the trip computer incorporate average fuel mileage and perhaps an outside temperature display. Middle-of-the-road versions will often incorporate trip information into a bundle and include information on fuel, speed, distance, cardinal heading (compass), and elapsed time. The most 6)___ are reserved for high-end cars and often feature average calculations for two drivers, a stop watch, tire pressure information, an over speed warning tone, as well as a multitude of other features.

Sometimes the trip computer display will be incorporated into the gauge cluster, into 7)_____, or in an overhead console. Some vehicles will convey maintenance information to the driver to inform them of scheduled maintenance. Mercedes-Benz vehicles constantly monitor 8)_____ and alert the driver of the need of a change when the oil degrades to a certain extent.

Some trip computers can 9)_____ mechanics use. This is specially useful when the mechanic wants to see what the codes are while driving the car. In 2004 Linear Logic developed the ScanGauge which is 10)___ that works as a trip computer, 4 digital gauges, and a diagnostic trouble code reader.

Check your answers on p. 321

24. Work in pairs. Make up questions to which the word combinations below are the answers. Using your questions role-play the dialogue:

a trip computer
fitted to cars
distance travelled, average speed, average fuel consumption
in various vehicles
on long trips
in late 1970s
from basic to complex;
average fuel mileage and perhaps an outside temperature display
information on fuel, speed, distance, cardinal heading (compass), and elapsed time
for two drivers
a stop watch, tire pressure information, an over-speed warning tone, as well as a multitude of other features
the trip computer display
into the gauge cluster, into the dashboard or navigation system screen, or in an overhead console
the quality of the oil, and alert the driver of the need of a change
the ScanGauge
as a trip computer, 4 digital gauges, and a diagnostic trouble code reader

WRITING PRACTICE

25. Complete the application form. The line spacing between fields is 1, 2 and 3 typewriter intervals:

Job Application Form

Place photo here

1. **Last Name** _____
2. **First Name** _____
3. **Date of Birth**
   Day ____ Month (in words) _____ Year _____
4. **Sex** (tick the appropriate square with 'x') F ☐ M ☐
5. **The address where you live now**
   Post or Zip Code _____
   Town/City Street _____
   House Number _____
   Apartment _____
6. **Telephone Number** _____
7. **Passport**
   Number _____ Series _____
   Issued Day _____ Month (in Words) _____ Year _____
8. **Application Date**

Signature

UNIT 9

ACTIVE VOCABULARY

1. Read and remember the following words:

to benefit — приносить пользу, помогать; оказывать благоприятное (воз)действие;
contact patch — поле зацепления
deceleration — уменьшение скорости, замедление; торможение
to lock up — заклинить;
to monitor — управлять, контролировать
to make sure — убедиться
to kick in — начать работать, задействовать
to refer to — ссылаться на...
to release — отпускать
to slow down — замедлять движение, тормозить
to spin — быстро вращаться; вертеть(ся); крутиться
to steer — управлять (автомобилем и т. п.)
surface — поверхность
valve — клапан
traction — 1) тяга; тяговое усилие, сила тяги, 2) сила сцепления (напр., шины с дорогой)

PRE-TEXT EXERCISES

2. Translate the following word combinations:

A slippery road, nerve-wracking event, an average driver, a skidding wheel, the tire contact patch, the speed sensors, provide this information, the master cylinder, to prevent the pressure from rising, to push the brake pedal, to release some of the pressure, to put the pressure back, many different variations, to experience a rapid deceleration, under ideal conditions, significantly change speed, maximum braking power, to reduce brake effectiveness.

3. Give antonyms to the following words:

stopping	slippery	significantly	to be able
to provide	isolating	professional	rising
to open	to push	to release	quick
before	less	different	maximum

4. Give synonyms to the following words:

rising	prevent	ideal conditions	to look for
fast	to monitor	rate	located
benefit	to reduce	to be in operation	type
ordinary	to push	average	kick in

WORD-BUILDING

5. Translate the following nouns and adjectives with the prefixes:

mis- misinformation, mistruster, misunderstanding, misusage, misfortune, misadjustment, misapplication, misbehaviour;

post- postglacial, postpositive, postwar, post-revolutionary, postaxial, postscript, postscoring;

pre- predestination, predomination, pre-existence, prearrangement, pre-election, pre-accelerator, pre-aeration, pre-adjusted;

re- reaction, reabsorption, re-payment, retraction, reconsideration, reproof, reusing, retread.

6. Translate the following adjectives and verbs with the suffixes:

-ive conclusive, intensive, objective, positive, radioactive, adoptive, intensive; primitive, creative, negative, native, absorptive, refractive, automotive, imaginative, decorative;

-ize crystallize, criticize, minimize, patronize, stabilize, realize, mechanize, immobilize;

-less colourless, countless, hatless, meaningless, powerless, regardless, harmless, cloudless.

7. Form words using the prefixes and suffixes above:

fortune	graduate	arrangement	historic	revolutionary
construction	set	form	natal	date
war	act	expense	addict	effect
impress	pain	thought	use	hope
harm	care	human	crystal	

TEXT WORK

8. Read the text below to learn about operation of anti-lock braking system:

Text 9A. Anti-Lock Braking System (ABS)

Stopping a car in a hurry on a slippery road can be very challenging. Anti-lock braking systems (ABS) take a lot of the challenge out of this sometimes nerve-wracking event. In fact, on slippery surfaces, even professional drivers can't stop as quickly without ABS as an average driver can with ABS.

The theory behind anti-lock brakes is simple. A skidding wheel (where the tire contact patch is sliding relative to the road) has less traction than a non-skidding wheel. If you have been stuck on ice, you know that if your wheels are spinning you have no traction. This is because the contact patch is sliding relative to the ice. By keeping the wheels from skidding while you

slow down, anti-lock brakes benefit you in two ways: 'You'll stop faster, and you'll be able to steer while you stop.'

There are four main components to an ABS system:

— Speed sensors
— Pump
— Valves
— Controller

Speed Sensors. The anti-lock braking system needs some way of knowing when a wheel is about to lock up. The speed sensors, which are located at each wheel, or in some cases in the differential, provide this information.

Valves. There is a valve in the brake line of each brake controlled by the ABS. On some systems, the valve has three positions:

In position one, the valve is open; pressure from the master cylinder is passed right through to the brake.

In position two, the valve blocks the line, isolating that brake from the master cylinder. This prevents the pressure from rising further should the driver push the brake pedal harder.

In position three, the valve releases some of the pressure from the brake.

Pump. Since the valve is able to release pressure from the brakes, there has to be some way to put that pressure back. That is what the pump does; when a valve reduces the pressure in a line, the pump is there to get the pressure back up.

Controller. The controller is a computer in the car. It watches the speed sensors and controls the valves.

ABS at Work. There are many different variations and control algorithms for ABS systems. We will consider how one of the simpler systems works.

The controller monitors the speed sensors at all times. It is looking for decelerations in the wheel that are out of the ordinary. Right before a wheel locks up, it will experience a rapid deceleration. If left unchecked, the wheel would stop much more quickly than any car could. It might take a car five seconds to stop from 60 mph (96.6 kph) under ideal conditions, but a wheel that locks up could stop spinning in less than a second.

The ABS controller knows that such a rapid deceleration is impossible, so it reduces the pressure to that brake until it sees an acceleration, then it increases the pressure until it sees the deceleration again. It can do this very quickly, before the tire can actually significantly change speed. The result is that the tire slows down at the same rate as the car, with the brakes keeping the tires very near the point at which they will start to lock up. This gives the system maximum braking power.

When the ABS is in operation you will feel a pulsing in the brake pedal; this comes from the rapid opening and closing of the valves. Some ABS systems can cycle up to 15 times per second.

Types of Anti-Lock Brakes. Anti-lock braking systems use different schemes depending on the type of brakes in use. We will refer to them by

the number of channels — that is, how many valves are individually controlled — and the number of speed sensors.

Four-channel, four-sensor ABS — This is the best scheme. There is a speed sensor on all four wheels and a separate valve for all four wheels. With this setup, the controller monitors each wheel individually to make sure it is achieving maximum braking force.

Three-channel, three-sensor ABS — This scheme, commonly found on pickup trucks with four-wheel ABS, has a speed sensor and a valve for each of the front wheels, with one valve and one sensor for both rear wheels. The speed sensor for the rear wheels is located in the rear axle.

This system provides individual control of the front wheels, so they can both achieve maximum braking force. The rear wheels, however, are monitored together; they both have to start to lock up before the ABS will activate on the rear. With this system, it is possible that one of the rear wheels will lock during a stop, reducing brake effectiveness.

One-channel, one-sensor ABS — This system is commonly found on pickup trucks with rear-wheel ABS. It has one valve, which controls both rear wheels, and one speed sensor, located in the rear axle.

This system operates the same as the rear end of a three-channel system. The rear wheels are monitored together and they both have to start to lock up before the ABS kicks in. In this system it is also possible that one of the rear wheels will lock, reducing brake effectiveness. This system is easy to identify. Usually there will be one brake line going through a T-fitting to both rear wheels. You can locate the speed sensor by looking for an electrical connection near the differential on the rear-axle housing.

TEXT AND VOCABULARY EXERCISES

9. Answer the following questions:

1. What is the ABS? **2.** Why do we need the ABS? **3.** What are the main components of the ABS? **4.** What kind of information do the speed sensors provide? **5.** What does the pump serve for? **6.** What does the controller do? **7.** How does the ABS work? **8.** Describe different types of Anti-Lock Brakes.

10. Finish the following sentences according to the text above:

1. Stopping a car in a hurry on a slippery road ... **2.** On slippery surfaces, even professional drivers can't stop as quickly without ABS as ... **3.** By keeping the wheels from skidding while you slow down, anti-lock brakes benefit you in two ways: ... **4.** There are four main components to an ABS system: ... **5.** The anti-lock braking system needs ... **6.** Since the valve is able to release pressure from the brakes, ... **7.** The controller monitors... **8.** The ABS controller knows that such a rapid deceleration is impossible, ... **9.** When the ABS is in operation you will feel... **10.** Anti-lock braking systems use different schemes... **11.** The controller monitors

each wheel individually... **12.** This system provides individual control of the front wheels,... **13.** With this system, it is possible that ... **14.** This system is commonly found on ... **15.** The rear wheels are monitored together and they both have to start... **16.** In this system it is also possible that one of the rear wheels... **17.** You can locate the speed sensor by ...

11. Find in the text equivalents to the following phrases:

In a hurry, challenging, slippery surfaces, average driver, skidding wheel, no traction, by keeping the wheels from skidding, the speed sensors, in some cases, main components, provide this information, the master cylinder, reduces the pressure, watches the speed sensors, consider, out of the ordinary, significantly change speed, maximum braking power, in operation, a pulsing, depending on, a separate valve, provides individual control, reducing brake effectiveness.

12. Find the English equivalents for the following Russian words:

1) блокировать	a) to lock	b) lock	c) to lock up
2) сила сцепления	a) tract	b) traction	c) tractable
3) скользкий	a) to slip	b) slippage	c) slippery
4) торможение	a) deceleration	b) to decelerate	c) decelerating
5) отдельный	a) separated	b) separate	c) separately
6) значительно	a significantly	b) significant	c) significance
7) зависящий	a) to depend	b) dependable	c depending
8) передний	a) frontal	b) front	c) frontality
9) станина	a) housing	b) to house	c) house
10) эффективность	a) effectless	b) effective	c) effectiveness
11) определять	a) identical	b) to identify	c) identity
12) соединение	a) connection	b) to connect	c) connectivity

13. Match a line in A with a line in B:

A	B
a) emergency braking	1) занос
b) traffic accident	2) датчик вращения
c) the main pole	3) тормозить прерывисто
d) lockup	4) качение
e) total static friction force	5) поперечное направление
f) slipping motion force	6) юз
g) rolling	7) максимальная сила трения покоя
h) skidding	8) сила трения скольжения
i) cross direction	9) полная блокировка
j) spin round and round	10) важная веха
k) to break interruptedly	11) датчик углового ускорения
l) angular accelerometer	12) датчик угла поворота
m) rate-of-turn sensor	13) крутиться «волчком»
n) skid	14) экстренное торможение
o) rotation sensor	15) авария

14. Translate the article into English using the expressions from the previous exercise:

Зачем нужна ABS

Известно: опытный водитель редко прибегает к экстренному торможению. И все же, как ни старайся, аварийные ситуации случаются с каждым, кто проводит большую часть жизни за рулем. Тогда — педаль тормоза в пол и дай бог остановиться до препятствия. Конструкторы постоянно совершенствуют тормозную систему. Прогресс за полвека заметный: если раньше для остановки со 100 км/ч требовалось метров 60, то сегодня не редкость 40 м, а иным образцам достаточно и меньше! Важной вехой стало появление в 1978 году антиблокировочной системы (ABS), препятствующей полной блокировке колес. Каким образом?

Как известно, максимальная сила трения покоя больше силы трения скольжения. Значит, если колесо проскальзывает относительно дороги, возможное тормозное усилие меньше, чем в случае качения без юза. Кроме того, если некоторое тело скользит по другому, то исчезает трение в поперечном направлении. Следовательно, автомобиль, идущий юзом с заблокированными колесами, неуправляем и даже слабый боковой толчок может закрутить его «волчком». Поэтому опытные водители умудряются сохранить самообладание и тормозить прерывисто, давая колесам проворачиваться. ABS помогает, в первую очередь, новичкам. Датчики вращения колес передают контроллеру информацию, а он периодически ослабляет тормозное усилие, не позволяя колесам полностью остановиться. Тормозной путь укорачивается, к тому же автомобиль остается управляемым, так что у водителя есть шанс изменить траекторию даже при полностью нажатой педали тормоза.

За годы, прошедшие с момента изобретения ABS, ее узлы становились все меньше, легче и ... интеллектуальней. ABS последнего поколения способны на большее. Дополнительные датчики углового ускорения и угла поворота баранки позволяют контролировать соответствие реальной траектории движения и той, что задана водителем. Если они расходятся, ABS «доворачивает» машину, притормаживая одно или два колеса. Кроме того, на машинах с ABS теперь ставят и так называемый brake assist — устройство, автоматически увеличивающее силу нажатия на педаль в случае экстренного торможения: заноса-то можно не бояться.

15. Write the summary of the article you have translated.

SUPPLEMENTARY READING

16. Read the texts 39, 40 to get more information about ABS system.

TEXT WORK

17. Read and translate the text about road safety.

Text 9B. Safety

Road traffic injuries represent about 25 % of worldwide injury-related deaths (the leading cause) with an estimated 1.2 million deaths each year. Automobile accidents are almost as old as automobiles themselves. Early examples include Mary Ward, who became one of the first document automobile fatalities in 1869 in Parsonstown, Ireland, and Henry Bliss, one of the United States first pedestrian automobile casualties in 1899 in New York. Cars have many basic safety problems — for example, they have human drivers who make mistakes, wheels that lose traction when the braking or turning forces are too high. Some vehicles have a high center of gravity and therefore an increased tendency to roll over. When driven at high speeds, collisions can have serious or even fatal consequence. Early safety research focused on increasing the reliability of brakes and reducing the flammability of fuel systems. For example, modern engine compartments are open at the bottom so that fuel vapors, which are heavier than air, vent to the open air. Brakes are hydraulic and dual circuit so that failures are slow leaks, rather than abrupt cable breaks.

Systematic research on crash safety started in 1958 at Ford Motor Company. Since then, most research has focused on absorbing external crash energy with crushable panels and reducing the motion of human bodies in the passenger compartment. This is reflected in most cars produced today. Significant reductions in death and injury have come from the addition of safety belts and laws in many countries to require vehicle occupants to wear them. Airbags and specialised child restraint systems have improved on that. Structural changes such as side-impact protection bars in the doors and side panels of the car mitigate the effect of impacts to the side of the vehicle.

Many cars now include radar or sonar detectors mounted to the rear of the car to warn the driver if he or she is about to reverse into an obstacle or a pedestrian. Some vehicle manufacturers are producing cars with devices that also measure the proximity to obstacles and other vehicles in front of the car and are using these to apply the brakes when a collision is inevitable. There have also been limited efforts to use heads up displays and thermal imaging technologies similar to those used in military aircraft to provide the driver with a better view of the road at night.

Despite technological advances, there is still significant loss of life from car accidents: About 40,000 people die every year in the United States, with similar figures in European nations. This figure increases annually in step with rising population and increasing travel if no measures are taken, but the rate per capita and per mile traveled decreases steadily. The death toll is expected to nearly double worldwide by 2020. A much higher number of accidents result in injury or permanent disability. The highest accident

figures are reported in China and India. The European Union has a rigid program to cut the death toll in half by 2010, and member states have started implementing measures.

TEXT AND VOCABULARY EXERCISES

18. Work in pairs and decide whether these statements according to text 9B are true or false, correct the false ones:

1. Road traffic injuries represent about 50 % of worldwide injury-related deaths with an estimated 1.2 million deaths each year. **2.** Cars have only one basic safety problem — they have human drivers who make mistakes. **3.** Some vehicles have a high center of gravity and therefore an increased tendency to roll over. **4.** When driven at high speeds, collisions can't have serious or fatal consequence. **5.** Early safety research focused on increasing the reliability of brakes but didn't pay any attention on reducing the flammability of fuel systems. **6.** Brakes are hydraulic and dual circuit so that failures abrupt cable breaks. **7.** Most research has focused on absorbing external crash energy with crushable panels and reducing the motion of human bodies in the passenger compartment. **8.** Significant reductions in death and injury have come from the addition of safety belts. **9.** Unfortunately, modern cars don't have radar or sonar detectors to warn the driver if he or she is about to reverse into an obstacle or a pedestrian. **10.** Some vehicle manufacturers are producing cars with devices that measure the proximity to obstacles and other vehicles in front of the car and are using these to apply the brakes when a collision is inevitable. **11.** Despite technological advances, there is still significant loss of life from car accidents. **12.** The death toll is expected to reduce significantly worldwide by 2020. **13.** The European Union has a rigid program to cut the death toll in half by 2010, but member states haven't started implementing measures yet.

19. Work with a partner, take turns to ask and answer the questions. Use the words and word combinations below:

road traffic injuries early examples
first pedestrian automobile casualties many basic safety problems
an increased tendency to roll over focused on
the reliability of brakes and reducing the flammability of fuel systems
in 1869 vent to a rigid program
airbags and specialised child restraint systems
systematic research on crash safety
focused on absorbing external crash energy
significant reductions in death and injury safety belts and laws
measure the proximity to obstacles used in military aircraft
to provide the driver with a better view of the road at night
the death toll the highest accident figures by 2020
about 40,000 people

20. Find in the text the English equivalents to the following Russian words and word combinations:

травма	центр тяжести	защита
пешеход	следовательно	предостерегать
всемирный	переворачиваться	уменьшать
измерять	требовать	выветриваться
ремень безопасности	последствие, результат	приводить в исполнение
неизбежный	препятствие	отражать
несчастный случай	обрывать	снижение
военный самолет	испаряться	воспламеняемость
сцепление	надежность	спаренная схема
ежегодно	течь	авария
вращающая сила	давать задний ход	

21. Compose your own sentences with each English equivalent of the words given in exercise 20. Compare your variants with the sentences of your partner.

SUPPLEMENTARY READING

22. Read the texts 41, 42 to get more information about automobile safety.

GRAMMAR

23. Проанализируйте структуру объектного инфинитивного оборота:

Complex Object

а) Подлежащее +	глагол-сказуемое	+ дополнение +	инфинитив с *to*
I	*want*	*him*	*to come.*
The teacher	*expects*	*the work*	*to be done in time.*
b) Подлежащее +	глагол-сказуемое	+ дополнение +	инфинитив без *to*
Nobody	*watched*	*him*	*speak on the telephone.*
She	*made*	*me*	*learn the rule by heart.*

24. Переведите предложения:

1. I know him to be a good writer. **2.** Everybody believes her to be right. **3.** I have never heard her play the piano. **4.** The scientist expects his report to be published. **5.** I felt somebody look at me. **6.** Everybody considers him to be a clever man. **7.** They want the installation to be dismantled.

8. She watched her son play football. **9.** The girl heard somebody call her. **10.** She saw her daughter fall and cry. **11.** You can't make me believe that all these stories are true. **12.** I heard him mention her name. **13.** I expect you to come. **14.** I saw them doing experiments. **15.** The teacher made me go to the library.

25. Составьте предложения. Придумайте свое оончание:

		to make
	nobody	to lose
	anybody	to do
	a question	to say
I've got	things	to be afraid of
We've got	a call	to ask
He's got	nothing	to speak of
Have you got	something	to complain of
Has he got	anything	to add
	nothing important	to worry about
	some news	to consult
	a lot of things	to help me
		to be proud of

26. Проанализируйте структуру субъектного инфинитивного оборот:

Complex Subject				
Подлежащее	+	глагол-сказуемое	+	инфинитив
He		*is said*		*to live in Moscow.*
He		*is considered*		*to be a clever man.*

27. Переведите предложения, обращая внимание на случаи употребления Complex Subject:

1. The report was said to be very interesting. **2.** He seems to know everything. **3.** He proved to be a very good specialist. **4.** This University is considered to be the best. **5.** The paper is said to have been invented in China. **6.** This student is known to work hard. **7.** The weather appears to be improving. **8.** He is known to be a prominent public figure. **9.** These two scientists happened to work on the same problem. **10.** The foreign scientists are expected to come at the end of the month.

28. Переведите на русский язык следующие предложения. Обратите внимание на объектный и субъектный инфинитивные обороты:

1. A material which breaks with little permanent deformation is said to be brittle. **2.** Ordinary objects are not likely to move with a velocity approaching the velocity of light. **3.** This device appears to be of some interest. **4.** They reported the capacity of the new engine to have been increased.

5. Mechanical work is known to be defined as the product of two physical quantities, namely, force and distance. **6.** The values measured proved to be equal. **7.** The lack of data is certain to slow down the work. **8.** The new engine proved to be quite satisfactory for variable load conditions. **9.** This new device is likely to gain wide recognition. **10.** Scientists found the amount of deformation to be connected with the chemical composition and physical structure of materials. **11.** We expected him to be appointed director of a new automobile plant.

TEXT WORK

29. Read the text, compare and contrast the basic rules of the road in England with the rules of your country using the expressions below:

the main difference is ... in both countries you have to ...
on the contrary ... but the other is ... whereas ... each of them ...
what's more ... while ... in addition ...

Text 9C. Basic Rules of the Road

1. Keep left allowing the vehicles from the opposite direction to pass.
2. Give way to all traffic on your right, especially at road junctions and roundabouts.
3. While turning left or right, give way to vehicles going straight.
4. While turning left, keep to the left side of the road and turn close to the left side of the road which you enter.
5. Slow down at road junctions, intersections and pedestrian crossings. You must also slow down near school zones, temple areas etc., where a lot of pedestrians and vehicle traffic move. Signal before you make any maneuver indicating your intention so that the other road users can adjust accordingly.
6. Always use a helmet if you are driving a two-wheeler and always see that when you use the helmet, the strap is fixed properly.
7. Stick to the speed limit and remember that speed limit is related to the traffic condition.
8. Remember that the stopping distance of your vehicle depends on the speed at which you are driving.
   Ex.: If you are driving at 40 km per hour, the braking distance would be 22 ms. But if you are driving at 60 km per hour, the braking distance will be 42 ms.
9. Keep adequate distance from the vehicle ahead to avoid collision.
10. Yellow lines should not be crossed, even while overtaking.
11. At road junctions or intersections, do not park the vehicle beyond the stop line.
12. Remember that at pedestrian crossings, the pedestrian has the right of way.

13. At the signal, do not stop your vehicle on the Pedestrian Crossing but stop it within the stop line.
14. Two wheelers are meant only for two. Do not carry children additionally.
15. Do not start on the amber light. Wait for the green.
16. Overtake only on the right side and do not overtake on bridges, narrow roads, junctions, school zones and pedestrian crossings. Do not overtake when one vehicle is already overtaking the vehicle which you want to overtake.
17. Never drive in a zig-zag manner. You can observe all the above only if you are patient, considerate and careful.

30. Match a line in A with a line in B:

A	B
1) road junction	а) кольцевое пересечение автомобильных дорог
2) roundabout	б) обгон
3) intersection	в) тормозной путь
4) pedestrian crossing	г) пешеходный переход
5) collision	д) желтый свет
6) helmet	е) соединение дорог
7) stopping distance	ж) перекресток
8) over-taking	з) шлем
9) amber light	и) столкновение

31. Read and translate the text. Work with a partner and make a dialogue using the given expressions:

What do you think of
I think
It goes without saying
I'd like to say a few words in favour of
On the contrary
I think I can add ...
As far as I know
You didn't mention the fact that
To sum it up
It is necessary to say that

Some Basic Precautions to Avoid Accidents

Most accidents happen due to overspeeding and rash driving. When you overspeed, your field of vision itself will be reduced as the speed increases. Remember that the speed limit is only the maximum permissible speed and that actual speed should be related to the traffic and road conditions.

1. Front and rear doors of the car particularly the right hand side door should be opened only after making sure that there is no vehicle, cyclist or even a pedestrian coming along close to the door.

2. In places where it is indicated as accident-prone areas, you must drive very carefully.

3. When there is obstruction ahead, do not drive on the other side of the road without waiting and giving way to the on coming traffic.

4. Never exceed speed limits even if the road is free and even if there is no policeman around. Never be a rash driver.

5. Be a defensive driver by anticipating situations which can lead to accidents. Expect the unexpected.

6. Keep a safe distance between the vehicles by avoiding driving very close behind the vehicle in front.

7. Avoid turning your vehicle abruptly.

8. Never drive when you are overtired since you cannot be alert.

9. Any distraction, whether conversation or looking at advertisement hoardings should be avoided.

10. During night driving, dip your headlights and do not direct the full glare of your headlight at the on coming vehicle even if he does not dip his headlight.

11. Keep your vehicle, particularly brake, in good condition.

12. Finally your attitude, frame of mind and behaviour are also very important.

Courtesy and consideration to other road users, patience and responsible behaviour can always save you and other road users from accidents.

32. If you are a driver, share with the group your experience how to avoid an accident.

33. Tell about the time when you managed to avoid the accident.

34. Work with a partner, discuss what you have to do situations:

a) in case of brake failure;
b) in case of steering failure;
c) in case of tyre burst;
d) in case of skidding.

35. Read the tips for emergencies and find out if you were right.

Tips for Emergencies

In case of brake failure:

1. First do not panic; when you panic, you cannot take correct action.
2. Take your foot off the accelerator and rapidly change gear down.
3. Use hand brake.
4. Steer to the side.

In case of steering failure:

1. Reduce speed.
2. Apply brakes.

In case of tyre burst:

Hold the steering wheel tight to control the pulling and halt the car quickly.

In case of skidding:

1. It can occur due to bad tyres, due to spilt oil on roads and wet surface in rainy weather. It can also occur when you apply sudden brake or take a sharp fast turn.
2. While it is skidding do not apply brake but gently steer in the direction in which it is pulling.

Precautions to be taken at intersections:

1. At intersections, stop, look and then enter.
2. Always give way to traffic on the main road.
3. At the intersection of two main roads give way to traffic coming from your right.
4. At all roundabouts, traffic on the right has preference.

36. Match a line in A with a line in B:

A	B
1) to ram	a) перекресток
2) crossroad	b) смутный
3) to overtake	c) обгонять
4) to swerve	d) штрафовать
5) to career	e) беспечный
6) a forecourt	f) устремиться
7) vague	g) сворачивать в сторону
8) reckless	h) таранить, налететь на ...
9) to fine	i) внешний двор

37. Read the newspaper report. Draw what happened:

Driver Forgets Crashes

Motorist Lesley Aston doesn't remember much about her trip home from work.

But villagers at Studley, Warwicks, will never forget it.

First her Austin 1300 rammed the back of another car waiting at a pedestrian crossing and swung into a roundabout on the wrong side.

Then 20-year-old Lesley crashed head-on into a second car, swerved into a third and careered into a brick wall before coming to rest on a garage forecourt.

She later told police that she had only vague memories of what had happened.

Lasley, of Hewell Road, Ressitch, Worcs, was fined £150 for reckless driving and failing to stop after an accident or report it.

38. Imagine an accident — you were the only witness besides the drivers or remember a real accident you have witnessed, or been involved in. Write a very simple report of the accident, like the one in exercise 37. Read it to another student: he or she must try to draw what happened.

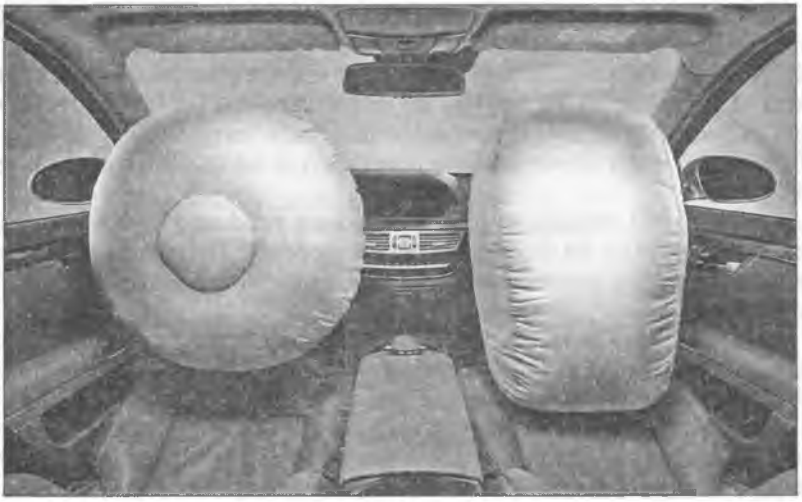
WRITING PRACTICE

39. Read the article carefully in order to discover the main line of thought. Write a short summary of the article:

Airbag

An airbag, A.K.A. a Supplementary Restraint System (SRS), an Air Cushion Restraint System (ACRS), or the Supplemental Inflatable Restraint (SIR) is a flexible membrane or envelope. Air bags are most commonly used for cushioning, in particular for rapid inflation in the case of an automobile collision. The number of lives saved by air bags is hard to pin down. One study cited below, puts the number at under 400 per year (6000 total), and another study indicates only if seatbelts are worn do air bags reduce fatalities by 8 %. Since the start of 1994, Ford made airbags standard across their entire range of cars sold in Europe.

The airbag was invented by John W. Hetrick of Newport, PA, US, in 1951 and he patented the device the following year. Hetrick came up with the idea to help protect his own family using expertise from his naval engineering days. There have been devices similar to airbags for airplanes as early as the 1940s, with the first patents filed in 1958. Early air bag sys-



tem origins trace back to air filled bladders. These systems were large and bulky, and primarily consisted of compressed or heated air, compressed nitrogen gas (N_2), freon, carbon dioxide (CO_2), or a mixture of water and potassium (KH_2O).

The American inventor Allen Breed then developed a key component for automotive use — the ball-in-tube sensor for crash detection. He marketed this innovation first in 1967 to Chrysler.

First automotive applications: 'replacing' the seatbelt. The device was briefly available in the United States in the mid-1970s. During this era, Americans were infrequent users of seat belts and a means of offering seat belt-like levels of occupant protection to unbelted occupants in a head-on collision was felt to be a valuable innovation.

Ford built an experimental fleet of cars with airbags in 1971. General Motors followed with a fleet of 1,000 experimental vehicles in 1973, and these Chevrolet cars equipped with dual airbags were sold to the public through GM dealers two years later. GM called this the Air Cushion Restraint System. In the seventies GM cars had two-stage deployment similar to newer air bags.

The design is conceptually simple — accelerometers trigger the ignition of a gas generator propellant to very rapidly inflate a nylon fabric bag, which reduces the deceleration experienced by the passenger as they come to a stop in the crash situation. The bag has small vent holes to allow the propellant gas to be (relatively) slowly expelled from the bag as the occupant pushes against it.

Before these Chevrolets were sold, airbags were made available to the public in November, 1973, when General Motors began offering dual airbags as an extra-cost option on several 1974 model full size cars made by the Buick, Cadillac and Oldsmobile divisions. This system was known as the Air Cushion Restraint System.

The market did not appear to reward this innovation. Airbags were first implemented by GM and Ford in low-volume production (in approximately 12,000 automobiles in the 1973 — 1976 era), then abandoned by GM and Ford. The passenger side airbag on 1970s cars was located in the lower part of the dashpad and it also acted as a knee restraint. The lower part of the dash on the driver side was also different on cars with air bags as it was padded.

About 12,000 vehicles with an Airbag were produced by GM and Ford from 1973 to 1976. In 1976, production stopped. The standard shoulder belts were actually removed on these cars, as they were designed to replace seat belts.

Although they were marketed as a seat belt replacement, the airbag cannot actually perform this function — occupants can be hurt from any sudden body movement within the vehicle during a crash.

Front air bags are not designed to deploy in side impact, rear impact or rollover crashes. Since air bags deploy only once and deflate quickly after the initial impact, they will not be beneficial during a subsequent collision.

Safety belts help reduce the risk of injury in many types of crashes. They help to properly position occupants to maximize the air bag's benefits and they help restrain occupants during the initial and any following collisions.

Airbag injuries and fatalities. Airbags involve the extremely rapid deployment of a large cushion. While airbags can protect a person under the right circumstances, they can also injure or kill. To protect occupants not wearing seat belts, US airbag designs trigger much more quickly than airbags designed in other countries. As seat belt use in the US climbed in the late 1980s and early 1990s, US auto manufactures were able to adjust their designs. Today all airbag control units recognize if a belt is used and set the trigger time accordingly.

Newer airbags trigger at a lesser speed; nonetheless, passengers must remain at least 25 centimeters (10 in) from the bag to avoid injury from the bag in a crash.

Injuries remain fairly common in accidents with an airbag deployment. Injuries such as abrasion of the skin, hearing damage (from the sound during deployment), head injuries, eye damage for spectacle wearers and breaking the nose, fingers, hands or arms can occur as the airbag deploys.

Smoking a pipe should be avoided while driving. If the airbag inflates and hits the pipe, it is likely to be fatal, even if the crash is moderate.

The increasing use of airbags may actually make rescue work for Firefighters, EMS and Police Officers more dangerous. Airbags can detonate long after the initial crash, injuring or even killing rescue workers who are inside the car. The addition of side impact airbags to the frame of the car has reduced the number of places that rescue workers can use hydraulic spreader-cutters ('the jaws of life') or other similar cutting tools to remove the car roof, or doors safely. Every first responder should be properly trained on how to safely deactivate airbags or be aware of the potential hazards. Removing the car battery may be a good precaution.

40. Speak about advantages and disadvantages of having an airbag in a car. What precautions should be taken while driving a car with an airbag?

PART IV

MODERN CARS

UNIT 10

ACTIVE VOCABULARY

1. Read and remember the following words:

to accentuate — выделять
beige — бежевый
to convey — перевозить
to contribute — вкладывать
dashboard — приборный щиток
gauge — прибор
highway — трасса
to fishtail — тормозить
grille — решетка
lineup — строй, расстановка
manual — ручной
to redesign — переконструировать
rigid — стойкий
snazzy — броский, шикарный
to souped-up — увеличивать мощность
to squared off — приготовить к защите
steering — управление рулем
subtle — неуловимый, тонкий
suspension — подвеска, суспензия
trunk — багажник
to tweak — дергать, щипать
to understeer — плохо слушаться руля
update — последний, обновленный
warranty — гарантия

PRE-TEXT EXERCISES

2. Translate into Russian the following word combinations:

Subtle styling, the most fun-to-drive, squared-off fog light housings, press release, improved steering response, sharper handling, antilock brakes, make it more rigid, gauges feature, the suspension has been tweaked for, glare-cutting black dashboard topper, include two new grilles, convey the image of stability.

3. Give antonyms for the following words:

understeer	hard	front wheels	rear wheels
inside	less	include	worse
the former	manual	better	exclude
the latter	outside	automatic	darkness
brightness	oversteer	soft	more

4. Find the English equivalents for the following expressions:

1) автоматическая подсветка	a) fuel economy
2) самое важное изменение	b) manual transmission
3) красная пластиковая отделка	c) the most important change
4) экономия топлива	d) sudden panic maneuver
5) ручная трансмиссия	e) snazzy black-on-white gauges
6) чувствительные дворники	f) red plastic trim
7) внезапный резкий маневр	g) automatic headlights
8) шикарные черные приборы на белом	h) rain-sensing wipers
	i) power windows
9) черная приборная панель	j) black dashboard
10) стеклоподъемники	

WORD-BUILDING

5. Translate the following nouns paying attention to the suffixes:

-ment agreement, argument, armament, measurement, achievement;

-ness vividness, politeness, brightness, darkness, iceness, miserliness.

6. Translate the following words paying attention to the prefixes:

self- selfassurance, selfdrive, selfconfidence, selfcontrol, selfgoverned;

semi- semidome, semidarkness, semiprecious, semicrystalline;

sub- subgroup, subtropics, subclassify, subirrigate, subsoil, subatomic;

super- supersonic, superman, supermarket, superpower, superior;

sur- surchange, surtax, surface, surpass, surround, surpassable.

7. Using the suffixes above form the nouns:

To treat, hard, to develop, to improve, stiff, to advance, tough, brittle, to achieve, inert, useful, to move, to replace, soft, to arrange, to equip.

8. Work with the dictionary and find the missing forms:

	Noun	Verb	Adjective	Adverb
semi-		semifit	semicircular	
self-	selfabuse		selfconscious	
sub-	subdivision	subcontract		
sur-		surcharge		surprisingly

TEXT WORK

9. Read the text below to learn about 2007 Mazda 3's Touring Sedan:

Text 10A. 2007 Mazda 3 Touring Sedan

By Aaron Gold

The Mazda has a reputation as the most fun-to-drive car in the compact class. But 2007 brings a host of redesigned competitors, and class standards are moving up. The 2007 Mazda 3 compares to the competition as $14,390 base, $18,980 as tested, EPA fuel economy estimates 26 MPG city/33 MPG highway. For 2007 Mazda has updated the both inside and out. Subtle styling updates include two new grilles (unique for 'i' and 's' models) and squared-off fog light housings. Mazda's press release says the new bumpers offer 'superior aerodynamics that contribute to better fuel economy'. Indeed, the highway estimate for the 3s model with manual transmission is up one MPG, but estimates for other versions are unchanged. The 3's new alloy wheels have been redesigned to both accentuate the aluminum alloy look and convey the image of stability. What hasn't changed is the lineup: two body styles, 4-door sedan and 5-door hatchback; two engines, a 148 horsepower 2-liter in the 'i' model and 156 hp 2.3 liter for the 's'; and three trim levels, Sport, Touring and Grand Touring, the latter only in 's' form. Changes to the Mazda 3's body shell make it more rigid and the suspension has been tweaked for improved steering response and sharper handling. But the most important change is the addition of electronic stability control, standard on 's' Touring and Grand Touring. Electronic stability control can help keep the driver from losing control in a sudden panic maneuver or during over-aggressive driving. Antilock brakes, front-seat-mounted side airbags and side-curtain airbags remain standard on some models, optional on others.

The 3's interior has also been revised for 2007. Particular attention was paid to revising interior quality on all models. Grey and red trim spruces

up the Mazda 3s' black interior, but overall design seems dated compared to newer designs such as the Honda Civic and Nissan Sentra. The 'i' offers a choice of beige or black interior, the former with glare-cutting black dashboard topper, while the 's' is black-only. The 3s has grey and red plastic trim that spruces it up nicely. The 3s' gauges feature red numbers on a black background with blue floodlighting while the 3i gets snazzy black-on-white gauges. The three-dial air conditioning controls are simple as can be, but the button stereo takes some getting used to. The 11.5 cubic foot trunk is on the small side. Base price for the Mazda 3i Sport is $14,390; it has a stereo with CD player, steering-wheel-mounted controls and a jack to plug in MP3 player. A/C is optional, but power windows, locks and mirrors require stepping up to the 3i Touring. The top-of-the-line 3s Grand Touring adds leather seats (heated in front), automatic headlights, climate control, and rain-sensing wipers, breaking the $20k barrier. Its optional GPS navigation system is a rarity in this segment.

The Mazda 3's reputation as a driver's car is not undeserved. Its steering response is notably sharp, though the firm ride might put some buyers off. This year Mazda has retuned the suspension for less understeer. (Understeer is when the front wheels try to push towards the outside of a curve when cornered hard; the opposite condition is oversteer, when the rear wheels slide or fishtail. Most front-wheel-drive cars like the Mazda 3 are tuned for understeer.) Even so, don't expect the Mazda 3 to suddenly spin out in a hard corner. The 2.3 liter 156 horsepower four-cylinder engine in the 's' model is big by compact-car standards; most of the 3's competitors have engines in the 1.8 to 2.0 liter and 126 to 140 horsepower range. Transmission choices are a 5-speed manual or 5-speed automatic. (The 3i gets a 2.0 liter engine and 5-speed manual or 4-speed automatic.) Both 2.0 and 2.3 engines come in a clean-burning Partial Zero Emissions Vehicle (PZEV) version for cars sold in California, New York, Vermont, Masachusetts and Maine. Horsepower drops slightly, but while many cars only offer a PZEV engine with an automatic transmission, the Mazda 3 retains its PZEV rating with the stick-shift as well.

The Mazda 3 has a much sportier feel than its competitors. The big engine, sharp steering response and firm ride set it apart from cars like the Civic, Corolla and Sentra, where driving is a means to an end rather than an enjoyable activity in and of itself. As a hatchback, the Mazda 3 is unique; as a sedan it has to fight harder to stand out, a tall order against newer designs like the Nissan Sentra, Honda Civic and Hyundai Elantra.

2007 brings more driver-oriented compacts into the fray, notably the Civic Si and Mazda's own Mazda speed 3, a phenomenally souped-up version of the Mazda 3 hatchback. But both carry heftier car payments and neither is available with an automatic transmission. VW's Rabbit is another sporty-themed hatchback; its engine is more powerful but not as eager to rev, and the Rabbit is likely to spend more time in the dealer's service department than the Mazda.

TEXT AND VOCABULARY EXERCISES

10. Put the missing information and translate the Details and Specs:

3s Grand Touring	Front airbags
$14,390 — $26,960	5-speed manual
Japan	25/31 (2.3 automatic)
4-door sedan	5 years/60,000 miles power train
135 lb-ft @ 4500 RPM	

- **Body style:** 5-door hatchback, ___
- **Trim levels:** 3i/3s Sport, 3i/3s Touring, _____
- **Price range (including options):** _____
- **Base engine:** 2.0 liter inline 4, 148 hp @ 6500 RPM, ____
- **Premium fuel required**? No
- **Optional engine:** 2.3 liter inline 4, 156 hp @ 6500 RPM, 150 lb-ft @ 4500 RPM
- **Transmission:_____,**
- **4-speed automatic (3i),**
- **5-speed automatic (3s)**
- **Driveline:** Front engine, front-wheel-drive
- **EPA fuel economy estimates:** 28 MPG city/35 MPG highway (2.0 manual), 26/34 (2.0 automatic), 26/33 (2.3 manual), _____
- **Where built:** ____
- **Standard safety equipment:** ___ Optional safety equipment: Front seat mounted torso airbags, two-row side curtain airbags, antilock brakes, electronic stability control
- **Major standard features**: CD player
- **Major options:** Power windows/locks/mirrors, air conditioning, sunroof, CD changer, GPS navigation
- **Warranty:** 3 years/36,000 miles bumper-to-bumper, _____, 5 years/unlimited mileage outer body rust-through
- **Roadside assistance/free maintenance**: 3 year/36,000 mile roadside assistance

11. Answer the following questions:

1. What is this text about? **2.** What facts about Mazda cars are interesting for you? **3.** What reputation does the Mazda have? **4.** What characteristic can you give to the Mazda 3 2007? **5.** What changes has the Mazda 3's 2007 updated? **6.** What is the most important change? **7.** What hasn't changed? **8.** What advantages and disadvantages does it have to your mind? **9.** Where is it built? **10.** What safety equipment does it have? **11.** Why is the Mazda 3 unique? **12.** Think of who should buy the Mazda 3 2007 and who should not.

12. Find the information in the text concerning:

the Mazda 3's body shell
base price
safety equipment
the Mazda 3's interior
engine of the Mazda 3

13. Find in the text equivalents for the following phrases:

Черная отделка, фронтальные подушки безопасности, кожаный салон, заднее колесо, противоположное состояние, боковые подушки безопасности, противотуманные фары, потеря контроля, городской (загородний) цикл, электростеклоподъемники, средства безопасности, особое внимание уделяется, передние фары, экономия топлива, модернизация стиля, улучшенное рулевое управление, сервисный центр, пробег тридцать шесть тысяч миль, точное повиновение рулю, топливный бак.

14. Choose the right word which best completes the sentence:

1. The new bumpers offer superior aerodynamics that ... to better fuel economy.
a) include b) influence c) contribute
2. Changes to the Mazda 3's body shell make it more ...
a) rigid b) hard c) tough
3. The most ... change is the addition of electronic stability control.
a) unusual b) important c) incredible
4. The 3's interior has also been ... for 2007.
a) revised b) redesigned c) restored
5. Transmission choices are a 5-speed ... or 5-speed automatic.
a) hand b) tame c) manual
6. ... is when the front wheels try to push towards the outside of a curve when cornered hard.
a) oversteer b) understeer c) steering
7. ... attention was paid to revising interior quality on all models.
a) particular b) special c) singular
8. Most front-wheel-drive cars ... the Mazda 3 are tuned for understeer.
a) like b) as c) such
9. The 'i' ... a choice of beige or black interior.
a) offers b) gives c) proposes
10. As a hatchback, the Mazda 3 is ...
a) special b) unusual c) unique

15. Find the English equivalents to the following Russian words:

1) оплата	a) payment	b) pavement	c) permanent
2) топливо	a) few	b) fuel	c) full
3) сплав	a) allow	b) yellow	c) alloy
4) черта	a) fitchew	b) future	c) feature
5) колесо	a) weal	b) will	c) wheel
6) тонкий	a) subtitle	b) subtle	c) subtype

7) ручной	a) manual	b) menu	c) maneuver
8) щиток	a) blackboard	b) dashboard	c) board
9) рулевое управление	a) stereo	b) stirring	c) steering
10) подергивание	a) tweak	b) weak	c) week

16. Match a line in A with a line in B:

A	B
1) Understeer	a) means miles per gallon
2) Oversteer	b) is when the front wheels try to push towards the outside of a curve when cornered hard
3) PZEV	c) means account current
4) MPG	d) is when the rear wheels slide or fishtail
5) A/C	e) means revolutions per minute
6) RPM	f) means horsepower
7) SUV	g) Partial Zero Emissions Vehicle
8) hp	h) means Sports Utility Vehicle
9) VW	i) is abbreviation for Volkswagan

17. Finish the following sentences:

1. The Mazda has a reputation as ... **2.** The 3's new alloy wheels ... **3.** It has three trim levels ... **4.** The most important change is ... **5.** Particular attention was paid to ... **6.** The 'i' offers a choice ... **7.** Transmission choices are ... **8.** Base price for the Mazda 3i Sport is ... **9.** It has all optional safety equipment... **10.** The top-of-the-line 3S Grand Touring adds ...

18. Translate the following article into English:

Mazda — компания, история которой началась с пробки. Именно строительными материалами из пробкового дерева и занималась компания, основанная Дзюдзиро Мацуда (Jujiro Matsuda) в 1920 году. Это занятие позволило заложить финансовый фундамент для дальнейшей деятельности. Выпустив в 1920-х годах небольшую тестовую партию мотоциклов, в 1929 году компания перешла к производству станков. В 1931 году компания начала выпускать автомобили в чисто японском стиле — трехколесные грузовички с двигателями объемом 500 куб. см. В качестве торговой марки для обозначения этих машин было выбрано слово Mazda — имя зороастрийского верховного бога света, которое, к тому же, было очень близким по звучанию к имени основателя компании — Мацуда. Компания начала выпускать легковые автомобили только в 1960 году. В вопросах стратегии развития и продаж компания тесно взаимодействует с Ford, хотя в производственную сферу Ford не вмешивается. Mazda по праву может считаться мировым автопроизводителем — ее сборочные заводы в 21 стране позволяют ей экспортировать свои автомобили в 120 государств мира.

19. Tell about the history of Mazda's company and the latest model Mazda 3 2007. Use the information of the texts above.

TEXT WORK

20. Read and translate the text:

Text 10B. 2007 Hyundai Elantra

By Aaron Gold

The Elanta is the last car to be redesigned as part of Hyundai's '24/7' program (7 all new models in 24 months). And if ever a Hyundai needed a redesign, it was the Elantra. It wasn't a bad little car to drive but the old Elantra suffered dismal crash-test scores. So it's no surprise that safety is one of the highest priorities for the new Elantra. Like the newest versions of the Honda Civic and Nissan Sentra, the Elantra offers front seat-mounted torso airbags and roof-mounted side curtain airbags for front and rear seats as standard. Antilock brakes are also standard fare, and while most competitors come with disc brakes in front and drum brakes at the rear, the Elantra comes with four-wheel-discs, which offer better braking performance in the rain. If there's one place the Elantra comes up short, it's styling. The car actually has some rather nice details, but unless the light hits the car just right you probably won't notice the swoopy character line that runs from nose to tail.

At first glance the Elantra looks rental-car anonymous, and the tail-lights, which bear more than a passing resemblance to those of the old Ford Contour, don't do the rear view any favors.The new Elantra's interior and trunk are bigger than the Civic and Corolla — in fact combined interior and trunk volume are so great that the EPA classifies the Elantra as a mid-size, not a compact. The controls and switches had the high-quality feel normally

associated with Japanese cars, and the Elantra has many bins and cubbies. The Elantra is particularly kind to back seat passengers.

Three shingle-style headrests provide adequate whiplash protection and slide down out of the driver's view when not in use. Parents will like the child seat tethers at all three seating locations, and adult passengers will appreciate the center armrest with integrated cupholders, a rare find in a budget-priced car.

The $13,995 Elantra GLS comes with the aforementioned safety equipment plus power windows, power locks, heated power mirrors, keyless entry and alarm, but does not include air conditioning or a stereo. Those features are optional on the GLS and included on the $16,295 Elantra SE, along with alloy wheels, XM satellite radio, Bluetooth phone compatibility, leather-wrapped steering wheel and shifter, and cruise control. $1,000 more buys the Elantra Limited with heated leather seats. The new Elantra is powered by Hyundai's familiar 4-cylinder 2-liter Beta engine with 138 hp and 136 lb-ft of torque. The shifter is clunky but precise and the light clutch makes it easy to drive in stop-and-go traffic. Hyundai claims 0 to 60 in a decent 8.8 seconds for the stick-shift.

The new continuously variable valve timing system helped make the engine feel nice and snappy off the line, The Honda Civic's 5-speed automatic and the Nissan Sentra and Versa's CVT offer more flexibility in situations like these. On the bright side, Hyundai targeted MPG, particularly on the automatic models.

Through a variety of improvements — from driving the power-steering equipment with an electric motor rather than the engine (0.68 MPG) to lowering the engine's idle speed (0.24 MPG) — EPA estimated fuel economy for automatic Elantras was increased by 4 MPG on both city and highway cycles. EPA estimates are 28/36 for both manual and automatic, respectably close to the automatic Civic's 30/40.

The Elantra has some nice curves, but they manage to stay hidden under the paintwork. Inside it's simple and functional but very conventional. Styling-wise the Elantra trails behind with the Toyota Corolla, along with second-fiddlers like the Mitsubishi Lancer and Chevrolet Cobalt, all cars that are functional but frumpy. Granted, the Elantra could find worse company to hang out with, but with the Corolla and Lancer rumored for radical redesigns in 2008, it's going to get lonely back there.

TEXT AND VOCABULARY EXERCISES

21. Using the information from Details and Specs make up sentences:

Example: The Elantra is available as 4-door compact sedan. It has three trim levels: GLS, SE, Limited. The price starts from $13,995.

Details and Specs

- **Body style:** 4-door compact sedan
- **Trim levels**: GLS, SE, Limited
- **Price range (including options):** $13,995 — $19,910
- **Base engine:** 2.0 liter inline four-cylinder engine, 138 hp @ 6000 RPM, 136 lb-ft @ 4600 RPM
- **Optional engine(s)**: PZEV 2.0 liter inline four-cylinder, 132 hp @ 6000 RPM, 134 lb-ft @ 4600 RPM
- **Transmissions:** 5-speed manual, 4-speed automatic
- **Driveline:** Front-wheel-drive
- **Emissions:** ULEV (automatic cars sold in CA, NY, MA, ME, VT are SULEV/PZEV)
- **EPA fuel economy estimates:** 28/36 MPG city/highway (manual and automatic)
- **Where built:** South Korea
- **Standard safety equipment:** Front airbags, front seat-mounted torso airbags, two-row side curtain airbags, four-wheel antilock disc brakes, front seat belt pretensioners, front seat active headrests
- **Optional safety equipment:** None
- **Major standard features:** Power windows/locks/mirrors, heated side mirrors, keyless entry, alarm system
- **Major options:** CD stereo with Bluetooth speakerphone capability, 220 watt stereo with external amplifier and 6-disc CD changer, heated leather seats, sunroof
- **Warranty:** 5 years/60,000 miles bumper-to-bumper, 10 years/100,000 miles powertrain, 7 years/unlimited mileage outer body rust-through
- **Roadside assistance/free maintenance:** 5 years/unlimited mileage roadside assistance

22. Find information in the text about:

a) safety equipment
b) fuel economy
c) the interior
d) engine

23. Using the information from text 10B add some more Pros and Cons:

Pros:	Cons:
Long list of standard safety equipment	Dull styling
Lots of interior space	Least-expensive GLS model lacks stereo and A/C
Rewarding to drive	Honda, Toyota, Nissan and Suzuki now offer cars in the Elantra's price range

24. Work in pairs and decide whether these statements according to text 10B are true or false:

1. It's no surprise that interior is one of the highest priorities for the new Elantra. **2.** The new Elantra's interior and trunk are bigger than the Civic and Corolla. **3.** The EPA classifies the Elantra as a compact. **4.** The $13,995 Elantra GLS comes with the aforementioned safety equipment plus power windows, power locks, heated power mirrors, keyless entry and alarm, air conditioning and a stereo. **5.** The new Elantra is powered by Hyundai's familiar 4-cylinder 2-liter Beta engine with 138 hp and 136 lb-ft of torque. **6.** EPA estimates are 28/36 for both manual and automatic, respectably close to the automatic Civic's 30/40. **7.** The Elanta is the last car to be redesigned as part of Honda's '24/7' program. **8.** It has two trim levels. **9.** It is built in Japan. **10.** Price range (including options) is $13,995 — $19,910. **11.** EPA fuel economy estimates 18/26 MPG city/highway (manual and automatic). **12.** The Elantra comes with four-wheel-discs, which offer better braking performance in the rain.

25. Translate into English:

«Хёндэ» в вольном переводе означает «новое время». Почти 60 лет корейский концерн потратил на то, чтобы догнать это самое время и оказаться в рядах флагманов мировой индустрии. Отделение Hyundai Motor со штаб-квартирой в Сеуле было основано 29 декабря 1967 года, а через полгода — рекордно короткий срок — было введено в строй первое предприятие мощностью 20 000 автомобилей в год. Началось все со сборки лицензионной модели Cortina европейского филиала Ford, а затем освоили и производство полного цикла. Сотрудничество с концерном Ford продолжалось до начала восьмидесятых. В августе 1973 года Hyundai Motor объявила о начале работ над первой собственной легковой моделью и параллельном строительстве нового завода. Разумеется, своих сил не хватало. Так возник союз с новым стратегическим партнером — Mitsubishi Motors, существующий и по сей день. В 1976 году марка Hyundai появилась на взыскательном европейском рынке. Ныне Hyundai Motor уверенно держится в русле автомобильной моды: фирменный дизайн, модельная линейка и маркетинг вполне отвечают потребностям сегодняшнего дня.

26. Using the information above tell about:

a) The history of the Hyundai's company
b) 2007 Hyundai Elantra

27. Fill in the gaps with the words from the box:

transportation van shock resistant frame courting collision greenhouse traveler automobile entertainment

The automobile is a ubiquitous element in our modern world. Used for a variety of purposes including transportation, entertainment, and courting, the automobile is an integral part of today's society on diverse levels. 1)___is, of course, still the number one reason to own an automobile. If you are a 2)____, perhaps a rugged four-wheel drive automobile is right for you. With a 3)___and a suspension system designed to withstand off-road driving, this type of automobile is for the adventurer — not the suburbanite. Picking the right type of 4)___can be both convenient and ecological-minded. Do not buy an SUV or four-wheel drive automobile if you will only use it in an urban setting. This kind of gas guzzling is one of the main reasons for the increase of 5)___ gases in atmosphere. If you need to take several children to school every morning then a 6)___could be the right automobile for your needs. Buying the smallest car you can is not only smart; it also reduces the chances that a fatality will occur in case of a 7)___. Most fatalities incurred during collisions are due to a large automobile colliding with a smaller car.

8)___ is another reason many own an automobile. From racing to customization, the automobile is like a larger-than-life toy for male and female enthusiasts alike. The use of the automobile as a symbol of wealth and standing is not a new concept either. The ritual of 9)___ usually involves an automobile in some form. Whether you need a car for functional or aesthetic purposes — the effect of the automobile on everyone's lives is undeniable.

Check your answers on p. 321

GRAMMAR

28. Проанализируйте формы времен, использующиеся в условных предложениях:

Conditionals
I. If you *apply* this method of calculation, you *will get* good results. II. a) If you *applied* this method of calculation, you *would get* good results. b) If you *had applied* this method of calculation a week ago, you *would have* already *got* good results.

29. Переведите следующие предложения на русский язык, обращая внимание на условные придаточные предложения:

1. If cars *had* a heart, it *would* no doubt *be* the gasoline engine. **2.** The gas *would have occupied* much smaller volume if it *had been compressed* enough. **3.** If they *receive* all the necessary equipment, they *will be able* to carry out their experiment. **4.** If the driver *had been* more careful, he *wouldn't have had* the accident. **5.** If petroleum suddenly *disappeared*, we *would find* ourselves without any gasoline for our machines. **6.** If you *are considering* buying a new car, your destination *will be* a car dealership showroom. **7.** If a car crash *occurred*, some vehicles *would be* safer than others.

30. Измените следующие предложения по приведенному ниже образцу и переведите их на русский язык:

a) If I *were* in your place, I *wouldn't buy* this model of car. — *Were* I in your place, I *wouldn't buy* this model of car.

b) If we *had used* new engine, we *would have saved* a lot of fuel. — *Had* we *used* new engine, we *would have saved* a lot of fuel.

1. If the price had grown, we would not have bought this car. **2.** They would have measured the volume of tank more accurately if they had taken an analytical balance. **3.** If ozone were suddenly withdrawn from the atmosphere, we should all be killed within a few minutes by the sun's ultraviolet light. **4.** If the engine had been heated, the car would have stopped at once. **5.** If one gram of ice should be melted, 79 calories of heat will be absorbed. **6.** If the testing of the experimental car model hadn't taken so much time, we should have completed our work long ago.

31. Переведите следующие предложения и скажите, какие значения они выражают:

1. If the Focus has anything approaching a weak point, it's the 2-liter four-cylinder engine. **2.** If metal conductors were replaced with superconducting ceramics, devices would be more efficient, and new types of devices would become possible. **3.** Even if you're not the type who grins whenever you see a squiggly-road-ahead sign, you'll appreciate the Focus' responsiveness if you ever have to swerve to avoid an accident. **4.** If it was toughened and the stone hit with enough force the whole windshield would shatter into the small squares. **5.** Power is of no value if a vehicle lacks poise in corners. **6.** If the Automotive industry had advanced at the same pace as the Computer industry, we would be driving cars, which gave a thousand kilometres to the litre and cost $25. **7.** If you were shopping for basic transportation and considering a Civic, Corolla, Rio or Accent, you would be sure to stop by Ford dealer and give the Focus a look. **8.** The Jetta's interior is pleasant if you can get through the open door. **9.** Whichever Corolla you prefer, insist on buying a car with antilock brakes and side airbags, especially if the car is to be used as a family-hauler or piloted

by inexperienced drivers. **10.** If you're in the market, the Honda Civic is better looking and the Hyundai Elantra does all the same stuff at a lower price. **11.** If there ever was an automotive application that needed hybrid power, the light truck category is it. **12.** If there was a battery failure after the warranty was expired, consumers would plan to cover the bill themselves. **13.** If this same PHEV needed to travel more than 30 miles, then the first 30 miles of the trip would be taken care of by the batteries and the rest of the trip it would operate as a normal hybrid car. **14.** If you've taken lots of engine components apart and cleaned them, you might find some things so old and scarred that you want to bury them. **15.** If Henry Ford could see a 2002 Ford Crown Victoria, he would be amazed how far it has come from his 1909 Model T.

32. Закончите следующие предложения:

1. If I graduated from University I would... **2.** If I went to work to Hyundai Motor I would ... **3.** If I bought Hyundai I would... **4.** If I became the chief engineer of the plant I would ... **5.** If there were no petrol there would be ... **6.** If I had a lot of money I would ... **7.** If I had a car I would ... **8.** If I buy a car I will ... **9.** If I choose the place of work I will ... **10.** If I pass all my exams I will... **11.** If I had had free time yesterday, I should ... **12.** If I had passed my exams in time, I should not...

33. Выберите правильный вариант и переведите предложения на русский язык:

1. If the Focus had a tail, it ... when it saw you coming.
a) would wag b) would have waged c) will wag

2. If you buy a car, you ... on getting a car equipped with all vital options.
a) would insist b) will insist c) would have insisted

3. If a 5-passenger Sports Utility Vehicle is what you are looking for, then you ... to check out the Ford Escape or Saturn VUE Green Line Hybrid.
a) will want b) would want c) would have wanted

4. If you had been more careful, a car crash ....
a) will not occur b) would not occur c) would not have occurred

5. If you ever needed a car, it ... the Elantra.
a) will be b) would be c) would have been

6. If the complete list of details had been prepared the mechanic ... everything in time.
a) will buy b) would buy c) would have bought

7. If you were a traveller, perhaps a rugged four-wheel drive automobile ... right for you.
a) will be b) would be c) would have been

8. If you needed to take several children to school every morning then a van ... the right automobile for your needs.
a) will be b) would be c) would have been

TEXT WORK

34. Read the text and underline its main idea. Give a brief summary of the text:

Text 10C. 2007 Volkswagen Jetta 2.0T

By Philip Powell

While the 2007 Volkswagen Jetta performs more than adequately with the standard 2.5 liter 4-cylinder engine, the optional 2.0 liter turbocharged engine turns this family car into a genuine performance car. Forgetting for a moment that the Jetta's primary duty is to serve as family transport, this particular model's secondary role: to perform for those drivers who, when not chauffeuring the kids to soccer practice, like to waltz with a car as dancing partner.

The Jetta's interior is pleasant if you can get through the open door. The rear seat was no better, suggesting that the car's tall stance has been sacrificed to style. All black and gray, the only visual relief is supplied by a band of lightly-patterned aluminum and a touch of chrome on the shift-surround. Primary instruments, speedo and tach, are clear but the engine temperature and fuel gauges are too small for a quick glance. The console has the same fault. Large and simple, it includes one set of switches that require a change of glasses if you're not wearing bifocals. Drinkers of morning revival juice will be pleased to note the two cup holders do not interfere with the handbrake and armrest. But be ready for a coffee-Tsunami if the sunroof's open. Like the Audi A3, the Jetta's transmission utilises direct-shift technology similar to F1 race cars and includes Tiptronic, which allowed

to control changes manually. Of course power's of no value if a vehicle lacks poise in corners.

The Jetta, with its precise steering turn-in and sharp responses, reacted to demands, turning the Malahat and other twisties into a personal playground. Such handling characteristics, as well as being fun for the driver, make for a safer car.

The car that handles well has a better chance of avoiding an accident. In normal cruising mode the Jetta is smooth and quiet. Back seat passengers will find the view forward somewhat limited and there's no center armrest. The test cars featured a 2.5 liter, 5-cylinder, 150 hp non-turbo engine. But the Jetta prospect who demands more can now choose a 2-liter turbo and exchange the conventional 5-speed for a race-based 6-speed. In this world of high performance automobiles a Jetta 2.0T can outrun many larger cars with V-6 engines and still beat them in an economy contest. Ah, but this is a changing world. In assessing this car you'd be right in admiring it's appearance. You'd make a wise choice in giving up a little interior space in favor of a more nimble, fun-to-drive sedan. You'd enjoy the European emphasis on driving vs. plush comfort. Still, the Volkswagen Jetta in any guise is so darned good it deserves a place on a list of best buys.

TEXT AND VOCABULARY EXERCISES

35. Divide the text into logical parts and give each a suitable title.

36. Translate into Russian the following words and word combinations:

A genuine performance car, fun-to-drive, primary duty, secondary role, morning revival juice, the only visual relief, a personal playground, a better chance of avoiding an accident, make a wise choice, in favour of.

37. Compose your own sentences with each English equivalent of the words given in exercise 35. Compare your variants with the sentences of your partner.

38. Fill the gaps with the words from the box:

19th century	locomotion	vintage cars
gasoline engine	hybrid motors	moment of glory
hybridized technologies		carbon monoxide

1)____ is one of the most important advancements of the modern age. Cars have been an obsession for human beings since their conception in the late 2)____. Many people, if their budget allows it, are becoming collectors of cars. Throughout the years, thousands of models have made their entrance, had their 3)____, and made their exit. Collecting 4)___ is a hobby only available to those who can afford it, however, as it is costly

and requires a lot of garage space. For many, however, cars are little more than a functional tool of locomotion. It is understandable then, that the controversy surrounding the 5)____ has now reached critical proportions. Cars can be powered by new-age 6)____ which rely on an electrical back-up system-only using gasoline combustion when absolutely necessary. These motors can help cars reduce their emissions of 7)___. There is a future for cars — one that remains stylish yet adapts to the modern world's needs. There would be nothing more luxurious than adapting classic cars to new, 8)___. This is why the future for cars, car collectors, and environment-friendly functionalists is a bright one.

Check your answers on p. 321

39. Using the information from texts 10A, 10B and 10C fill the table and compare three vehicles. Tell about advantages and disadvantages of each one:

	Volkswagen Jetta	Hyundai Elantra	Mazda 3S Touring Sedan
Interior			
Price			
Options			
Safety			
Details			
Country			

40. Choose the right form of the adjectives:

Cheap Car Insurance

Every car-owner has a dream: that dream is *cheap/cheaper/cheapest* car insurance. Where there is a demand, why is there no supply? The answer is simple: it is possible to find cheap car insurance, but not *easy/ easier/easiest.* To truly get cheap car insurance, you will benefit from having a strong driver's profile to give the insurance company of your choice. Having been in past accidents will not help you achieve your goal of cheap car insurance — bad driving history will make it much *difficult/more difficult/most difficult* to keep your payments inexpensive. Additionally, being a young driver will be a detriment to your quest for cheap car insurance. Experience is *important/more important/the most important* when your insurance company examines your profile: it will allow the company to feel secure that there is little chance you will get into an accident. This will lead to cheap car insurance and extensive coverage in case of damage collisions.

Another element necessary to get cheap car insurance is a relatively new car. The *much/more/most* the car you wish to insure has traveled already, the *much/more/most* likely it is to break down (in the insurance company's eyes at least.) One thing is for sure: everyone wants cheap car insurance. Shopping around for it is crucial because of the high demand — if you just go to the obvious companies, you may find yourself paying for the kind of expensive car insurance *much/more/most* end up with. The company, however, should not be too small or unknown — this will make you run the risk of being cheated out of cheap car insurance. Make sure the company you are going to use has been recommended to you by someone you trust. With the internet, finding cheap car insurance has become *fruitful/more fruitful/most fruitful* and *convenient/more convenient/most convenient* activity.

SUPPLEMENTARY READING

41. Read the texts 43, 44, 45 to get information about Audi.

WRITING PRACTICE

42. Read the following text carefully in order to discover the main line of thought. Write a short summary of the text:

Car Sale

A temporary lowering of prices in the spirit of a unique event: everyone loves a car sale. When a car dealership decides to hold a car sale, there are several things to keep in mind as a discerning customer. The first is definitely one of the most important: a lot of times, a car sale can be an excuse to attempt the sale of bad quality cars alongside good vehicles. This is because it is difficult to sell a bad car unless a car sale creates a perfect environment to do so. The juxtaposition of the good with the bad will be an element present at any given car sale. As you walk down the rows of cars with other excited would-be purchasers, keep in mind that it is a 'diamond in the rough' situation-if you find a nice car, it won't be by going for the first thing you see. If you understand this, a car sale can become a magical place to find an automobile. Mark-downs are one of the most attractive elements of any given car sale-the prices are reduced on previously expensive cars, possibly allowing you to afford a car which was previously outside of your budget range. Special deals are also something to look out for at a car sale. Sometimes a car will have several extra features added for no increase in price-tag-this is not unusual at a car sale. As long as you are wary, a car sale is the perfect opportunity to browse and perhaps even purchase the car you have been dreaming of.

UNIT 11

ACTIVE VOCABULARY

1. Read and remember the following words:

auxiliary — вспомогательный
bare — скудный
bones — отделение
cubby — коморка, гнездо
durability — долговечность
to emulate — соперничать
feisty — сварливый
to hamper — затруднять движение
headlamp — фара
iteration — повторение
jack — приспособление
legroom — достаточное место для ног
nook — укромное место
overhang — выступ
pod — гондола
propulsion — поступательное движение
reliability — надежность
slug — медлительный
spoke — спица, рукоятка
storage — хранение
truncated — срезанный
to whirr — шуметь, рычать
windshield — ветровое стекло
zippy — живой, быстрый

PRE-TEXT EXERCISES

2. Translate the following words combinations:

The fresh-out-of-school buck, bread-and-butter vehicles, the truncated tail, steeply angled windshield, touch-and-go, a futuristic space pod, an auxiliary jack for pods, an easy-to-use touch-screen, the current popularity, split-folding rear seats, the mundane world of FM, the top-of-the-line EX-trimmed test car, strong point, resulting in jerky deceleration, voice-activated navigation system, four-cylinder engine, standard front-seat airbags, with useful cubbies and nooks to keep things close at hand, antilock brakes, the split-level gauges.

3. Give synonyms to the following words:

short	narrow	close	growing
vehicles	rear	jack	to whirr
handsome	popularity	difficult	nook
iteration	prominent	storage truncated	uninterrupted
space	auxiliary	excellence	zippy
quickly	bare-bones		durability

4. Give antonyms to the following words:

to whirr	durability	reliability	the most
bare	to emulate	zippy	handsome

WORD-BUILDING

5. Translate the following adjectives paying attention to the suffixes:

-ous erroneous, tremendous, various, famous, luxurious;

-ry fragmentary, sedimentary, contradictory, auxiliary, necessary.

6. Using the suffixes above form the adjectives:

Mystery, glossarian, preciosity, marvel, heredity, porosity, viscosity, illusion, obviosity, glory, regular, oscillator

7. Define to what parts of speech the following words with prefixes refer and translate them:

trans- transmitter, transformer, transitive, transoceanic, transit, transpolar;

ultra- ultrasonic, ultravirus, ultraviolet, ultrastructural, ultramodern;

un- undo, unstable, unlike, uncertain, unalterable, unalter;

under- underchange, understeer, underclass, undercut, underlying, underground;

up- uplift, upstairs, upstream, update, upward, upright, upbuilding.

8. Work with the dictionary and find the missing forms:

	Noun	Verb	Adjective	Adverb
trans-	transcendence		transactional	
ultra-	ultrabase		ultrafashionable	
un-		uninterrupt		uncleanly
under-		underwrite	underpowered	
up-	uprise	upgrade		

9. Define to what parts of speech the following words belong to and translate them:

Introduction, affordable, category, iteration, steeply, prominent, futuristic, proportion, aesthetic, unconventional, generation, sensible, popularity, digital, glory, navigation, likely, redundant, numerous, difficult, interface, auxiliary, surprisingly, plentiful, useful, delivery, lovely.

TEXT WORK

10. Read the text below to learn about 2007 Honda Civic EX sedan:

Text 11A. 2007 Honda Civic EX Sedan

By Liz Kim

The Honda Civic, like the larger Accord, is one of Honda's bread-and-butter vehicles. With almost 10 million examples sold since its introduction in 1973, the Civic has been the affordable compact car other companies emulate, and likely will be for generations to come.

Past Civics may have been the ultimate in getting the most bang for the fresh-out-of-school buck, but they've been touch-and-go in the styling category. Call the eighth iteration of the Civic what you will, but at least it's not boring. With its steeply angled windshield, narrow strip of a grille and headlamps and short overhangs enhanced by handsome 16-inch alloy wheels, it looks more like a futuristic space pod than a sensible sedan. Overall, the Civic's proportions are more European or Japanese than your standard four-door, a design aesthetic that's spreading thanks to the current popularity of small Asian cars. Its prominent shoulder line runs the length of the Civic, abruptly ending at the truncated tail. Trunk space is on the small side at 11.5 cu.-ft. but is aided by 60/40 split-folding rear seats for when you have longer objects to transport.

The futuristic theme of the Civic continues as you open the door and peer inside. The split-level gauges are unconventional, with speed displayed in digital glory above the steering wheel and the tachometer lonely between the spokes of the wheel. It is perhaps the most controversial aspect of the Civic, and it takes a while to get used to.

The top-of-the-line EX-trimmed test car was decked out with all the bells and whistles. An easy-to-use touch-screen and voice-activated naviga-

tion system led the way. Press 'open' to reveal an auxiliary jack for pods and a media card reader to let your playlist's tunes flow. The XM satellite radio was a nice surprise; it's difficult to return to the mundane world of FM after enjoying foul-mouthed comics for several uninterrupted hours. The stereo's numerous buttons are small and make you look away from the road to operate them; good thing there are redundant controls mounted on the steering wheel. You can skip the navigation system to get a simpler interface. Storage space around the cabin was plentiful, with useful cubbies and nooks to keep things close at hand. Riding in the rear seat of a compact sedan is never a winning proposition; the Civic is no exception. Although comparable to its competitors in its class, with 30.3 inches of rear legroom and 52.1 inches of shoulder space, full-sized adults stuck in the back will be hoping for a short trip.

Those with growing families should consider this when it's time to buy a new car. Motivated by a 1.8-liter four-cylinder engine making 140 horsepower, the Civic is no slug. Propulsion is somewhat hampered by the five-speed automatic, which tends to upshift quickly at lower speeds. Power delivery is smooth, the Civic emitting a feisty whirr when pushed.

The steering is lively and direct, transmitting a good amount of information from the road to your hands. While throttle response could use more spirit, the brake pedal was a tad touchy, resulting in jerky deceleration. The Civic provides a surprisingly quiet ride, effectively dampening road and wind noise.

Like its big brother the Accord, the Civic represents the middle of the road in almost every aspect. Yet, within the Civic's range there's a rainbow of options, from the bare-bones DX and the natural-gas propelled GX to the 50 MPG Hybrid and the zippy Si; most available in sedan or coupe flavor. Safety is a Civic strong point, with all models getting standard front-seat airbags, side airbags, and antilock brakes. But the loaded EX Sedan test vehicle's sticker price of over 20 grand was a shocker, proof that Honda wants to move Civic up in the world.

The Accord, for instance, starts under $20,000. Still, there's a reason why the Civic is so popular. No single aspect may stand out for its excellence over and above other compact cars, but taken all together they meld into a lovely, mellow driving experience complemented by a proven record for reliability and durability.

TEXT AND VOCABULARY EXERCISES

11. Put the missing information and translate the Details and Specs:

4-door sedan	Canada
$15,504 — $24,945	28/39 (GX)
EX	128 lb-ft @ 4300 RPM
5-speed manual	GPS navigation system
side curtain airbags	

- **Body style:** 2-door coupe, ___
- **Trim levels:** DX, LX, ___, Si, GX, Hybrid
- **Price range (including options):** ___
- **Base engine:** 1.8 liter inline 4, 140 horsepower @ 6300 RPM, ___
- **Optional engines:** Si: 2.0 liter inline 4, 197 hp @ 7800 RPM, 139 lb-ft @ 6100 RPM; GX: 1.8 liter natural-gas-fueled inline 4, 113 hp @ 6300 RPM, 109 lb-ft @ 4300 RPM; Hybrid: 1.3 liter inline 4 + electric motor, combined output 110 hp @ 6000 RPM, 123 lb-ft @ 1000-2500 RPM
- **Premium fuel required?** No
- **Transmission:** ____, 5-speed automatic, continuously variable transmission
- **Driveline:** Front engine, front-wheel-drive
- **EPA fuel economy estimates:** 30 MPG city/38 MPG highway (manual), 30/40 (automatic), 23/32 (Si), 49/51 (Hybrid), ___
- **Where built:** US, ___, England, Japan
- **Standard safety equipment**: Front airbags, front-seat-mounted torso airbags, ___, antilock brakes, electronic stability control (Si only)
- **Optional safety equipment**: None
- **Major standard features**: Power windows, tilt/telescope steering column
- **Major options**: ____
- **Warranty:** 3 years/36,000 miles bumper-to-bumper, 5 years/60,000 miles powertrain, 5 years/unlimited mileage outer body rust-through, 8 years/80,000 miles hybrid driveline (Hybrid only)
- **Roadside assistance/free maintenance**: None

12. Answer the following questions:

1. How many years ago was The Honda Civic introduced? **2.** What characteristic can you give to 2007 Honda Civic EX sedan? **3.** Does it have any safety equipment? **4.** What is the price range (including options)? **5.** What are the differences between the Civic and the Accord? **6.** What are the major options of the Civic? **7.** Where is it built? **8.** What body style does it have? **9.** What do you like the most about 2007 Honda Civic EX sedan? **10.** Why is the Civic so popular? **11.** Think of who should buy the Honda Civic and who should not buy it.

13. Find the English equivalents in the text for the following words expressions:

Повседневное средство передвижения, доступный малолитражный автомобиль, прямо со школьной скамьи, неустойчив в стиле, благодаря современной популярности, цифровое изображение, бесконечные часы, держать вещи под рукой, с увеличением семьи, обеспечивает на удивление спокойную езду, сильное место, приятное вождение.

14. Finish the following sentences:

1. The title of the article is ... **2.** The article is written by ... **3.** The subject matter of this article is ... **4.** The article begins with the describing of... **5.** Then follows the information about ... **6.** The next paragraph deals with... **7.** The further paragraph presents ... **8.** The final part of the article describes ... **9.** This article is interesting for...

15. Find the right English equivalents for the following words:

1) приспособление	a) jack	b) jerk	c) jet
2) ветровое стекло	a) window	b) windscreen	c) windshield
3) соперничать	a) to illuminate	b) to emulate	c) to ammoniate
4) вспомогательный	a) exhaustive	b) auxiliary	c) executive
5) укромное место	a) nook	b) hook	c) look
6) поступательное движение	a) population	b) pulsation	c) propulsion
7) сварливый	a) feisty	b) thirsty	c) feast
8) фара	a) headline	b) headlight	c) headlamp
9) спица	a) spot	b) spoke	c) spoon
10) хранение	a) storage	b) story	c) store

16. Using the information from the text 1B add some more Pros and Cons:

Pros	Cons
Well-mannered in almost any situation	Small trunk
Great fit and finish	Controversial dash design
Useful storage space in cabin	Driving experience somewhat lacking in personality

17. Choose the most suitable word and fill in the gaps:

1. The Honda Civic is one of Honda's ... vehicles.
a) usual b) daily c) universal

2. Within the Civic's range there's ... options, from the bare-bones DX and the natural-gas propelled GX to the 50 MPG Hybrid and the zippy Si.
a) a number of b) a good amount of c) a list of

3. Propulsion is somewhat hampered by the five-speed automatic, which tends to upshift ... at lower speeds.
a) rapidly b) immediately c) swiftly

4. Safety is a Civic ... point.
a) important b) significant c) strong

5. The Accord, ... , starts under $20,000.
a) by the way b) besides c) for example

6. The steering is lively and direct, transmitting ... information from the road to your hands.
a) a rainbow of b) a great amount of c) all

7. You can ... the navigation system to get a simpler interface.
a) miss b) ignore c) use

8. Storage space around the cabin was plentiful, with useful cubbies and nooks to keep things ... at hand.
a) close b) near c) right

9. The Civic ... a surprisingly quiet ride, effectively dampening road and wind noise.
a) promises b) gurantees c) saves

10. ... in the rear seat of a compact sedan is never a winning proposition.
a) travelling b) driving c) riding

18. Translate into English:

Honda — компания, основанная в 1946 году японским инженером, изобретателем и автогонщиком Соитиро Хонда (Soichiro Honda), родившимся в 1906 году. Изобретения Хонды в будущем принесли ему славу человека, способного находить простые решения для сложных проблем. В 1938 году он изобрел поршневое кольцо; производством колец и занималась основанная им в 1937 году компания Tokai Seiki Heavy Industry. В 1946 году он основал компанию под названием «Институт технических исследований Хонда» (Honda Technical Research Institute), а в 1947 году началось производство первого продукта компании — 2-тактного двигателя A-type объемом 50 куб. см. Через год, в 1948-м, компания Honda Motor Company приступила к разработке и производству мотоциклов.

Первый мотоцикл компании, получивший название Dream («Мечта»), был выпущен в 1949 году. В 1955 году компания стала лидером по выпуску мотоциклов в Японии. Укрепив свои позиции на рынке мотоциклов, Honda вступила на рынок автомобилей, представив в 1963 году свой первый автомобиль — небольшую спортивную модель S500. С этого времени Honda начала завоевывать признание как производитель компактных недорогих качественных автомобилей.

В настоящее время Honda — динамично развивающаяся компания, выпускающая легковые автомобили и мотоциклы, спецтехнику, двигатели, силовую продукцию. Технологические новшества, которые компания постоянно разрабатывает и вводит в строй, касаются не только автомобилей — это и навигационные системы, и строительство экологически чистых заводов, и исследования во многих других сферах, и участие в разных видах автомобильного спорта. Сейчас компания располагает 119 производственными предприятиями в 33 странах мира, что позволяет ей ежегодно выпускать свою продукцию миллионами единиц.

19. Tell about 2007 Honda Civic EX Sedan using the information from text 11A.

TEXT WORK

20. Read and translate the text below:

Text 11B. 2007 Honda Fit Base

By Aaron Gold

Small in size, cheap in price, and easy on fuel consumption, the Fit is an easy-to-own Honda that gets back to basics, in a surprisingly sophisticated kind of way. Honda made its name along with small cars; most people know the Civic, and a few will remember Honda's diminutive N600 with its motorcycle-sourced engine. From the beginning, these small Hondas were cheap to buy, cheap to run, and seemingly allergic to repair shops. As the years went by, Hondas grew with their customers. The Civic grew big enough to haul college-age friends, and has since matured into a quiet, comfortable, grown-up car. The Accord has become a respectable sign of the establishment, and for many families the Odyssey minivan is the mom-mymobile of choice.

When you're trying to get as much interior space as possible into as little exterior space as possible, styling can't be your first priority. The Fit isn't a particularly good-looking car, though the body-colored details behind the big clear headlight covers stand out nicely. The top-of-the-line Sport model gets alloy wheels, but the Base model had steel wheels with plastic hubcaps that looked just fine especially when you consider that its slightly narrower tires contribute to fuel economy.

What most impressed is the proportioning of space between front seats, back seats and trunk. Most minicars, like the Scion xA, offer generous back seats at the cost of cargo space. Serious hauling requires folding the back seats down. The Fit is only 3 feet longer than the xA, yet offers nearly twice as much cargo room with the seats up. On paper the Fit shows less legroom for rear passengers, yet the rear seat is a surprisingly hospitable place. Honda relocated the fuel tank from the traditional spot under the rear seats to the middle of the car, so the rear seats fold down flat into the floor and turn the Fit into the subcompact answer to the moving van.

Honda did a beautiful job with the Fit's interior. The stereo control is innovative and unique-looking, yet easy to use without diverting attention from the road ahead. Same for the A/C. One of complaints about older, cheaper Hondas was the interior materials; they tended to use cheap plastics that scratched and scarred too easily. Fit materials are top-notch in the passenger areas, though the plastic that lines the cargo bay is, sadly, old-school Honda.

Great fuel economy, even under adverse circumstances Honda's been building bigger and bigger engines to suit the American market, so it's easy to forget that they are the masters of small-engine power. The Fit's engine is a tiny 1.5 liter 4-cylinder unit. Its horsepower output is 109, but more important is the torque rating: 105 lb-ft. Torque is pulling power. It's what pushes you back in your seat and makes the car feel fast. Torque is generally a function of displacement; bigger engines usually produce more torque, which is why so many small cars have 2.0 liter or larger engines. Honda uses VTEC, their variable valve timing system, to boost the 1.5 liter engine's torque, particularly at lower RPMs. In the real world, that means that the Fit doesn't feel totally gutless with an automatic transmission. Of course, the upside to small engines is economy.

The Fit is a smaller, less expensive car than the Civic; it's also noisier and less refined. That's OK considering the price point: $14,445 for the Fit Base, which includes power windows, locks and mirrors, A/C, CD player, power steering, front-seat-mounted side airbags, side curtain airbags and antilock brakes. The Fit Base's only factory-installed option is an automatic transmission ($800). For $1,320 more the Fit Sport gives you alloy wheels, fancier body trim, cruise control, leather-wrapped steering wheel, remote keyless entry, alarm, and — for automatics — steering-wheel-mounted paddles to shift the transmission in manual mode.

If you're shopping for a Fit, bear in mind that the Civic's EPA ratings are close or better — 30 city/38 highway for the stick shift, 30/40 for the automatic, compared to the Fit's 33/38 manual and 31/38 automatic. Good as the Fit is, the Civic offers more space and sophistication, but lacks the Fit's ability to squeeze into small parking spots and nip through tiny holes in traffic. If you're looking for a fuel-saving car, the Civic's refinement and comfort might please you more. But if you like small for small's sake, then the Fit is the way to go.

TEXT AND VOCABULARY EXERCISES

21. Find information in the text about:

a) interior
b) engine
c) fuel economy
d) major options

22. Make up questions to which the italicized words are the answers:

1. What most impressed is *the proportioning of space between front seats, back seats and trunk*. **2.** Serious hauling requires *folding the back seats down*. **3.** Honda relocated the fuel tank from the traditional spot under the rear seats *to the middle of the car*. **4.** One of complaints about older, cheaper Hondas was *the interior materials*. **5.** Its horsepower output is *109*. **6.** *The Fit* is a smaller, less expensive car than the Civic; it's also noisier and less refined. **7.** For *$1,320* more the Fit Sport gives you *alloy wheels*, fancier body trim, cruise control, leather-wrapped steering wheel, remote keyless entry, alarm, and — for automatics — steering-wheel-mounted paddles *to shift the transmission in manual mode*. **8.** If you're looking for a fuel-saving car, *the Civic's* refinement and comfort might please you more.

23. Match the line in A with the line in B:

Details and Specs

A	B
1) Trim levels:	a) No
2) Body style:	b) Front engine, front-wheel-drive
3) Price range:	c) $14,445 — $16,565
4) Base engine:	d) None
5) Optional engine:	e) 5-door hatchback
6) Premium fuel required?	f) liter inline 4, 109 hp @ 5800 RPM, 105 lb-ft @ 4800 RPM
7) Transmission:	g) Front airbags, front-seat-mounted torso airbags, side-curtain airbags, antilock brakes
8) Driveline:	h) 3 years/36,000 miles bumper-to-bumper, 5 years/ 60,000 miles powertrain, 5 years/ unlimited mileage outer body rust-through
9) EPA fuel economy estimates:	i) Base, Sport
10) Where built:	j) 5-speed manual, 5-speed automatic
11) Standard safety equipment:	k) 33 MPG city/ 38 MPG highway (manual), 31/ 38 (Fit Base automatic), 31/ 37 (Fit Sport automatic)
12) Optional safety equipment:	l) Air conditioning, power windows, door locks and mirrors, CD player, cruise control (Sport only), alloy wheels (Sport only)
13) Major standard features:	
14) Major options:	
15) Warranty:	

16) **Roadside assistance/free maintenance:**

m) Japan
n) None
o) None
p) None

24. Work in pairs and decide whether these statements are true or false and correct false ones:

1. Small in size, cheap in price, and easy on fuel consumption, the Fit is an easy-to- own Honda that gets back to basics sophisticated kind of way. **2.** Price ranges $14,445 — $20,565. **3.** EPA fuel economy estimates 43 MPG city/48 MPG highway. **4.** Honda is built in the USA. **5.** There is no any optional safety equipment in it. **6.** Great fuel economy, even under adverse circumstances Honda's been building bigger and bigger engines to suit the European market. **7.** The Fit is only 2 longer than the xA, yet offers nearly twice as much cargo room with the seats up. **8.** Honda uses VTEC, their variable valve timing system, to boost the 1.5 liter engine's torque, particularly at lower RPMs. **9.** Torque is pulling power. **10.** Honda relocated the fuel tank from the traditional spot under the front seats to the middle of the car.

25. Using the information from text 11B add some more Pros and Cons:

Pros	Cons
Excellent division of space between front seats, back seats and cargo area	Nerdy styling
Zippy engine	Plastics in the cargo area scratch easily
Great fuel economy	Pricier than rival minicars
Lots of standard safety equipment	

26. Choose the main sentences from text 11B and tell about the 2007 Honda Fit Base.

27. Put the correct prepositions. Give the title to the text.

for	to	on	for	around	with	in	away	of

The new car scent is a world famous anti-depressant 1)___ people of all ages. Chances are, if you are considering buying a new car, your destination is a car dealership showroom. Many times a car dealer will allow you 2)__ sit in a new car to feel the comfort of the seats and examine the various features you are being offered in that specific model. Even more luxurious: some dealers will allow you to take a new car 3)___ a spin 4)___ the neighbourhood (or a man-made track) to see how it handles 5)___ the road. Your decision can, as such, become more specific and focused-this will increase the chance that you will be fully satisfied 6)___your new car. Are you on a low budget and trying to get rid 7)___ your old car? Buy your new car using the trade-in system. This allows the car owner to turn 8)___

the old model 9)___a better deal on the new car. You must negotiate all prices, especially the trade-in, so as to make sure you have achieved the best financial agreement possible 10)___the new car.

Buying a new car should not be a time 11)___ regret or sorrow-make the effort where it needs to be made and ensure your satisfaction. Features are a very important part 12)___ buying a new car-make sure the music system, air conditioning, etc., are all up to par. Choose carefully and negotiate well — your new car is only a few hours 13)___.

GRAMMAR

28. Проанализируйте формы модальных глаголов в сочетании с перфектным инфинитивом и инфинитивом страдательного залога:

Modal Verbs with Infinitive Perfect

Must

The price of the new car *must have been* extremely high.
Стоимость новой машины, *наверное* (*должно быть*), очень высока.

May

He *may have arrived* but we don't know about it.
Он, *возможно*, приехал, но мы этого еще не знаем.

Could

You *could have repaired* this car yourself.
Он *мог бы отремонтировать* эту машину сам (но не сделал).

Should

They *should have tested* the new equipment.
Они *должны были проверить* новое оборудование (но не проверили).

Might

They *might have picked* us up.
Они *могли бы подвезти* нас.

Ought to

The driver *ought to have been* careful while driving a car.
Водителю *следовало быть* осторожным за рулем.

Modal Verbs with Infinitive Passive

Can

Today cars *can be found* everywhere.
Сегодня автомобили *можно встретить* повсюду.

May

This device *may not be switched* on here.
Этот прибор *нельзя включать* здесь.

Must

The tank *must be filled* as soon as possible.
Бак *должен быть заправлен* как можно скорее.

Should

The batteries *should not be kept* uncharged.
Батареи *не следует держать* разряженными.

29. Переведите следующие предложения на русский язык, обращая внимание на модальные глаголы:

1. Cars must have been an obsession for human beings since their conception in the late 19th century. **2.** The gas should have occupied much smaller volume than petroleum. **3.** The maintenance of cars should have been of utmost importance as the cars must be shiny, mechanically functional, and ready to be taken for any whimsical spin deemed necessary. **4.** Cars can be powered by new-age hybrid motors which rely on an electrical back-up system-only using gasoline combustion when absolutely necessary. **5.** There may have been nothing more luxurious than adapting classic cars to new, hybridized technologies. **6.** The new car scent can be found as a world famous anti-depressant for people of all ages. **7.** Buying a new car should not be a time for regret or sorrow-make the effort where it needs to be made and ensure your satisfaction. **8.** Past Civics may have been the ultimate in getting the most bang for the fresh-out-of-school buck. **9.** The 2007 Toyota Corolla could be said to be in the autumn of its years, lagging behind its rivals on style and standard safety kit. **10.** But that doesn't mean the Corolla should be stricken from your short list — it's still a very competitive car.

30. Translate into English:

1. Водителю за рулем следовало бы быть более внимательным. **2.** Здесь нельзя оставлять автомобиль. **3.** Ты должен был проверить бак на наличие в нем топлива прежде, чем ехать. **4.** Покупая новую машину, следовало бы хорошо проверить все опции. **5.** Ты не должен был здесь поворачивать. **6.** Он, возможно, заедет за нами в 9. **7.** Ты должен был пристегнуть ремень безопасности. **8.** Такая машина, должно быть, стоит очень дорого. **9.** Эта очень распространенная модель, которую можно встретить очень часто. **10.** Нельзя садиться за руль в нетрезвом состоянии. **11.** В новую модель микроавтобуса, наверно, поместится 18 человек. **12.** Не следует садиться за руль без документов. **13.** Машину должны были отремонтировать еще на той неделе. **14.** Новая машина, должно быть, прослужит вам долго.

31. Put the necessary modal verb (*can, could, should, must. may, might*) into the gaps and translate the text:

Your automobile ___ be as pretty as it wants-it will not be a good car if it is constituted of bad car parts. When purchasing a used car, you ___ be sure to get good descriptions of all car parts it contains. This will help you avoid later mechanical problems that ___ be caused by having low quality or used car parts fail on you. Safety is one of the most important aspects of driving a car: make sure your safety-related car parts are of utmost quality and functioning properly. Your airbag ___ be checked regularly for wear, as the failing of it ___ cost you your life. Your seatbelt is one of the most important of all car parts-it ___ change a deadly collision into a minor injury, and is proven to save lives.

Have you ever had problems starting up your car in the morning? This ___ be due to the bad quality of your ignition car parts. Your starter, car battery, ignition coil, and spark plugs all fall into this category of car parts. Without one of these of crucial elements functioning, the starting of your car ___ be a problematic event. Have these car parts checked by a professional for integrity and functionality. It is almost unnecessary to mention the importance of good car parts relating to your engine. Your engine is the core element in the functioning of your car- you ___ be sure its parts are well checked. Car parts are what makes up your automobile. You ___ be sure to give them the importance they deserve.

TEXT WORK

32. Read the text and give a brief summary of it:

Text 11C. 2006 Ford Focus

From Aaron Gold

It's got a tall seating position that makes you feel in command of the road. With a height adjustable seat and a steering wheel that moves in and out as well as up and down, the Focus invites every driver to find a comfortable position. The windows are big and visibility is excellent. The dashboard is simplicity itself, making it easy to concentrate on driving. The Focus is also available as a 5-door hatch (ZX5) and wagon (ZXW).

The Focus is more like a pet. If the Focus had a tail, it would wag when it saw you coming. 'You want to go driving?' it seems to say. Part of the Focus' secret is that it was designed in conjunction with Ford's European division, which means it's well suited to twisty roads. The steering feel is fantastic on both curves and straights. The ride is bouncy but the handling is well controlled. Even if you're not the type who grins whenever you see a squiggly-road-ahead sign, you'll appreciate the Focus' responsiveness if you ever have to swerve to avoid an accident. If the Focus has anything approaching a weak point, it's the 2-liter four-cylinder engine. It has more

миру Ford T — автомобиль, доступный каждому. Ford Motor Company первой ввела конвейер. Благодаря этой технической новинке Генри Форд сумел снизить стоимость модели Tin Lizzy с 850 до 290 долларов. Создавая компанию, Генри Форд мечтал об автомобиле, чья стоимость не превышала бы годового оклада тех простых рабочих, которые собирали машины на заводе в Детройте.

С 1976 года легендарная овальная эмблема Форд с синим фоном и серебряными буквами ставится абсолютно на все автомобили компании, чтобы в любой стране мира можно было с легкостью узнать продукцию Ford. В настоящий момент по всему миру продается более 70 различных моделей машин, произведенных под марками Ford, Lincoln, Mercury и Aston Martin. У Ford есть также доля акций в компаниях Mazda Motor Corporation и Kia Motors Corporation. 9 июля 2002 года в городе Всеволжск Ленинградской области официально открыт новый завод Ford Motor Company полного производственного цикла.

37. Using the information from texts 11A, 11B and 11C fill in the table and compare three vehicles. Discuss with your group advantages and disadvantages of each one. Use the following expressions:

What do you think of; I think; It goes without saying; I'd like to say a few words in favour of; On the contrary; I think I can add some more information; As far as I know; You didn't mention the fact that; To sum it up; It is necessary to say that, etc.

	Honda Civic EX Sedan	**Honda Fit Base**	**2006 Ford Focus**
Interior			
Price			
Options			
Safety			
Details			
Country			

38. Put the paragraphs into the correct order. The first is right. Discuss with your group mates all advantages and disadvantages of buying the used cars. The following expressions will help you:

I didn't think that; I agree that; I'd like to point out; On the one hand; on the other hand; I don't agree that; Did you know that?; I can quite agree with, etc.

Used Autos

(1) Although we have been taught that new is better, wisdom still dictates otherwise. Used autos will always have a huge appeal to budget-smart and nostalgic car shoppers around the world.

( ) Communicate with others and get information on where you can find a trustworthy dealership. Word of mouth is crucial and easy to come by in the age of the internet. Customers often form message boards online to discuss local dealerships and their pros and cons. Make sure to use this to your advantage: any used autos you may invest in will be safe purchases.

( ) It is important to examine used autos and their documentation. A good used autos dealer will have all the information on hand: technical information relating to past repair is the most basic element of this. Getting used autos examined by a third-party mechanic is also a good idea so as to get an unbiased perspective on the quality and durability of your potential purchase. In this day and age it is no longer the norm to be 'ripped off' by dealers in dingy sale lots.

( ) For many, a new car is not a financial option: used autos should not be thought of as a compromise, however, as they have their benefits. The fact that used autos are second hand can be a selling point for many potential car buyers, as these vehicles always have enough road time under their belts to prove they are trustworthy. Used autos, in fact, can redefine your concept of durability: many times they will outlast their new counterparts. The fact that used autos can be purchased for substantially less money must not be ignored: why create imbalances in your budget due to your transportation needs? Find what you want within the used autos market and your wallet will thank you later.

Check your answers on p. 321

SUPPLEMENTARY READING

39. Read the texts 46, 47 to get information about Ford Motor Company.

WRITING PRACTICE

40. Read the following text carefully in order to discover the main line of thought. Wright a summary of the text:

Car Movies

Some of the most entertaining parts of a movie, for many males, are the car chases. When a movie is mostly comprised of these, mainly in an effort to assuage the mechanically excitable, the movies take on a new name: car

movies. Car movies are a whole genre in and of themselves, with a cult following to match.

'Bullitt' is often called the greatest film in the car movies category. Released at the crest of the muscle car craze, this film involves car chases through San Francisco that make other car movies look flimsy. "Gone in 60 Seconds" was also a classic that stands out amongst other car movies for its intensely long car chase scenes. It was adapted in the year 2000 and starred in by Nicolas Cage — a second wave of love for this movie occurred then, reminding everyone how much they appreciated car movies in the first place. No matter what movies you normally appreciate, car movies will give you an extra kick of adrenaline that is undeniable.

Many of the car chase scenes in car movies are responsible for making generations enamored with certain specific car models. A good example of this is 'Smokey and the Bandit', in which Burt Reynolds plays a beer bootlegger driving across America-leaving cop cars shattered along the way. Of all car movies, this is the one that encouraged America's love of the Pontiac Trans Am. The glamour of car movies has a huge impact on their audiences. Experience a good car chase today: look for car movies at your local video rental store, you won't regret it.

UNIT 12

ACTIVE VOCABULARY

1. Read and remember the following words:

aforementioned — вышеупомянутый
agile — быстрый, живой
curve — поворот
fumbling — неловкость
geriatric — старческий
lagging — медлительный
to loom — вырисовываться
luxury — роскошный
margin — запас
proverbial — общеизвестный
roomy — вместительный
to saddle — седлать
sluggish — медлительный
squeal — визг, вопль
throttle — дроссель
tilt — наклон
top-notch — первоклассный
twisty — извилистый
to vault — прыгать, скакать
vital — жизненно важный

PRE-TEXT EXERCISES

2. Translate the following words combinations:

The proverbial brick outhouse, looming on the horizon, with a minimum of fumbling, a light stab of the throttle, a respectable margin, twisty roads, the squeals of protest from the tires, the sort of agile and predictable

response, the aforementioned electronic stability control system, saddle them with an automatic transmission, luxury cars, top-notch safety gear in lower-priced cars.

3. Find synonyms for the following words:

aforementioned	twisty	proverbial
agile	looming	tilt
geriatric	margin	roomy
lagging	curve	sluggish

WORD-BUILDING

4. Translate the following nouns paying attention to the suffixes:

-let booklet, droplet, eyelet, ringlet, streamlet, armlet, pondlet;

-ship friendship, membership, authorship, leadership, relationship, dealership, township;

-ure culture, picture, structure, failure, measure, pleasure, treasure;

-y density, property, visibility, economy, family, folly, mercy.

5. Translate the following adjectives and adverbs paying attention to the suffixes:

-like ape-like, dreamlike, marble- like, bell-like, workman — like, life-like;

-some tiresome, troublesome, awesome, handsome, foursome, irksome;

-y windy, sunny, holly, cloudy, shaky, chilly, greeny, craggy;

-ward(s) forward, inward, nayward, backward, poleward, windward.

6. Using the suffixes above make a) the nouns; b) the adjectives and adverbs:

a) deliver, fix, geometric, court, neck;

b) down, sleep, lone, home, gentleman, sponge, back, rotor, chat, west, up, stone, quarrel, sun, glass.

7. State to what part of speech the following words belong and fill the table below:

Version, safety, surprisingly, economical, outhouse, proverbial, windy, wonderfully, radical, powerful, electronic, stability, equipment, relatively, automatic, instrument, luxury, virtually, chunky, sluggish, adjustment, transmission, exclusive, respectable, predictable, suddenly, additional, active, protection, dealership, roomy, competitor, competitive.

Noun	Adjective	Adverb

TEXT WORK

8. Read and translate the text to know about 2007 Toyota Corolla.

Text 12A. 2007 Toyota Corolla

By Aaron Gold

With a new version looming on the horizon for 2008, the 2007 Toyota Corolla could be said to be in the autumn of its years, lagging behind its rivals on style and standard safety kit. It's surprisingly powerful and wonderfully economical, it knows its way around a windy road, and it's built like the proverbial brick outhouse. The Corolla CE base model is a smart buy at $14,825. EPA city/highway estimates: 32/41 MPG (manual), 30/38 (automatic).The current version of the Corolla, which dates from 2003, is geriatric. It's biggest rival, the Honda Civic, received a radical re-do for 2006 that vaulted it well past most of its competitors. Toyota offers electronic stability control, which they call VSC (Vehicle Stability Control), as an option on all but the base-model CE version of the Corolla. Of course, one could chide Toyota for offering side airbags and antilock brakes as options, not standard equipment as they are on the Civic and the new

Hyundai Elantra. Top-notch safety gear in lower-priced cars is a relatively recent phenomenon. If you buy a Corolla, insist on getting a car equipped with these vital options. They use big, chunky buttons and switches that are clearly and legibly marked, so virtually all of the controls can be used with a minimum of fumbling.

The electroluminescent gauges, exclusive to the LE model, are another nice touch. The instrument panel is dark when you first get in. The speedometer and tachometer light up. It wasn't long ago that this feature was only found on luxury cars, though it does have one problem: with the dash always lit up, it's easy to forget to turn the lights on at night, especially since the Corolla comes with standard daytime running lights. (That means the headlights are always on, but the taillights and side markers aren't.)

The Corolla's steering column has a tilt adjustment but no telescope (in-and-out) adjustment. Most small-car engines are optimized for use with a manual transmission. Saddle them with an automatic transmission and they often feel sluggish — there's never enough power unless you floor the gas, and then you get too much power. A light stab of the throttle gave all the power you needed, with plenty left in reserve even when cruising the freeway at ten above the limit. That's all the more surprising considering the Corolla's transmission has only 4 speeds, versus 5 in many newer designs. For those who like numbers, the Corolla's engine displaces 1.8 liters and puts out a modest 126 horsepower and 122 lb-ft of torque. (The hot-rod 170 horsepower Corolla XRS has been discontinued for 2007.)

What's amazing is how economical the engine is. EPA numbers for the automatic (30/38) match the Civic on the freeway and trail just 2 MPG behind on the highway, while in stick-shift form the Corolla bests the Civic by a respectable margin. Also surprising is the Corolla's behavior on twisty roads. The car handles the curves well, provided you can ignore the squeals of protest from the tires. Though it stops short of being fun to drive, the Corolla offers the sort of agile and predictable response you want should you have to suddenly swerve to avoid an accident. The aforementioned electronic stability control system, available in Corolla S and LE, adds an additional layer of active protection, helping to keep the car under control in a panic situation.

Corolla the entry-level CE comes with air conditioning and a CD player, and its interior is trimmed out with the same Camry-grade carpets, fabrics and plastics as other Corolla models. CEs can be a bit hard to find, though, as they are loss leaders; their primary mission in life is to allow dealerships to advertise Corollas for under $15,000. Other variants include the S model, which adds sporty body trim and a few more options, and the LE, with the aforementioned electroluminescent gauges and wood trim as well as remote keyless entry. Whichever Corolla you prefer, insist on buying a car with antilock brakes and side airbags, especially if the car is to be used as a family-hauler or piloted by inexperienced drivers.

Details of what a future Corolla might bring weren't known at the time of writing. You can bet it will be more radically styled, and hopefully it'll have more standard safety equipment. Still, despite its conservative duds,

the current Corolla is surprisingly up-to-date: roomy, powerful, economical, and agile, all things that we demand from the latest-and-greatest in compact sedans. If you're in the market, the Honda Civic is better looking and the Hyundai Elantra does all the same stuff at a lower price (and with lots of standard safety kit). Toyota offers an appealing competitor of its own, the smaller and simpler Yaris sedan. But that doesn't mean the Corolla should be stricken from your short list — it's still a very competitive car.

TEXT AND VOCABULARY EXERCISES

9. Put the missing information and translate the Details and Specs:

LE	bumper-to-bumper
122 lb-ft @ 4200 RPM	$14,825—$21,929
No	5-speed manua
30/38 (automatic)	the USA
Front airbags	CD player
3 years/36,000 miles	

- **Body style:** 4-door compact sedan
- **Trim levels:** CE, S, ___
- **Price range (including options):** _____
- **Base engine:** 1.8 liter inline 4, 126 hp @ 6000 RPM, ____
- **Optional engine:** None
- **Premium fuel required?** ___
- **Transmissions:**_____, 4-speed automatic
- **Driveline:** Front engine, front-wheel-drive
- **EPA fuel economy estimates:** 32 city/41 highway (manual), _____
- **Where built:** ____, Canada, Japan
- **Standard safety equipment:** ____
- **Optional safety equipment:** Antilock brakes, side airbags, electronic stability control (S, LE only)
- **Major standard features:** Air conditioning, ___
- **Major options:** JBL stereo with CD changer, sunroof, alloy wheels
- **Warranty:** _____, 5 years/60,000 miles powertrain, 5 years/unlimited mileage outer body rust-through
- **Roadside assistance/free maintenance**: None

10. Answer the following questions:

1. How many years ago was the current version of the Corolla introduced? **2.** What characteristic can you give to Toyota? **3.** Does it have any safety equipment? **4.** What is the price range (including options)? **5.** What are the differences between the CE, S and LE models? **6.** What are the major options of the Corolla? **7.** Where is it built? **8.** What body style does

it have? **9.** What do you like the most about 2007 Toyota Corolla? **10.** Why is the Toyota so popular? **11.** Think of who should buy the Honda Civic and who should not buy it?

11. Find the English equivalents for the following word combinations:

Используется в качестве семейного транспорта, современная версия, относительно редкое явление, оборудованная жизненно важными опциями, ясно и четко обозначенные кнопки, дневная подсветка, удивительно модернизирована, дополнительная защита, держать под контролем, избежать аварии, неопытный водитель, вопль протеста, первоначальная миссия.

12. Using the information from text 12A add some more Pros and Cons and discuss with your classmates. Use the following expressions:

I think that	It goes without saying
I'd like to say a few words in favor of	On the contrary
I think I can add some more information	As far as I know
You didn't mention the fact that	It is necessary to add

Pros	Cons
Powerful and economical engine	Conservative styling
Reliable as can be	Some safety features which are standard in rivals are optional in the Corolla
Low-end CE model is nicely trimmed and equipped	

13. Choose the right word which best complete the sentence:

1. It's ... powerful and economical car.
a) wonderfully b) amusingly c) terribly
2. Top-notch safety gear in lower-priced cars is a relatively ... phenomenon.
a) usual b) rare c) constant
3. Despite its conservative duds, the current Corolla is surprisingly ...
a) modernized b) equipped c) facilitated
4. The Corolla's steering column has a tilt ...
a) unit b) adaptation c) jack
5. That means the headlights always ... on.
a) light b) switch c) burn
6. If you buy a Corolla, insist on getting a car equipped with ... options.
a) important b) safety c) all
7. Their primary ... in life is to allow dealerships to advertise Corollas for under $15,000.
a) aim b) target c) demand
8. Most small-car engines are optimized for use with a ... transmission.
a) manual b) hand c) arm
9. Also surprising is the Corolla's behaviour on ... roads.
a) unequal b) curve c) indirect

14. Finish the following sentences according to text 12A:

1. The instrument panel is ... **2.** The Corolla comes with... **3.** Most small-car engines ... **4.** The Corolla's transmission has ... **5.** The Corolla the entry-level CE comes ... **6.** It wasn't long ago that ... **7.** The Corolla CE base model is .... **8.** Toyota offers... **9.** The current Corolla is ... **10.** The 2007 Toyota Corolla could be ...

15. Find the English equivalents to the following Russian words:

1) быстрый	a) agile	b) angel	c) engine
2) визг	a) square	b) squeal	c) squeeze
3) седлать	a) to set	b) to settle	c) to saddle
4) медлительный	a) lagging	b) luggage	c) lagan
5) дроссель	a) throttle	b) throw	c) thorough
6) прыгать	a) to work	b) to volt	c) to vault
7) извилистый	a) twister	b) twisty	c) twixt
8) общеизвестный	a) proverbial	b) proverb	c) provide
9) вместительный	a) loony	b) roomy	c) gloomy
10) скакать	a) volt	b) fault	c) vault

16. Translate into English:

Началом истории компании Toyota можно считать 1933 год, когда в компании Toyoda Automatic Loom Works, изначально не имевшей отношения к автомобилям и занимавшейся текстильной промышленностью, открылся автомобильный департамент. Открыл его старший сын владельца компании Сакити Тойоды (Sakichi Toyoda) Киитиро Тойода (Kiichiro Toyoda), впоследствии и приведший автомобильную марку Toyota к мировой известности.

В 1937 году автомобильный департамент превратился в отдельную компанию, получившую название Toyota Motor Co., Ltd. В 1961 году выпущена модель Toyota Publica — небольшой экономичный автомобиль, быстро ставший популярным. В 1962 году Toyota отметила выпуск миллионного за свою историю автомобиля.

Одним из главных событий 80-х годов можно считать появление такой марки, как Lexus — подразделения Toyota, созданного для выхода на рынок автомобилей высокого класса. До этого Япония ассоциировалась с небольшими, экономичными, недорогими и демократичными автомобилями; а с появлением Lexus в секторе роскошных дорогих машин положение изменилось. 1990 год ознаменовался открытием собственного дизайнерского центра — Tokyo Design Center.

На сегодняшний день Toyota — один из крупнейших мировых производителей автомобилей. Безусловно, она также является крупнейшим японским автопроизводителем, выпускающим более 5,5 миллионов машин в год, что примерно равно одной машине каждые шесть секунд. В группе Toyota — множество компаний, как автомобильных, так и занимающихся многими различными областями.

17. Tell about one of the latest models of Toyota Corolla.

TEXT WORK

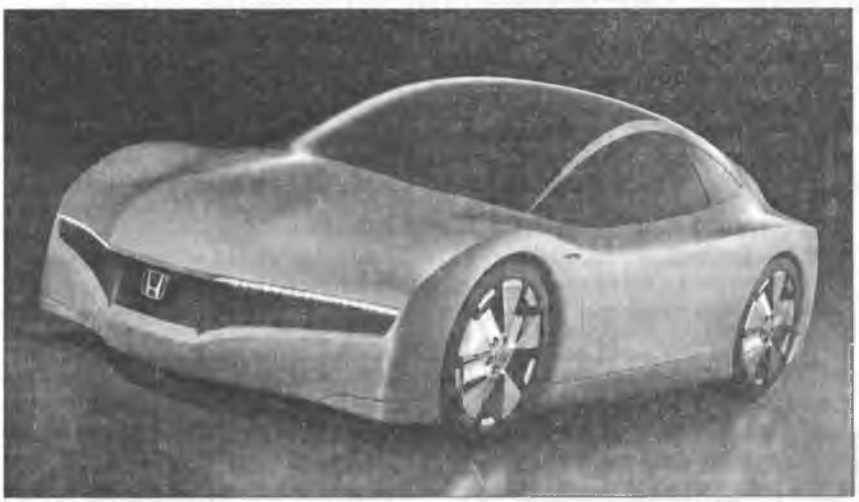
18. Read and translate the text below:

Text 12B. Hybrid Cars

Honda Extends Hybrid Warranty for Honda Insights. Although Honda stopped producing the 2-seater Honda Insight hybrid that started the hybrid car craze, Honda still stands behind the Insight and its hybrid technology. In fact, Honda sent letters to current owners of the 2000—2004 Insight extending the warranty on the hybrid components. Owners of model year 2000 through 2004 Honda Insights have received notices that Honda has extended the warranty on the Insights' Integrated Motor Assist (IMA) Battery Module.

The IMA Battery Module is the heart of the car's hybrid system and is now covered for 10 years or 150,000 miles, whichever comes first. Over the years some Honda Insight owners have reported failures of this system, but in most cases Honda was providing 'goodwill' financial assistance in repairing any problems on a case by case basis. In some cases owners paid a reduced amount for replacement of the hybrid battery module components. In other cases Honda covered the repairs in full. Now that current owners have been receiving official 'Warranty Extension' letters, Honda is also encouraging previous owners to contact them to see if they are eligible for reimbursement.

The letter doesn't mention anything about the reason why the hybrid battery module might fail in the first place, but most of the anecdotal



stories seem to identify manual transmission Honda Insights being more susceptible to failure. Speculation among owners is that manual transmission owners are able to use the hybrid system more heavily than the "automatic" transmission version. For example, driving up a long steep hill in fifth gear rather than downshifting to lower gear, thus overtaxing the hybrid battery. Honda's extension of the Insight's hybrid battery module warranty should help alleviate consumer's concerns about replacing the hybrid battery. Honda Insight owners are breathing a sigh of relief, knowing that their car is hybrid warranty has been extended.

Saturn 2007 Aura Green Line hybrid. General Motors has announced the 2007 Saturn Aura Green Line hybrid will have a starting base price of $22,695 which just makes it the lowest-priced hybrid on the market for 2007, undercutting the Toyota Prius by $100 and the Honda Civic Hybrid by $500. The IRS has certified that Aura Green Line buyers will qualify for a tax credit of $1,300, which makes the difference even larger as the tax credit for the Prius will drop to $787. While the Aura Green Line is less-expensive than the other hybrids, it is a 'mild' hybrid and can not be driven on electric power alone.

The Aura Green Line's hybrid system in the Aura mates 2.4 L four-cylinder to an electric motor/generator, which captures electrical energy during regenerative braking. The hybrid system in the Green Line improves fuel economy by providing electric assist during acceleration, by cutting fuel during deceleration, and by shutting the engine off at idle. The Aura Green Line EPA fuel economy rating of 28 mpg in the city and 35 mpg on the highway represents up to a 30 percent improvement in EPA combined fuel economy compared to the non-hybrid Aura XE. The 2007 Saturn Aura Green Line is arriving in dealerships now.

2007 Nissan Altima hybrid. In what may go a long way toward cementing the future staying power of hybrid-powered vehicles, Nissan today unveiled a prototype of the 2007 Altima Hybrid, a hybrid vehicle based on the Altima mid-size sedan. Nissan is the fifth major automaker to either introduce a hybrid to the US market or announce plans to do so; the first automaker is generally credited as Honda — with the Insight two-seater hybrid, followed by Toyota with the first mass-produced hybrid, the Prius. The technology behind Prius has powered Toyota's hybrid plans and, in fact, will play a part in launching the Altima hybrid. According to Nissan, in September, 2002, Nissan and Toyota signed a basic agreement stipulating that Nissan will produce 100,000 hybrid vehicles within a five-year period, and that Toyota will supply the hybrid system components (transaxle, inverter, battery, and control unit). Nissan will develop the engine and unit adaptation.

The Altima prototype model is the first completed by Nissan under the agreement. With the Altima hybrid, Nissan hopes to offer consumers a sedan with V6 power and fuel efficiency that betters many compact vehicles. And while most hybrid vehicles place a premium on fuel economy, Nissan's primary focus seems to be on acceleration and performance — with

increased fuel savings and environmental efficiencies. Hot on the heels of the redesigned Altima comes Nissan's first foray into the hybrid market. The greenie version of the Altima uses Nissan's 158-hp, 2.5-liter four-cylinder connected to a planetary type CVT and two electric motors—technology licensed from Toyota — for a combined output of 198 hp. That's up 11 hp on Toyota's own Camry hybrid.

Nissan estimates EPA fuel economy numbers of 41 city and 36 highway (Camry hybrid gets 40 city/38 highway) for the Altima hybrid when it goes on sale in early 2007. Nissan's hybrid will initially only be sold in California and the seven Northeastern states that have adopted California emissions regulations. No official word on price yet, but it will likely be significantly more than a base Altima, which starts around $20,000. Close to the $26,520 starting point on the Camry hybrid is probably a good guess. Nissan is also developing diesel engine technologies mainly for European market, and continuing the R&D of fuel cell vehicles for the future.

TEXT AND VOCABULARY EXERCISES

19. Find information in the text about:

a) the main problems of Honda Hybrid
b) the characteristic Saturn 2007 Aura Green Line hybrid
c) the agreement between Nissan and Toyota

20. Find the true sentences and correct the other:

1. The IMA Battery Module is the heart of the car's hybrid system and is now covered for 10 years or 150,000 miles.

2. The letter mentions the reason why the hybrid battery module might fail in the first place.

3. The IRS has certified that Aura Green Line buyers will qualify for a tax credit of $10,000.

4. The Nissan Altima hybrid is scheduled to be launched in 2007 for the US market.

5. Nissan will produce 200,000 hybrid vehicles within a five-year period.

6. The Altima prototype model is the first completed by Nissan under the agreement.

7. Nissan estimates EPA fuel economy numbers of 61city.

8. Camry hybrid gets 40 city/38 highway.

9. The Altima hybrid price starts around $20,000.

21. Fill in the gaps with the correct prepositions from the box:

into	for	by	to	on	in	of	at

PHEV is short 1)___ Plug-in Hybrid Electric Vehicle. PHEV generally refers to a hybrid car that has additional batteries than can be recharged

2)___ plugging them 3)___ an electrical outlet. This outlet could be a standard US 120V-volt house current or a higher-power, 220-volt line, depending 4)___ the design. The extra batteries allow the hybrid car 5)___ travel a longer distance solely on battery power, while still allowing it to operate as a normal hybrid car whenever necessary. Being able to plug 6)___ to recharge the batteries adds convenience. When the PHEV drives 7)___ battery power alone, it produces zero emissions, making it environmentally friendly. The further it can go 8)___ battery power alone, the less the hybrid car will need to use the gas engine.

That means if driven only 20 miles, it only uses battery power and 9)___ the end of the trip the hybrid car could simply be plugged in to recharge the batteries. If this same PHEV needed to travel more than 30 miles, then the first 30 miles the trip would be taken care 10)___ by the batteries and the rest of the trip it would operate as a normal hybrid car. Again recharging the batteries by plugging them in 11)__ the end of the trip. The battery's size and weight as well as other factors have made PHEVs somewhat cost prohibitive but as battery technology and hybrid technology advance, this could become the car 12)___ the future.

22. Read the paragraphs below and put them into the logical order. The first is right:

(1) We live in an age of environmental crisis, as illustrated by Al Gore in his shocking film: 'An Inconvenient Truth'. As the effects of global warming appear on a scale we cannot ignore, outdated pollution-causing technology will have to make a transition to more sustainable forms of locomotion.

( ) The clever displays usually built into the dashboards of hybrid cars indicate to the driver what mode the engine is in at any given time. This allows drivers of hybrid cars to avoid situations where petroleum-intensive engine use will occur. This works towards a goal we are in dire need of achieving: empowering each individual is the job of the new generation of hybrid cars. If we can see our effect on the environment visually, perhaps we will be more eager to work towards change.

( ) The advent of hybrid cars is just one element of the buildup towards a cleaner and environmentally friendly future. It is our responsibility to find ways to become more sustainable in our ever-changing world. Hybrid cars are here to help us make the right decisions.

( ) Hybrid cars are the poster children for the next generation of environmentally conscious vehicles. Through 'rechargeable energy storage systems' hybrid cars accumulate kinetic energy and allow the engine to shift between consuming petroleum to relying on stored energy whenever possible. This allows hybrid cars to limit their output of carbon monoxide, one of the major greenhouse gases responsible for the environmental crisis we are facing. Some hybrid cars also use ethanol or hydrogen fuel to power their engines-the new generation certainly has approached our world-wide problem with a range of ideas and technology.

23. Choose the sentences expressing the main ideas of text 12B and tell about hybrid cars.

24. Find more information about different hybrid cars and tell about one of them.

GRAMMAR

25. Поставьте глаголы в скобках в необходимую временную форму:

What a car is? That may sound strange. A car is more than an engine and a body, it is a complex machine that (*to have undergone*) over a century of evolution. If Henry Ford could see a 2002 Ford Crown Victoria, he (*to be amazed*) how far it (*to have come*) from his 1909 Model T. Over the years we (*to have seen*) a constant stream of innovations and improvements in engine design. We (*to have seen*) the advent of 4 wheel brakes, the carburetor, fuel injection, and the automatic transmission. Once we understand how the system works, we can get into how to repair that system when it fails.

There (*to be*) many repairs that can be performed by the do-it-yourself, and many that are best performed by a trained professional. The specialist give you advice on the best techniques, terminology, the tools you will need and the replacement parts you (*to use*). And most importantly, you should be taught how to perform those repairs safely. After a short time, you (*to be doing*) most of your own repairs as well as a professional and save a lot of money as well.

Start with that thing under the hood. Some people (*to call*) it a motor and some (*to call*) it an engine. The two terms (*to be used*) to describe the power plant under the hood, but which is correct? Motor first (*to appear*) in 1925. This electric device (*to be used*) on either an alternating or a direct current supply. That's why we have a blower motor in our heating and A/C system, we have power window motors in the doors and a windshield wiper motor to keep our windshields clean. They all (*to run*) on electricity. Engine first (*to appear*) in 13th century. It (*to be*) a machine for converting any of various forms of energy into mechanical force and motion.

What an automobile engine (*to do*) is (*to convert*) the energy contained in the fuel into motion that propels it. Some of the early cars (*to be powered*) by an external combustion engine which means the fuel (*to be burnt*) outside of the engine proper. A steam locomotive is a classic example of an external combustion engine. The fuel (*to be used*) to turn water into steam which (*to supply*) the motive power. All cars today have an internal combustion engine which means the fuel (*to be burnt*) inside the engine proper.

26. Переведите текст на русский язык, обращая внимание на слова с *-ing* окончанием:

Milne once said: 'They're funny things, accidents. You never have them till you're *having* them.' *Having* a car accident is actually quite probable

in your lifetime as a driver. *Being* properly *prepared* for a car accident is important-both mentally and physically.

The best way to deal with an accident is to avoid *underestimating* the consequences of *getting* behind the wheel: around 90 percent of all car accidents occur because of driver negligence. This means that the driver was probably not *paying* enough attention to avoid the car accident. *Making* sure you are alert enough to get behind the wheel is an important factor: to avoid a car accident, make sure you aren't drowsy and have not consumed alcohol. Additionally, a long car trip can make the driver bored and inattentive. Make sure you stop to go to the restroom- do not drive for hours on end with no break. Drink water often and make note of your level of alertness: there is no price to *avoiding* a car accident. Speed is another killer: *driving* too fast or too close to the car in front of you is *asking* for a car accident. The amount of time you save by *driving* too fast is negligible, while the gas consumption and risk of *having* a car accident tend to skyrocket.

In the case of a car accident that does not involve you, make sure to take appropriate action. If no one is on the scene, make sure to call the paramedics and the police-if they are already present, resist the urge to rubberneck and clog up traffic. A car accident is *something* to be taken very seriously: take the appropriate steps to avoid one in the first place.

27. Выберите правильную форму глагола:

Once you (*own/are owning*) the car of your dreams, the next step is to customize it exactly to your liking. Car accessories are popular for a reason: they (*are allowed/allow*) you to truly make your car feel like a personal item. Some car accessories (*hold/holds*) the purpose of keeping your vehicle clean and free of dents and scratches. These types of car accessories (*are include/include*) car bras and car covers- the bra protects the front of your vehicle while you (*are driving/drive*) while the cover (*is designed/designed*) to protect your car while it is stationary. Bug deflectors, tail light guards, bull bars, and rear bumper guards (*to be/are*) other examples of protective car accessories. They (*will allow/are allowing*) your car to have a longer life and keep it beautiful and shiny.

Of all car accessories, organizers may be the most functionally useful for people who (*are/ are being*) on the road for long periods of time (especially with kids in the back.) Organizers can (*be designed/designed*) for any part of the inside of your car: the back seat, the driver's seat, even the trunk. These car accessories allow you to have organized storage space for any items you (*are going/go*) to need on the road-whether it (*be/is*) your car papers or some children's games. Never again you (*will be reaching/are reaching*) uncomfortably to the floor to pick up some item carelessly flung there earlier-car accessories can help increase your comfort and convenience. No matter what car accessories you (*are choosing/choose*), make sure that they (*will help/help*) define your car as your own. (*Owning/Own*) a car should be a personal investment as well as a financial one.

28. Некоторые предложения содержат ошибки разного характера. Исправьте их.

Buy a new car may be an attractive option, but the using automobile cannot be ignore as a viable option to mindless spending. Buying a new vehicle is actual tantamount to an anti-sustainable lifestyle. Purchasing a use automobile, however, encourages the attitude that new is not always better but it always produce unwanted waste which will lead to a decline in environment conditions.

Buying a used aytomobiles is a tricky affair, however. Figure out the right place may be the hardest- there are much dealers who will offer you a low quality used automobile for a unhonest profit. These kinds of used automobile salesmen be avoided like the plague. Make sure that you research you used automobile properly-how many miles does it have under its belt? How many accidents it has been in? How old it is? All this elements should play important roles in your decision for purchase (or not to purchase) a used automobile.

Once you settled on a used automobile that fits your needs, begin negotiate with your used automobile salesman so as to lighten the load on you wallet. Make sure to read some small print when purchasing a used automobile- once you signed documents, it is hardly to backtrack. Get the absolute maximum amount of information on a used automobile you may purchase is the only way to going about it. Once you have taken all precautions and your purchase carried out — it is time enjoy your used automobile.

TEXT WORK

29. Read the following text to find answers to the given questions:

Text 12C. Hybrid Cars: Pros and Cons

How much does a hybrid car battery cost? While most hybrid battery packs are actually made up of a number of individual cells, generally the whole pack must be replaced if there is a problem. Replacement battery packs for hybrid cars run in the several thousand dollar range including labor. Most estimates are near the $2000 — $3000 range. Avoiding heavy draining of the battery seems to be one of the main ways to keep the battery healthy. Different hybrids use different methods to help prevent overcharging, but battery management is controlled mainly by the car's computers. The early manual transmission Insights are the only cars that have experienced failure of the battery packs. For those that experience battery failure within the warranty period, manufacturers are standing behind their product and providing replacement units.

In some cases Honda has even provided additional 'goodwill coverage' for at least a portion of the bill for hybrid battery replacement even after the warranty has expired. Although normally, if there is a battery failure after the

warranty is expired, consumers should plan to cover the bill themselves. To purchase a brand new hybrid battery from a dealer, the price for a Honda Insight Hybrid battery is around $3600.

What things you should keep in mind when choosing a hybrid car? In considering the purchase of a hybrid car, you are joining a growing national trend. Consumers are looking for ways to stretch their dollars, and with current gas prices, a hybrid is a smart choice. In surveying options in the hybrid field, you will want to consider: size, price, gas mileage, appearance.

The Honda Insight, Honda Civic Hybrid, Honda Accord Hybrid, and Toyota Prius are the four hybrid cars available to purchase from dealers today. The Ford Escape Hybrid was the first hybrid SUV available, but additional choices now available are the Lexus RX 400h, Toyota Highlander and Mariner Hybrid. Additional 2007 models discussed in this article are are the Lexus GS 450h hybrid sedan, Toyota Camry Hybrid . The Nissan Altima Hybrid is not discussed. Be warned, though; some models, like the Prius may have a waiting period of two to nine months, as manufacturers strive to fill orders.

What size are the hybrid cars? It used to be that hybrid cars only came in two sizes: small and smaller. But times are changing, and manufacturers are responding to consumer interest in hybrid cars. When thinking about size, be sure to consider the number of passengers and typical loads you may be transporting. At the space-saving end of the spectrum is the sporty, two-passenger Honda Insight. This hybrid car may not be the answer as the only vehicle for family of five, but as a commuter car, it is ideal. Storage room is ample for this size vehicle; however don't expect to be able to haul a 4×8 piece of plywood.

The Honda Civic Hybrid is a compact sedan that seats five and is outwardly the same size as the non-hybrid Civic. The interior is the same size as well, but the trunk of the hybrid is slightly smaller because of the battery. It was redesigned in 2006 and now has a sleeker, sportier design. Although model years 2000—2003 of the Prius were 5 passenger compact cars, it was redesigned in 2004 and now fits in the mid-size category. This roomier version also includes a versatile hatch back.

The Honda Accord also offers a hybrid version in the mid-size category. It's a snazzy 255hp version of the ever-popular Accord. The Toyota Camry Hybrid became available in May 2006 about the same time that Lexus added a sporty GS 450h hybrid sedan.

If a 5-passenger Sports Utility Vehicle (SUV) is what you are looking for, then you will want to check out the Ford Escape, Mariner Hybrid, or Saturn VUE Green Line Hybrid. The first two are available in two and four wheel-drive models. If ultimate luxury is what you have in mind you can also check out the Lexus RX 400h. Currently no manufacturer offers a hybrid minivan, so Toyota's Highlander Hybrid is the only hybrid that seats 7 passengers. Hybrid cars and SUV's are priced from around $19,000 to nearly $55,000 for the base models. Expect the hybrid to be three to five thousand dollars more than their non-hybrid siblings. The lowest entry point

into the hybrid car market is the manual transmission 2006 Insight at an MSRP of $19,330, and the Lexus hybrid sport sedan, the GS 450h is the highest at $54,900. Don't forget, though, these are just the MSRP for the base model. Any additional features will increase the cost.

What is Gas Mileage? The average vehicle sold in the United States gets a combined highway and city EPA fuel economy estimate of about 20.4 miles per gallon (mpg). No matter which hybrid you choose, the EPA estimate will be well above that number. The Honda Insight was specifically designed to get the best mileage and is the hands down leader when it comes to gas mileage. The manual transmission hybrids have EPA estimates of 60 mpg in the city and 66 mpg on the highway. Automatic transmission versions are rated slightly lower at 57 city/56 highway.

The next best choice is the current version of the Prius at 60 city/51 highway. Notice that the city estimate is higher than the highway estimate due to the car's ability to operate on battery power alone at low speeds. The pre-2004 versions of the Prius are rated at 55 city/47 highway. Up until model year 2006 the Honda Civic Hybrid was available with a manual transmission that was rated at 46 city/51 highway; the automatic at 48 city/47 highway. The 2006 the Civic Hybrid has been redesigned and is only available with an automatic transmission with EPA MPG estimates of 50 hwy/50 city.

The Honda Accord Hybrid is rated at 29 city/37 highway.

The Toyota Camry Hybrid is rated at 43 city/38 highway.

The Lexus GS 450h hybrid sedan is rated at 25 city/28 highway.

Besides the GS450h, the SUVs get the lowest gas mileage of the hybrid vehicles, but they are respectable levels for their vehicle category. The Ford Escape is rated at 36 city/31 highway. That is much better than a non-hybrid Escape that is only rated at 22 city/25 highway.

The Mariner is rated at 33 city/29 highway. The Saturn VUE Green Line Hybrid is rated 27 city/32 highway. The Lexus RX 400h is rated at a still-respectable 31 city/27 mpg highway. The Toyota Highlander, being the largest of the hybrid SUVs gets the lowest mpg and is at 22 city/27 highway.

How do the hybrids look alike? A final consideration when choosing a hybrid is how it looks. You can choose a hybrid car that looks similar to others on the road today, or dare to be different and go with one that has a more unconventional styling. The Insight and Prius are the two hybrids with unique, 'space age' looks. People tend to have strong reactions one way or another when they see the cars; they either love it or hate it. The rest of the hybrid vehicles tend to look exactly like their non-hybrid counterparts. Often the only way you can tell it is a hybrid is by the cars' special emblems or markings, or by looking closely at the dashboard.

The aspects of size, price, mileage and appearance will give you a good base for beginning the process of choosing the right car. There is no substitute for taking one out for a test drive, though. It is fairly certain, with their reasonable pricing and excellent mileage, you won't be disappointed.

30. Give the title to the text above.

31. Fill in the gaps with the words from the box:

gas	battery	energy	electric	components
	power	hybrid	braking	categories

How Hybrid Cars Work

Hybrid cars work by seamlessly integrating a 1)___engine, an 2)___ motor and a high-powered battery. The 3)___ provides power for the electric motor and is recharged by recapturing 4)___ that would normally be lost when decelerating or coasting. This recapturing of energy is called regenerative 5)___. If needed, 6)___ from the gas engine can be diverted to recharge the battery as well. Because of these charging strategies, 7)___ cars never need to be plugged in.

To understand how the gas engine, electric motor and battery work together, it is best to divide hybrids into two 8)___: mild hybrids and full hybrids. Each has its own approach to incorporating the three 9)____.

32. Read the paragraphs below and put them into the logical order. The first is right:

(1) The car is one of our most prized tools in dealing with the chaos of the modern world; additionally, the car allows us to travel over long distances-we dynamite mountains and pave through jungles for the sake of transportation. Unfortunately, with our reliance on cars, comes a grave danger to our persons: the car crash.

( ) If a car crash does occur, some vehicles are safer than others. Driving in an SUV may create a lower risk of fatality in case of a car crash for its driver and passengers, but the SUV ultimately just transfers the risk over to the other vehicle involved in a collision-the chance of a fatality in the other car actually becomes higher. "Safety" cars, such as a few of the Volvo models, sharply reduce the chance of fatality in case of a car crash through their advanced crumpling mechanism designed to protect those inside the car.

( ) A car crash is most likely to occur when the driver is not properly paying attention to his or her driving. It is important to remember how dangerous driving is at all times-keeping in mind the consequences of a car crash can help prevent one. Over ninety percent of the time, a car crash is due to human inattention on the road. This means that the very concept of a car crash cannot exist separately from human mistake-they are innately correlated.

( ) Great controversy has been created over the new generation of cars designed to reach higher speeds-car companies are accused of encouraging

the possibility of a car crash. On the other hand, many security measures have been put in place such as ABS, the airbag, and safer seatbelts. One can only hope these things compensate for each other and reduce the total risk of a car crash. In the end it is up to us to be attentive and alert while driving-car crashes will occur frequently until we do.

33. Put the articles *a/an* or *the* where necessary:

Sometimes __ vocation is also __ passion. Many will find that they have ___ calling in life — __ hobby, __persuasion, __ raison d'etre. For some this sense of purpose is clear: they want to buy __cars. __ urge to buy cars is not __ unnatural one. __ human obsession with __ automobile can be tracked back to their very conception. So what are ___ key features of __ man whose purpose is to buy cars? __ strong sense of nostalgia, __ love for ___ engineering behind locomotion, and __ healthy bank account. It is important to remember, if you want to buy cars, that your budget should remain balanced-nothing is worth going bankrupt over. Limit your ___ purchases to what is actually feasible for you and your finances.

So what is there to consider when you buy cars? __ first is where your personal aesthetic tastes lay. You do not want to buy cars recklessly and with no __ purpose: buy only what you believe to be beautiful. Buying __ minivan will not be satisfactory if you are __ lover of all things small and fast. __ vintage Corvette may be just __ right choice in this case. Do not buy cars on impulse: carefully consider all ___ strong and weak points of each automobile you are examining. Some buy cars blindly, and most of these people will pay dearly later on for it. Although __ urge to buy cars can be __ positive thing, it may also land you in __ lot of trouble. There is no problem in __ letting yourself buy cars once in ___ while-make sure you can take good care of all of them and do not end up neglecting __ vehicles because of overabundance. __ good rule to live by is: always use your brain when you want to buy cars.

SUPPLEMENTARY READING

34. Read the texts 48, 49, 50, 51 to get information about Renault.

WRITING PRACTICE

35. Read the following text carefully in order to discover the main line of thought. Write a short summary about your dream car:

Luxury Cars

So you are interested in luxury cars. Who wouldn't be? Luxury cars offer the absolute top quality materials, the latest in technology, and more features than you could want. They are usually produced in much smaller

numbers than their commercial counterparts because of the difference in affordability.

Leather interiors are very common in many luxury cars — their comfort and aesthetic is enjoyed by many a lover of luxury. Wood grain trim is also an integral part of most luxury cars — this material has always been associated with an abundance of prestige.

There are different levels of luxury cars, ranging from lower end to ultra-luxury vehicles. Examples of lower end luxury cars are higher end Buicks, Cadillacs, the BMW 3 series, and a few Lexus models. Costing around thirty thousand dollars, this level of luxury cars is highly in demand — it is a competitive market. The mid-level luxury cars are defined by their price tag upwards of thirty thousand and reaching around sixty thousand dollars at times.

The BMW 5 series, the Jaguar S-Type, and the Mercedes-Benz E-class vehicles are all part of this category of luxury cars. Higher end luxury vehicles are mostly made by German manufacturers and include the Mercedes-Benz S-class, The BMW 7 Series, and the Jaguar XJ. These luxury cars are of superior comfort, high quality, and are technologically over-equipped. Finally, the Ultra-luxury cars include all the famous luxury brand names such as Maserati, Rolls Royce, and Bentley. These cars are status symbols — they communicate to others around you that you can afford the type of lifestyle they refer to. Whatever luxury car you finally decide to purchase, there is something for everyone's budget range — as long as you are very, very well off.

TEXTS FOR SUPPLEMENTARY READING

Text 1. Henry Ford (1863 — 1947)

Automobile manufacturer Henry Ford was born July 30, 1863, on his family's farm in Dearborn, Michigan. From the time he was a young boy, Ford enjoyed tinkering with machines. Farm work and a job in a Detroit machine shop afforded him ample opportunities to experiment. He later worked as a part-time employee for the Westinghouse Engine Company. By 1896, Ford had constructed his first horseless carriage which he sold in order to finance work on an improved model.

Ford incorporated the Ford Motor Company in 1903, proclaiming, 'I will build a car for the great multitude.' In October, 1908, he did so, offering the Model T for $950. In the Model T's nineteen years of production, its price dipped as low as $280. Nearly 15,500,000 were sold in the United States alone. The Model T heralds the beginning of the Motor Age; the car evolved from luxury item for the well-to-do to essential transportation for the ordinary man.

Ford revolutionized manufacturing. By 1914, his Highland Park, Michigan plant, using innovative production techniques, could turn out a complete chassis every 93 minutes. This was a stunning improvement over the earlier production time of 728 minutes. Using a constantly-moving assembly line, subdivision of labor, and careful coordination of operations, Ford realized huge gains in productivity.

In 1914, Ford began paying his employees five dollars a day, nearly doubling the wages offered by other manufacturers. He cut the workday from nine to eight hours in order to convert the factory to a three-shift workday. Ford's mass-production techniques would eventually allow for the manufacture of a Model T every 24 seconds. His innovations made him an international celebrity.

Ford's affordable Model T irrevocably altered American society. As more Americans owned cars, urbanization patterns changed. The United States saw the growth of suburbia, the creation of a national highway system, and a population entranced with the possibility of going anywhere anytime. Ford witnessed many of these changes during his lifetime, all the while personally longing for the agrarian lifestyle of his youth. In the years prior to his death on April 7, 1947, Ford sponsored the restoration of an idyllic rural town called Greenfield Village.

On January 12, 1900, the Detroit Automobile Company released its first commercial automobile — a delivery wagon — designed by Henry Ford. This was Ford's second car design — his first design was the quadricycle built in 1896. On May 27, 1927, production ended for the Ford Model T — 15,007,033 units had been manufactured. On January 13, 1942, Henry Ford patented a plastic-bodied automobile — a car 30 percent lighter than metal cars. In 1932, Henry Ford introduced his last engineering triumph: his 'en block', or one piece, V-8 engine.

Text 2. Karl Benz (Carl Benz)

In 1885, German mechanical engineer, Karl Benz designed and built the world's first practical automobile to be powered by an internal-combustion engine. On January 29, 1886, Benz received the first patent (DRP No. 37435) for a gas-fueled car. It was a three-wheeler; Benz built his first four-wheeled car in 1891. Benz & Company, the company started by the inventor, became the world's largest manufacturer of automobiles by 1900.

Karl Friedrich Benz was born in 1844 in Baden Muehlburg, Germany (now part of Karlsruhe). He was the son of an engine driver. Benz attended the Karlsruhe grammar school and later the Karlsruhe Polytechnic University. In 1871, he founded his first company with partner August Ritter, the 'Iron Foundry and Machine Shop' a supplier of building materials.

Benz began his work on a two-stroke engine, in hopes of finding a new income. He received his first patent in 1879. In 1883, he founded Benz & Company to produce industrial engines in Mannheim, Germany. He then began designing a 'motor carriage', with a four-stroke engine (based on Nicolaus Otto's patent). Benz designed his engine (958 cc, 0.75 hp) and the body for the three-wheel vehicle with an electric ignition, differential gears, and water-cooling.

The car was first driven in Mannheim in 1885. On January 29, 1886, he was granted a patent for his gas-fueled automobile (DRP 37435) and in July, he began selling his automobile to the public. In 1893, the Benz Velo became the world's first inexpensive, mass-produced car. In 1903, Karl Benz retired from Benz & Company; his designs were already outdated by Gottlieb Daimler. He served as a member of the supervisory board of Daimler-Benz AG from 1926, when the company was formed, until his death.

He married Bertha Ringer in 1872, who played an active role in his business, together they had five children. Karl Benz passed away in 1929.

Text 3. Gottllieb Daimler's 1885 Motorcycle

Daimler was a workaholic who made the automotive revolution possible. In 1885, Gottlieb Daimler (together with his design partner Wilhelm Maybach) took Nicolaus Otto's internal combustion engine a step further and patented what is generally recognized as the prototype of the modern gas engine. Daimler's connection to Otto was a direct one; Daimler

worked as technical director of Deutz Gasmotorenfabrik, which Nikolaus Otto co-owned in 1872. There is some controversy as to who built the first motocycle Otto or Daimler.

The 1885 Daimler-Maybach engine was small, lightweight, fast, used a gasoline-injected carburetor, and had a vertical cylinder. The size, speed, and efficiency of the engine allowed for a revolution in car design. On March 8, 1886, Daimler took a stagecoach (made by Wilhelm Wimpff & Sohn) and adapted it to hold his engine, thereby designing the world's first four-wheeled automobile.

In 1889, Daimler invented a V-slanted two cylinder, four-stroke engine with mushroom-shaped valves. Just like Otto's 1876 engine, Daimler's new engine set the basis for all car engines going forward. Also in 1889, Daimler and Maybach built their first automobile from the ground up, they did not adapt another purpose vehicle as had always been done previously. The new Daimler automobile had a four-speed transmission and obtained speeds of 10 mph. Daimler founded the Daimler Motoren-Gesellschaft in 1890 to manufacture his designs. Eleven years later, Wilhelm Maybach designed the Mersedes. A few years later Maybach left Daimler to set up his own factory for making engines for Zeppelin airships. In 1894, the first automobile race in the world was won by a car with a Daimler engine.

Text 4. Honda Civic

Honda finally established a foothold in the American market in 1972 with the introduction of the Civic — larger than their previous models, but still small compared to the typical American car—just as the 1973 energy crisis was impacting worldwide economies. New emissions laws in the US, requiring American car makers to add expensive smog pumps and catalytic converters to engines, increased car prices. However, Honda's introduction of the 1975 Civic CVCC (Compound Vortex-Controlled Combustion) being a variation on the stratified charge engine. This allowed the Civic to pass emissions tests without a catalytic converter, and also provided it with the lowest fuel consumption per given displacement due to its more complete combustion. American companies were slow to begin producing small, fuel efficient cars, which gave the Honda Civic a chance to sell well, as well as prove Honda's reputation for reliability and further expand its customer loyalty.

Text 5. Honda Accord

In 1976, the new, larger-than-the-Civic Accord was immediately popular because of its value, economy, and fun-to-drive nature. Honda had found its niche in the United States. In 1982, Honda was the first Japanese car manufacturer to build car plants in the US, starting with an Accord plant in Marysville, Ohio.

Honda was the first Japanese automaker to introduce a separate luxury line of vehicles. Created in 1986 and known as Acura, the line is made up of

modified versions of Honda vehicles usually with more power and sportiness than their Honda counterparts. The very first model was the Acura Legend, with a 2.5 liter engine producing 151 horsepower. European luxury-car manufacturers initially scoffed at the thought of a luxury company from Japan, with criticism coming mostly from Mercedes-Benz.

1987 was an important year for new safety and technology at Honda. The 1987 Honda Prelude was the first passenger vehicle in the world equipped with four-wheel steering (4WS) technology. This also marked the year for the first Japanese car equipped with an SRS airbag, the Honda (Acura) Legend.

In 1989, Honda launched their VTEC variable valve timing system in its production car engines, which gave improved efficiency and performance across a broader range of engine speeds. One of the first of its kind in passenger vehicles, it worked on the premise of tuning one engine to operate at two different 'settings' depending on load. Normal driving would use a 'shorter' camshaft lobe that resulted in more efficient operation. A more aggressive, longer duration, car engages when engine RPM reaches a set point resulting in more power during hard acceleration.

In 1999, Honda began selling the Insight which is a small two-seat hybrid vehicle. Power is derived from a combination of a 1.0L 3-cylinder gasoline engine, and a large NiMH battery pack providing power-assist during acceleration. This computer-controlled combination provided acceptable performance with exceptionally low fuel consumption and emissions. Honda's hybrid power train is now an available option for the Civic and Accord. For the 2007 model year, Honda plans to improve the safety of its vehicles by providing front-seat mounted side airbags, side-curtain airbags, and anti-lock brakes as standard equipment in all automobiles available in North America (except the Insight and S2000, which will not have side-curtain airbags). By 2008, Honda plans to have standard traction with vehicle stability control with rollover sensors in all light trucks, which include the CR-V, Odyssey, Pilot, and Acura MDX. Honda also plans to make its vehicles safer for pedestrians, with more safely-designed hoods, hinges, frame constructs, and breakaway wiper pivots.

Text 6. Honda Racing Corporation

Honda Racing Corporation (HRC) was formed in 1954. The company combines participation in motorcycle races throughout the world with the development of high potential racing machines. Its racing activities are an important source for the creation of leading edge technologies used in the development of Honda motorcycles. HRC also contributes to the advancement of motorcycle sports through a range of activities that include sales of production racing motorcycles, support for satellite teams, and rider education programs.

Soichiro Honda, being a race driver himself, could not stay out of international motorsport. In 1959, Honda entered five motorcycles into the Isle

of Man TT race, at that time the most prestigious motorcycle race in the world. While always having powerful engines, it took until 1961 for Honda to tune their chassis well enough to allow Mike Hailwood to claim their first Grand Prix victories in the 125 and 250 cc classes. Hailwood would later pick up their first senior TT wins in 1966 and 1967. Honda's race bikes were known for their exotic engine configurations, such as the 5 cylinder, 22,000 rpm, 125 cc bike and their 6 cylinder 250 cc and 380 cc bikes.

1979 saw Honda return to Grand Prix motorcycle racing with their exotic, monocoque-framed, four-stroke NR500. The NR500 featured elongated cylinders each with 8 valves and with connecting rods in pairs, in an attempt to comply with the FIM rules which limited engines to four cylinders. Honda engineered the elongated cylinders in an effort to provide the valve area of an 8 cylinder engine, hoping their four-stroke bike would be able to compete against the now dominant two-stroke racers. Unfortunately, it seemed Honda tried to accomplish too much at one time and the experiment failed. For the 1982 season, Honda debuted their first two stroke race bike, the NS500 and in 1983, Honda won their first 500 cc Grand Prix World Championship with Freddie Spencer. Since then, Honda has become the dominant marque in motorcycle Grand Prix racing and, more recently, won the 2006 MotoGP championship with rider Nicky Hayden on a Honda RC211V.

Text 7. Strategy and Public Image of Honda

During the 1960s, when it was a small manufacturer, Honda broke out of the Japanese motorcycle market and began exporting to the US. Taking Honda's story as an archetype of the smaller manufacturer entering a new market already occupied by highly dominant competitors, the story of their market entry, and their subsequent huge success in the US and around the world, has been the subject of some academic controversy. Competing explanations have been advanced to explain Honda's strategy and the reasons for their success. The first of these explanations was put forward when, in 1975, Boston Consulting Group (BCG) was commissioned by the UK government to write a report explaining why and how the British motorcycle industry had been out-competed by its Japanese competitors. The report concluded that the Japanese firms, including Honda, had sought a very high scale of production (they had made a large number of motorbikes) in order to benefit from economies of scale and learning curve effects. It blamed the decline of the British motorcycle industry on the failure of British managers to invest enough in their businesses to profit from economies of scale and scope.

The second story is told in 1984 by Richard Pascale, who had interviewed the Honda executives responsible for the firm's entry into the US market. As opposed to the tightly focused strategy of low cost and high scale that BCG accredited to Honda, Pascale found that their entry into the US market was a story of 'miscalculation, serendipity, and organizational learn-

ing' — in other words, Honda's success was due to the adaptability (and hard work) of its staff, rather than any long term strategy. For example, Honda's initial plan on entering the US was to compete in large motorcycles, around 300 cc. It was only when the team found that the scooters they were using to get themselves around their US base of San Francisco attracted positive interest from consumers that they came up with the idea of selling the Supercub.

The most recent school of thought on Honda's strategy was put forward by Gary Hamel and C. K. Prahalad in 1989. Creating the concept of core competencies with Honda as an example, they argued that Honda's success was due to its focus on leadership in the technology of internal combustion engines. For example, the high power-to-weight ratio engines Honda produced for its racing bikes provided technology and expertise which was transferable into mopeds. Honda's entry into the US motorcycle market during the 1960s is used as a case study for teaching introductory strategy at business schools worldwide. Its first entrance into the pickup segment, the lightduty Ridgeline, won Truck of the Year from Motor Trend magazine in 2005, and its redesigned Civic also won Car of the Year in 2005.

Text 8. Later History and Management of Toyota

The company 'Toyota Motor Corporation' was awarded its first Japanese Quality Control Award at the start 1970s and began participating in a wide variety of Motorsports. Due to the 1973 oil crisis consumers in the lucrative US market began turning to small cars with better fuel economy. American car manufacturers had considered small economy cars to be an 'entry level' product, and their small vehicles were not made to a high level of quality in order to keep the price low. Japanese customers, however, had a long-standing tradition of demanding small fuel-efficient cars that were manufactured to a high level of quality. Because of this, companies like Toyota, Honda, and Nissan established a strong and growing presence in North America in the 1970s.

In 1982, the Toyota Motor Company and Toyota Motor Sales merged into one company, the Toyota Motor Corporation. Two years later, Toyota joined NUMMI, the New United Motor Manufacturing, Inc. Toyota then started to establish new brands at the end of the 1980s, with the launch of their luxury division Lexus in 1989.

In the 1990s, Toyota began to branch out from producing mostly compact cars by adding many larger and more luxurious vehicles to its lineup, including a full sized pickup, the T100 (and later the Toyota Tundra), several lines of SUVs, a sport version of the Camry, known as the Camry Solara, and the Scion brand, a group of several affordable, yet sporty, automobiles targeted specifically to young adults. Toyota also began production of the world's best selling hybrid car, the Toyota Prius, in 1997.

With a major presence with Europe, due to the success of Toyota Team Europe, the corporation decided to set up TMME (Toyota Motor Europe

ily J. D. Power and Consumer Reports. In 2005, Toyota, combined with its half-owned subsidiary Daihatsu Motor Company, produced 8.54 million vehicles, about 500,000 fewer than the number produced by GM that year. Toyota has a large market share in the United States, but a small market share in Europe. Its also sells vehicles in Africa and is a market leader in Australia. Due to its Daihatsu subsidiary it has significant market shares in several fast-growing Southeast Asian countries. In the Fortune Global 500, Toyota Motor is the 8th largest company in the world. Since the recession of 2001, it has gained market share in the United States. Toyota's market share struggles in Europe where its Lexus brand has three tenths of one percent market share, compared to nearly two percent market share as the US luxury segment leader.

In the first three months of 2007, Toyota together with its half-owned subsidiary Daihatsu reported number one sales of 2.348 million units. Toyota's brand sales had risen 9.2 % largely on demand for Corolla and Camry sedans. The difference in performance was largely attributed to surging demand for fuel-efficient vehicles. In November 2006, Toyota Motor Manufacturing Texas added a facility in San Antonio. Toyota has experienced quality problems and was reprimanded by the government in Japan for its recall practices. Toyota has factories all over the world, manufacturing or assembling vehicles for local markets, including the Corolla. Toyota has manufacturing or assembly plants in Japan, Australia, Canada, Indonesia, Poland, South Africa, Turkey, the United Kingdom, the United States, France, Brazil, and more recently Pakistan, India, Argentina, Czech Republic, Mexico, Malaysia, Thailand, China, Vietnam, Venezuela, and the Philippines. The first Toyota built outside of Japan was a Land Cruiser FJ-251, built in São Paulo, Brazil, in May 1959. Toyota invests a great amount of research into cleaner-burning vehicles such as the Toyota Prius, based on technology such as the Hybrid Synergy Drive. In 2002, Toyota successfully road-tested a new version of the RAV4 which ran on a Hydrogen fuel cell. Scientific American called the company its Business Leader of the Year in 2003 for commercializing an affordable hybrid car.

Text 9. Toyota Motor North America, Inc.

Toyota is headquarted in New York City, New York, and operates at a holding company level in North America. Toyota has large presence in the United States with five major assembly plants in Huntsville, Alabama, Georgetown, Kentucky, Princeton, Indiana, San Antonio, Texas, Buffalo, West Virginia and the new one being built in Blue Springs, Mississippi. Toyota also has a joint-venture operation with General Motors at New United Motor Manufacturing Inc. (NUMMI), in Fremont, CA, which began in 1984, and with Subaru at Subaru of Indiana Automotive, Inc. (SIA), in Lafayette, IN, which started in 2006. Production on a new manufacturing plant in Blue Springs, Mississippi, is schedule for comple-

tion in 2010. It will be producing the Toyota Highlander. North America is a major automobile market for Toyota. In these assembly plants Toyota Camry and the 2007 Toyota Tundra among others are manufactured. It uses number of catchphrases and/or slogan in its American TV commercials such as 'It's time to move forward', '"Smart way to keep moving forward', or 'Moving forward'. Toyota and its brand Lexus vehicles consistently rank well in terms of performance and quality in North American automobile magazines, awards and tests. It also started produce larger trucks such as the new Toyota Tundra editions to go after the bug truck market in the United States. It also pushed hybrid vehicles in the country such as Toyota Prius, which the most sold hybrid vehicle in the country.

Text 10. Redesign Controversy

In the early 2000s, BMW undertook another of its periodic cycles of redoing the design language of its various series of vehicles, under the auspices of newly promoted design chief Christopher Bangle. These designs often featured unconventional proportions with complex concave and convex curved surfaces combined with (sometimes arbitrary-appearing) sharp panel creases and slashes, a design cue called 'flame surfacing' by Bangle. Much of the new language did not rest well with BMW enthusiasts or the automotive press which referred to the new designs as 'Bangled' or 'Bangle-ized'. Bangle is commonly mistakenly believed to have penned all of the designs himself; however, he only chose which design was to be used. As Bangle has now been promoted within the company to the BMW Group Head of Design, leaving him in charge of not only BMW but also Rolls-Royce and Mini, some question what long term effect the disaffection of BMW traditionalists for these designs will have on sales, and on the company's future. Despite this, or maybe because of it, sales at BMW have increased every year since some of his most debated designs have gone into production. BMW currently reigns as the most profitable luxury car manufacturer in global sales.

Many aspects of the 'controversial' designs are now beginning to surface in other auto manufacturer's designs, most notably Toyota, Audi, and Honda. It should also be noted that similar designs to controversial styling cues such as the 'Bangle-butt' rear end of the 7 Series, have since appeared on competing cars, most notably on the new Lexus LS and the new Mercedes-Benz S-Class.

What is not as well known, however, is that Bangle was also responsible for many 'conservative' BMW designs and has worked at BMW for almost a decade. The first X5 sketches (which closely resembled the production car), were designed by him, and under his tenure the E46 3 Series came to be. Despite much of the scorn heaped on Chris Bangle it is well known throughout the automotive community that his design selections were prompted and approved by the entire executive board of BMW AG, including the majority owners, the Quandt family.

Text 11. 'The English Patient' — Rover

Between 1994 and 2000, under the leadership of Bernd Pischetsrieder, BMW owned the Rover Group in an attempt to get into mass market production, buying it from British Aerospace. This brought the active Rover, Mini and Land Rover brands as well as rights to many dormant marques such as Austin, Morris, Riley, Triumph and Wolseley under BMW ownership. The venture was not successful. For years, Rover tried to rival BMW, if not in product, then in market positioning and 'snob appeal'. BMW found it difficult to reposition the English automaker alongside its own products and the Rover division was faced with endless changes in its marketing strategy. In the six years under BMW, Rover was positioned as a premium automaker, a mass-market automaker, a division of BMW and an independent unit. BMW was more successful with the Mini and Land Rover brands, which did not have parallels in its own range at the time.

In 2000, BMW disposed of Rover after years of losses, with Rover cars going to the Phoenix Venture Holdings for a nominal £10 and Land Rover going to the Ford Motor Company. The German press ridiculed the English firm as 'The English Patient', after the film. BMW itself, protected by its product range's image, was largely spared the blame. Even the British press was not particularly sympathetic towards Rover. Land Rover has since enjoyed a greater success as part of Ford's Premier Automobile Group. BMW retained the rights to Mini, Rover, Triumph and other marques. MINI has been a highly successful business, though the other names have not been used yet. The Rover name has recently been sold to Ford after BMW gave it a first refusal offer in 2000.

Text 12. Rolls-Royce

In the early 1990s, BMW and Rolls-Royce Motors began a joint venture that would see the new Rolls-Royce Silver Seraph and Bentley Arnage adopt BMW engines.

In 1998, both BMW and Volkswagen tried to purchase Rolls-Royce Motors. Volkswagen outbid BMW and bought the company for £430 million, but BMW outflanked its German rival. Although Volkswagen had bought rights to the 'Spirit of Ecstasy' mascot and the shape of the radiator grille, it lacked rights to the Rolls-Royce name. Rolls-Royce plc (the aero-engine business) retained the rights over the Rolls-Royce trademark and wished to strengthen its existing business partnership with BMW which extended to the BMW Rolls-Royce joint venture. Consequently, BMW was allowed to acquire the rights to the grille and mascot, and licensed the name and 'RR' logo after 2003 for £40 million. Volkswagen was permitted to build Rolls-Royces at its Crewe factory only until 2003, but quickly shifted its emphasis to the Bentley brand.

In the meantime, BMW was faced with the need to build a new factory and develop a new model. The new factory at Goodwood produced the new Rolls-Royce Phantom, unveiled on January 2, 2003, and officially launched

at the Detroit Auto Show on January 5, 2003. The model, priced around US $330,000, has experienced record sales worldwide of 796 Phantoms sold in 2005.

Text 13. Famous Collectors of Porsche

Miles Collier, Jr. — grandson to Barron Collier, purchased the renowned seventy-one car collection of Briggs Cunningham and combined some of the collection with his own, that includes about twenty Porsche race cars — including their class winners at Sebring, the Porsche 904GT in 1964 and Porsche 917K (Kurzheck) in 1970 — when he created a museum dedicated to his father Miles, and uncles, Sam and Barron Jr., who founded the 1933 Automobile Racing Club of America that metamorphosed in 1944 into the Sports Car Club of America.

James Dean — died on the way to a hospital after a crash in his silver Porsche 550 Spyder, caused when he was cut off by another driver, in September 1955 near Cholame, California.

Bill Gates — was briefly jailed in Albuquerque for racing his Porsche 911 in the New Mexico desert; imported a Porsche 959 which was impounded by US Customs.

Richard Hammond — Top Gear co-presenter, owns two 911s and a 928.

Janis Joplin — owned a Porsche 356C Cabriolet that was extravagantly and psychedelically painted for her by Dave Richards to match her public persona.

Steve McQueen — raced Porsche prototypes, owned a Porsche 356 Speedster, a Porsche 908, and a Porsche 917, and made a movie dedicated to the 24 Hours of Le Mans.

Carl Sagan — astronomer, astrobiologist, scientist, and a highly successful science popularizer — remembered for his articulate explanations of astronomical and cosmological research while commenting upon space exploration to the public — whose license plate bore the name of a moon of another planet in our solar system.

Jerry Seinfeld — rumored to own one of the largest collections of Porsche automobiles in the world.

Lake Underwood — Porsche's Quiet Giant — so named by Excellence magazine (a magazine covering everything Porsche) — has several historic Porsches among his collection.

Text 14. Relationship with Porsche, and the 'Volkswagen Law'

The company has always had a close relationship with Porsche, with the first Porsche car the Porsche 64 of 1938, using many components from the Volkswagen Beetle.

The two companies collaborated in 1969 to make the VW-Porsche 914 and 914-6 whereby the 914-6 had a 6-cylinder Porsche engine and the standard 914 had a 4-cylinder Volkswagen engine, in 1976 with the Porsche 912E (USA only) and the Porsche 924, which used many Audi components and was built at an Audi Neckarsulm factory. Most 944s also were built there although they used far fewer VW components. The Porsche Cayenne, introduced in 2002, shares its entire chassis with VW Touareg, which is built at the Volkswagen factory in Bratislava. In late 2005, Porsche took an 18.65 % stake in VW, further cementing their relationship and preventing a takeover of Volkswagen, which was rumored at the time. Speculated suitors included DaimlerChrysler, BMW, and Renault.

On March 26, 2007, Porsche took its holding of Volkswagen shares to 30.9 %, triggering a takeover bid under German law. Porsche formally announced in a press statement that it did not intend to takeover Volkswagen (it would set its offer price at the lowest possible legal value), but intended the move to avoid a competitor taking a large stake or to stop hedge funds dismantling VW, which is Porsche's most important partner. Porsche's move comes after the European Union moved against a German law that protected VW from takeovers. Under the so-called 'Volkswagen Law', any shareholder in VW cannot exercise more than 20 % of the firm's voting rights, regardless of their level of stock holding. The European Court of Justice has already indicated that the law probably breaks EU rules, and a full judgement to that effect is expected later in 2007.

Text 15. Volkswagen: From Beetle to Golf/Rabbit

Volkswagen was in serious trouble by the end of the 1960s. The Type 3 and Type 4 models had been comparative flops, and the NSU-based K70 also failed to woo buyers. The company knew that Beetle production had to end one day, but the conundrum of replacing it had been a never-ending nightmare. The key to the solution was the 1964 acquisition of Audi/Auto Union. The Ingolstadt-based firm had the necessary expertise in front wheel drive and water-cooled engines that Volkswagen so desperately needed to produce a credible Beetle successor. Audi influences paved the way for this new generation of Volkswagens, known as the Polo, Golf and Passat.

The VW Polo was in fact simply a re-badging of the short-lived Audi 50, which had been hastily developed from a saloon design, the Audi 60, which never reached production as an Audi vehicle. However, VW produced it shortly after the introduction of the Polo as the VW Derby. In the rear of the car can plainly be seen that panels are added to the Polo structure to make a 'three-box' design of saloon or sedan with a boot or trunk. A 1975 American advertisement for the Volkswagen Golf, sold as the Rabbit in the US and Canada.

The Passat (Dasher in the US), introduced in 1973, was again simply a fastback (available as either a hatchback or with separate boot) version of the Audi 80, using identical body and mechanical parts, and the Audi

80 was later produced on the same line in Wolfsburg as the VW Passat. Wagon versions were offered for overseas markets, however, for two years, if European customers wanted an estate or wagon version, they had to go considerably up-market and buy the Audi 80GL estate.

Production of the Beetle at the Wolfsburg factory switched to the VW Golf in 1974, marketed in the United States and Canada as the Volkswagen Rabbit until 1985 and as the Golf until 2006, when the Rabbit name was re-introduced. This was a car unlike its predecessor in most significant ways, both mechanically as well as visually (its angular styling was designed by the Italian Giorgetto Giugiaro). Its design followed trends for small family cars set by the 1959 Mini and 1972 Renault 5—the Golf had a transversely mounted, water-cooled engine in the front, driving the front wheels, and had a hatchback, a format that has dominated the market segment ever since. Beetle production continued in smaller numbers at other German factories (Essen and Emden) until 1978, but mainstream production shifted to Brazil and Mexico.

Text 16. Volkswagen: from 1970 to 2000

While Volkswagen's range of cars soon in 1974 became similar to that of other large European automakers, the Golf has been the mainstay of the Volkswagen lineup since its introduction, and the mechanical basis for several other cars of the company. There have been five generations of the Volkswagen Golf, the first of which was produced from the summer of 1974 until the end of 1983, sold as the Rabbit in the United States and Canada and as the Caribe in Latin America. Its chassis also spawned the Scirocco sport coupe, Jetta sedan, Cabriolet convertible, and Caddy pickup. North American production of the Rabbit commenced at a factory in Pennsylvania in 1978. The production numbers of the first-generation Golf has continued to grow annually in South Africa with only slight modifications to the interior, engine and chassis. It would be produced in the United States as the Rabbit until the spring of 1984. The second-generation Golf hatchback/Jetta sedan ran from late 1983 to late 1991, and a North American version produced in Pennsylvania went on sale at the start of the 1985 model year.

In the eighties, Volkswagen's sales in the United States and Canada fell dramatically, despite the success of models like the Golf elsewhere. The problems had stemmed from the Rabbit, which had developed a reputation for bad electrical systems and oil burning. The Japanese and the Americans were able to compete with similar products at lower prices. Sales in the United States were 293,595 in 1980, but by 1984 they were down to 177,709. The introduction of the second-generation Golf, GTI and Jetta models helped Volkswagen briefly in North America. Motor Trend named the GTI its Car of the Year for 1985, and Volkswagen rose in the J. D. Power buyer satisfaction ratings to eighth place in 1985, up from 22nd a year earlier. VW's American sales broke 200,000 in 1985 and 1986 before resuming the

downward trend from earlier in the decade. Chairman Carl Hahn decided to expand the company elsewhere, and the Pennsylvania factory closed on July 14, 1988. Meanwhile, Hahn expanded the company by purchasing a greater share of the Spanish car maker SEAT, which VW bought outright in 1990; the Czech car maker Skoda was acquired the following year.

In 1991, Volkswagen launched the third-generation Golf, garnering the European Car of the Year for 1992 (the previous two generations were nominated but lost to the Citroën CX in 1975 and the Fiat Uno in 1984). (The Mark 3 Golf and Jetta arrived in North America just before the start of 1994 model year, first appearing in southern California in the late spring of 1993.) The sedan version of the Golf was badged Vento in Europe (but remained Jetta in the USA, where its popularity outstripped the Golf).

The late 1990s saw a gradual change in perception of the company's products — with Audi having elevated itself into same league as BMW and Mercedes-Benz, Volkswagen moved upmarket to fill the void left by Audi; with Seat and Skoda now occupying what was once VW's core market. The first tangible evidence of this was the fifth-generation Passat in 1996 with its high-quality interior trim and standards of build quality which were demonstrably a cut above contemporary products from Ford and Opel.

This move upmarket was continued with the Mark 4 Golf, introduced at the end of 1997 (and in North America in 1999), its chassis spawned a host of other cars within the Volkswagen group — the Volkswagen Bora (the sedan, still called Jetta in the USA), VW New Beetle, SEAT Toledo, SEAT León, Audi A3, Audi TT and Skoda Octavia. However, it was beaten into third place for the 1998 European Car of the Year award by the winning Alfa Romeo 156 and runner-up Audi A6. The other main models have been the Polo, a smaller car than the Golf, and the larger Passat for the segment above the Golf. The Scirocco and Corrado were both Golf-based coupés.

By the early nineties, Volkswagen's sales in the United States were below 100,000, and many car buyers found the company's products to be lacking in value. Some automotive journalists believed that Volkswagen would have to quit the North American market altogether. VW eventually realized that the Beetle was the heart and soul of the brand in North America, and the firm quickly set about creating a new Beetle for American and Canadian showrooms. In 1994, Volkswagen unveiled the J Mays-designed Concept One, a 'retro'-themed car with a resemblance to the original Beetle but based on the Polo chassis. Its genesis was secret and in opposition to VW management, who felt it was too backward-looking. Management could not deny the positive public response to the concept car and gave the green-light to its development as the New Beetle. The production car would be based on the Golf rather than the Polo, because the Polo chassis was too small for the car to pass crash test standards in the US It has been quite popular in the North America, less so in Europe. Volkswagen's fortunes in North America improved once the third-generation Golf and Jetta models became available there. Sharp advertising and savy promotional stunts, like

including Trek bicycles and accompanying bike racks with a limited edition of the 1996 Jetta sedan, were credited for the firm's recovery in the US and Canada, but the introductions of the New Beetle and the fifth-generation Passat were a major boost to the brand.

Text 17. VAZ-1111

VAZ-1111 Oka is a city car designed in Russia in 1988 by AvtoVAZ featuring a 750 cc SOHC 2-cylinder engine. The car was developed by AutoVAZ, but it has never entered volume production there. All production was sourced to SeAZ factory in Serpukhov and ZMA in Naberezhnye Chelny (formally owned by Kamaz). There were plans to start production at the new plant in Yelabuga which never materialized. The car is also produced in Azerbaijan by the Gyandzha Auto Plant). The name comes from the Oka river in Russia upon which Serpukhov is situated.

History. This extremely cheap, lightweight and simple car has taken the plume of ZAZ Zaporozhets, the pariah of USSR automotive industry. Zaporozhets was developed in 1975 as the 'people's car' and served its purpose for almost ten years as a low-end transportation and occasion for cruel jokes. There was only one Soviet car more basic, and that was the special vehicle for disabled people, SZD. Initially, when Serpukhov factory engineers came up with the project for Oka, they turned to their VAZ colleagues.

The tiny car was to be a replacement for the SZD and featured a simple motorcycle engine. Andrei Rozov, one of the lead VAZ engineers, designed a new one from scratch, but then decision was made to implement the 'chopped in half' VAZ 2108 4-cylinder engine instead. It was 1983, and the first Soviet front-wheel drive automobile, the 2108, was ready to hit the market; so the Oka initiative quickly became the next 'people's car' project, the one that 'every factory engineer can afford'.

The inspiration for Yuri Vereschagin, VAZ exterior designer that created Oka, came from Japanese Daihatsu Cuore. Tightly restricted by project specifications, he did his work hardly believing that the car is going to make it to serial production. Nevertheless, its comparatively satisfactory technical characteristics and low price (as of now, it sells for about $3,500) allowed it to lead a prolific career in the turbulent years to come.

As of 2006, there are four versions of Oka distributed: basic VAZ 11113 Oka made by either ZMA (Naberezhnye Chelny) or SeAZ factory (33 hp, 125 km/h max, 3.2 litres per 100 km), 'custom' VAZ 11301 Astro (49 hp) and VAZ 11113-27 Toyma — commercial use subcompact with a cargo compartment instead of two rear seats.

Usage. In its evident city car role, the Oka is considered highly unfashionable, and is a clear statement of inability to buy anything cheaper. Still, it is widely used by local delivery companies. Its road agility and acceleration rate (quite surprising for its appeal) prevented it from taking Zaporozhets' place in folklore (which takes its delight in the awkwardness and slow speed of the former). Its small size and weight, however, gives

birth to a multitude of funny (and often true) stories involving several men carrying Oka away from its parking place. Like its brethren VW Beetle, it often attracts the sentiment of the owner, so various customized and tuned versions are inevitably exhibited at local exotic cars festivals. There is a restyling scheduled by the manufacturing company for 2007; it will not affect anything but the bodyworks, lights, interior design and features. Reportedly, there are no positive prospects for Oka-2 and Oka-3, Lada's concept city cars in development for years.

Text 18. Lada Niva

The Lada Niva is an off-road vehicle vehicle built by Russian automaker AutoVAZ. The car is very popular in its home country. It is also popular in Canada (despite disappearing from show rooms in 1997 it still has a large cult following), South America, Europe, and other regions where the terrain requires a robust and tough car for a reasonable price. It was one of the first off-road vehicles to feature a unibody architecture and a predecessor to current crossover SUVs. Before it was introduced to the UK, it was referred to by some in the motoring press as the 'Russian Range Rover'.

The Niva (2121) was Lada's (VAZ/AutoVAZ) first non-Fiat model. Much of its mechanicals are carried over from the Fiat based Lada models, though the body and four-wheel drive system were designed by Lada. Production began in 1977 and still carries through with only minor changes to the engine, rear hatch design, and interior trim levels.

In basic form, the Niva has a carbureted 1.6-litre overhead cam four-cylinder gasoline engine producing 54 kW (72 hp) and 126 N·m (93 ft·lbf), a four- or five-speed manual transmission, and full-time four-wheel drive. There are no hubs and the transfercase can be locked on the fly. The original Niva has a maximum speed of around 130 km/h (80 mph), and can cruise at 90 km/h (56 mph) while consuming gasoline at a respectable 8.25 litres/100km (28.5 mpg (US)). Its towing capacity is rated for up to 860 kg (1900 lb). A 1.7-litre petrol engine was introduced later in production, as was fuel injection supplied by General Motors. Around this time the rear hatch was revised to have a lower opening. In some markets a 1.9L Peugeot diesel powered Niva was sold. Coil springs are located at each of the four wheels, and suspension is independent in front, whereas the rear axle is a 5 link live-type, with ratios between 3.90 and 4.30 depending on the model and market. Ground clearance is good at 235 mm (9.25 in) and water 510 mm (20 in) deep can be negotiated.

The brakes (disc front, drum rear) are servo-assisted dual-circuit style and the clutch is hydraulic. The turning circle, at 36.25' is adequate, while the center of gravity is exceptional. Cargo space is 0.48 m^3 (17 ft^3), or 1.33 m^3 (47 ft^3) with the rear seats folded down. A spare tire is located, of all places, in the engine bay under the hood, and like all Lada's, a 21 piece toolkit is also supplied for do-it-yourself roadside repairs. The latter feature is considered a useful and practical feature by off-road fans.

During the 1980s, local Lada importers in various markets made their own upgrades to help compete with more modern SUVs. In the UK the Cossack model featured large body decals, roof rails, running boards, 15" alloy wheels, and on some versions a sunroof, steel bull-bars, spotlights, a rear-mounted spare tyre and semi-bucket seats. Other markets' importers made similar upgrades and many were also called Cossack. In 1995, Lada UK introduced a face-lifted version of the Niva Cossack and renamed the basic model as the Hussar. Whereas the Hussar had the original 1977 trim, the new UK Cossack featured a new Rover-designed grille and other body kit items, and gained soft nudge-bars at the front in deference to public opinion against bullbars. Both models received the same new 1.7-litre engine and a new deeper tailgate which extended the rear opening to the level of the bumper — a vast improvement over the original model's high lip. Official Niva imports to the UK ceased in 1997 due to the importers having difficulty in sourcing the GM fuel injection unit required to satisfy ever-tightening UK emissions regulations.

Uses of the Niva. In Russia and Europe the Niva was used as an ambulance, a military vehicle, and by various police forces (e.g. Slovakia) and utility companies (e.g. Manx Electricity Board).

Transmanche-Link, the consortium of companies organized to construct the Channel Tunnel between England and France, used a fleet of 45 Nivas to aid in the enormous project. Each Niva accumulated in excess of 70,000 off-road kilometres during its employment, and after construction ceased in 1993 the fleet was sold off to a local dealer.

Chevrolet Niva. GM-AvtoVAZ, a joint venture between AutoVAZ and General Motors, produces the Chevrolet Niva. The car was previously known as VAZ 2123 in the design stage. It features an updated body and 1.7-litre gasoline engine with fuel injection. Although the body and the interiors are new, it is still based on the old VAZ 2121 engine, transmission and most mechanicals. Its off-road ability is exemplary compared with many modern budget SUVs, having been designed for tough tundra territory.

An export version with reinforced hull, 1.8-litre Opel Ecotec Family I gasoline engine and Aisin four-wheel drive was considered since 2003. Although most of the engineering work has been completed, the release was constantly postponed. Although the GM-AvtoVAZ considered building a new engine plant for the local production of Ecotecs, in July 2005 it was announced that the project is cancelled and so are the plans for the long-anticipated 'export' Niva. However, the project was revived in Fall 2006 and the 'Niva FAM1' was introduced as a new trim for 2007 model year. The price has nearly doubled, so the market prospectives of this trim are not clear.

VAZ-2122 Reka. In 1974, when VAZ 2121 development was almost finished, the engineers from Togliatti began working on an amphibian off-roader, VAZ 2122 Reka ('River') based on VAZ-2121 Niva underpinnings. It was supposed to offer the car to Soviet Ministry of Defence. Six evolutions of prototypes were built, much development work has been done. The car

was tested in experimental military unit, on the proving grounds belonging to Ministry of Defence, and in the Turkmenian desert. VAZ-2122 received very positive feedback, and in 1987 VAZ finished all development work: car was ready for production.

By the end of the eighties, the Ministry of Defence did not have the financial resources necessary for the mass production of VAZ-2122. As a result, VAZ-2122 did not see series production.

Text 19. Car-models of AvtoVAZ

AvtoVAZ is a Russian automobile manufacturer. It produces nearly one million cars a year, including the Samara, Lada 110 and the Niva off-roader. The variations of their first car, the model VAZ-2101, based on the 1966 Fiat 124 and introduced in 1970, are still the cars most associated with its Lada brand. The plant was set up as a collaboration between Italy and the Soviet Union and built on the banks of the Volga river in 1966. A new part of town Togliatti was built around the factory. The Lada was envisaged as a 'people's car' like the Citroën 2CV or the VW Beetle.

The lightweight Italian Fiat 124 was adapted into something intended to survive treacherous Russian driving conditions. Among many changes, aluminium brake drums were added to the rear, and the original Fiat engine was dropped in favour of a newer design also purchased from Fiat. This new engine had a modern overhead camshaft design but was never used in Fiat cars. The suspension was raised (to clear rough Russian roads) and the bodyshell was made from thicker, heavier steel. The first Lada models were equipped with a starting handle in case the battery went flat in Siberian conditions, though this was later dropped. Another feature specifically intended to help out in cold conditions was a manual auxiliary fuel pump.

Engines fitted to the original Ladas start with the 1.2L carburetor in the original and go up to the 1.7L export model set up with a General Motors single point fuel injection system. Diesel engines were later fitted for the Russian market only. The drivetrain is a simple rear-wheel drive setup with a live rear axle. The engine is an inline four with two valves per cylinder and a single overhead camshaft.

The Fiat-based Ladas feature various headlight, trim and body styles. The original, Fiat style models included VAZ-2101 sedan and VAZ-2102 station wagon. 1972 saw introduction of deluxe version of the sedan, VAZ-2103, which was based on Fiat-124 Speciale and featured new 1.5L engine and twin headlights. In 1974, the original VAZ-2101 was updated with new engines and interiors; VAZ-2102 underwent the same improvements in 1976. The body style with two round headlights was manufactured until 1988, all others remain in production in slightly updated form.

The VAZ-2106 introduced in 1976 was an updated verion of VAZ-2103, featuring different interiors and new 1.6L engine. 2106 is the oldest and the most popular rear-drive model of AvtoVAZ, its production continued until 2001 and still carried on by licensees. VAZ-2105, still based on the

2101 but updated to 80s styling, was introduced in 1980. Square headlights and new body panels distinguish this style from the old models. A deluxe version, VAZ-2107, was out in 1982; it featured a better engine, refined interiors and Mercedes-like radiator grille. In 1984, the VAZ-2104 station wagon completed the line-up.

In the domestic market, these classic models were called Zhiguli. The LADA name was used for exports only, but a large share of Ladas was reexported from Eastern block countries, so the brand was well-known in the domestic market as well. AvtoVAZ designers proved that they had some original ideas when the VAZ-2121 Niva was introduced in 1978. This highly popular car was made with off-road use in mind, featuring full time all-wheel drive, an original body style and the most powerful 1.7L engine in the VAZ range. The Niva has also been available with 1.9L Peugeot sourced diesel engine. The Niva is still in production. The 2108 — 2109 models were in production until 2001, when they were restyled with new side panels, interiors and 1.5L fuelinjection engines (though fuel injection was available as early as 1995). The Lada 2109 hatchback was rebadged as Lada 2114, and Lada 21099 sedan was rebadged as the Lada 2115.

VAZ-1111 Oka micro-car, which resembles the Fiat Panda, was introduced in 1988, and in 1991 the production was transferred to KamAZ and SeAZ factories. The VAZ-2120 Nadezhda minivan is based on original Niva and is in low-volume production since 1998. A five-door version of the Niva, the VAZ-2131, has been in production since 1995.

The break-up of the USSR delayed the production of new 110-series by a couple of years. The VAZ-2110 sedan was introduced in 1996, the 2111 station wagon followed in 1998 and the 2112 hatchback completed the range in 2001. These models are basically based on Samara technology with a new body and fuel injection engines as standard, though carburated versions have also been available up until 2001. The 110-series remains in production and has been continually updated over the years — for example, engines used to be 1.5L units with either 8 or 16 valves, but these have now been upgraded to 1.6L units that meet stricter emissions rules.

Changes to emissions- and safety-legislation meant that AutoVAZ withdrew from most Western markets by the late 1990s; often, there were also problems with spare parts. In the USA they were never sold due to the cold war, but they were available in Canada (where the Niva was quite popular) however Canadians travelling in the USA in a Lada found out that some gas stations refused to sell fuel to them due to anti-Soviet sentiment. The rise in popularity of Far Eastern imports from newly established manufacturers such as Daewoo, Proton, Kia and Hyundai contributed to Lada's demise in the West. These Korean and Malaysian-manufactured vehicles offered modern Japanese-developed technology and high equipment levels which Lada could not hope to compete with.

Though the original Lada, and as of the early part of the new millennium the Samara, have now been withdrawn from Europe, the Lada 110 and the Niva are still sold on the European market, as are the more modern models.

The Lada is widely available in many Central and South American countries as well as Africa, the Middle East and in all of the former Soviet Union.

GM-AvtoVAZ, a joint-venture with General Motors, adopted updated version of Niva, VAZ-2123, that was considered for production since the 1990s. Named Chevrolet Niva, it's being built on the venture's plant since 2001 and is exported to Europe and Latin America. In 2004, the Chevrolet Viva, a four-door version of the Opel Astra G, was introduced.VAZ has also tried to get into the sportier markets: several Ladas were factory-tuned and given a Momo steering wheel. A convertible was also produced. In 2003, VAZ presented the concept car Lada Revolution, an open single seater sports car powered by a 1.6L engine producing 215 hp.

There are other experimental cars like VAZ-210834 Tarzan SUV concept, VAZ-1922 monster truck and VAZ-2359 pick-up both based on Niva etc. The VAZ-211223 110-series coupe, with the sister models 111 and 112 has been developed with a modern and luxurious look and feel, has been mass produced and are popular in Russia today. 2005 saw the introduction of the new Kalina supermini lineup to the market. AvtoVAZ has built a new modern plant for this model and hoping to sell some 200,000 cars annually. Test production of Lada 1118 sedan started in November, 2004, and full-scale assembly was launched in May, 2005. The Lada 1119 hatchback and Lada 1117 station wagon with updated DOHC 1.6L engines are to follow in 200510 sedan was introduced in 1996, the 2111 station wagon followed in 1998 and the 2112 hatchback completed the range in 2001. These models are basically based on Samara technology with a new body and fuel injection engines as standard, though carburated versions have also been available up until 2001. The 110-series remains in production and has been continually updated over the years — for example, engines used to be 1.5L units with either 8 or 16 valves, but these have now been upgraded to 1.6L units that meet stricter emissions rules.

Text 20. Nikolaus Otto

The German inventor Nikolaus August Otto (1832 — 1891) created the internal-combustion engine, the first engine to efficiently burn fuel directly in a piston chamber. Although other internal combustion engines had been invented these were not based on four separate strokes. The concept of four strokes is likely to have been around at the time of Otto's invention but he was the first to make it practical.

According to recent historical studies, the Italian inventors Eugenio Barsanti and Felice Matteucci patented a first working efficient version of an internal combustion engine in 1854 in London (pt. Num. 1072). It is claimed that the Otto engine is in many parts at least inspired from this precedent invention, but, as yet there is no documentation of knowledge about the Italian engine by Otto. In 1864, Otto co-founded an engine manufacturing business in Cologne along with his business partner Eugen Langen. The first major breakthrough at Otto's company was during its founding year, with

the development of the 'atmospheric gas power machine'. This atmospheric engine was later awarded a Gold Medal at the World Exhibition in Paris as an economical drive engine for small businesses and manufacturing of these engines began.

Gottlieb Daimler and Wilhelm Maybach joined his company for several years and together they produced the idea of the four-stroke cycle or Otto cycle engine, which was first described in 1876. This engine was designed as a stationary engine and in the action of the engine; the stroke was an upward or downward movement of a piston in a cylinder. In 1882, the Philosophical Faculty of the University of Wurzburg awarded Otto with an honorary doctorate. In 1884, Otto once again revolutionized engine design. At this point in time internal combustion engines were stationary due to the fact that they could not run on liquid fuel. They were run with gas, and required a pilot light in order to operate. This changed with the introduction of a low-voltage magneto ignition. This electrical ignition system allowed engines to use liquid fuel, making mobile use possible.

Meanwhile, Daimler and Maybach established Daimler Motoren Gesellschaft (Daimler Engines Company) or DMG. Its purpose was the construction of small, high speed engines based on the same technology. Daimler and Maybach designed and built a motorcycle with an engine of the Otto Cycle type that they patented. In 1886, they placed a stationary engine into a stagecoach as an experiment, designed and built their first automobile. In 1892, they first sold an automobile to a customer.

Text 21. Rudolf Diesel

Rudolf Christian Karl Diesel, a German engineer and inventor, contributed to the advancement of technology with his internal-combustion engine. Although he was best recognized for his invention of the pressure-ignited heat engine that bears his name, Diesel was also an eminent thermal engineer, a linguist, a 'connoisseur' of the arts, and a social theorist. Born in 1858, Diesel pursued his education in England and at the Polytechnic School in Munich. Already early Rudolf was interested in engines. In his youth he was fascinated by the engines of Lenoir and the steam engines that were usual at his time. During his study he learned of his teacher, professor Linde, a famous inventor, that the thermal engine could reach by far a better performance. He referred to the young Frenchman Sadi Carnot (1796 — 1832), who discovered the Carnot cyclic process, a physical principle that describes the ideal process of the burn in an engine. Diesel was pursued from now on by the thought to build such an engine. He had some practice working as a mechanic and parts designer for two years at the Sulzer Machine Works of Winterthur in Switzerland. In 1880, he returned to Paris and began his career. He joined the Linde Refrigeration Enterprises and worked as a refrigerator engineer.

Rudolf established his first shop-laboratory in Paris and began his 13-year ordeal of creating and developing his distinctive engine. He moved to

the Berlin branch to continue his search for an efficient internal-combustion engine, in 1890. Diesel had the crucial idea, how the combustion process could be improved: The engine takes in just air, which is to be compressed now to a pressure of about 200 bars. At this point, heavy fuel (such as crude oil or petroleum) gets injected by an injector in the air that is heated up because of the huge pressure. The high temperature leads immediately to the inflammation of the fuel by autoignition, which makes a spark plug unnecessary. In 1892, he received a patent for his internal-combustion engine, which utilized auto-ignition of fuel. His ideas for a machine where the combustion would be transported within the cylinder were published. In 1893, in Augsburg, Diesel's prime model, which was composed of only a 10-foot iron cylinder with a flywheel at its base, operated on its own power for the first time.

For ten years he developed various heat engines, including a solar-powered air engine. Diesel spent two more years at improvements and in 1896 he presented an enhanced model that was very successful commercially. He constructed the first successful diesel engine, employing low-cost fuel while he was associated with the Krupp firm in Essen. His 'rational heat motor' demonstrated the first compression-ignition engine in 1897. Commercial manufacture was delayed another year and began at a very gradual pace. However, Diesel became very wealthy from franchise fees in great part international. His engines were utilized to power electric and water plants, pipelines, automobiles and trucks, and marine craft, and soon after were employed in applications that included oil fields, mines, factories, and transoceanic shipping.

Text 22. Compressed Air Hybrid Car

Researchers have developed a method to add a compressed air energy storage system to cars for a low cost and low weight increase. Air hybrid cars could bring big fuel savings for city drivers, according to a recent study released by engineers. Experiments based on modelling and simulations showed that the air hybrid engine improved fuel efficiency by 64 percent in city driving and 12 percent in highway driving. The study also suggested that by adopting the air hybrid approach, carmakers could avoid some of the manufacturing costs associated with the more common electric hybrid design.

Tsu-Chin Tsao, professor of mechanical engineering at the UCLA (University of California, Los Angeles) School of Engineering and Applied Science, has been collaborating with engineers at Ford Motor Co. for more than a year on an air hybrid vehicle design that uses a camless valve train. Like its cousin the electric hybrid, air hybrid vehicles are being explored as a more fuel-efficient means of travelling the nation's roads, especially in urban areas, where stop-and-go traffic leads to a wasteful use of gas. During a typical day of city driving, fuel energy used to accelerate the vehicle is partially wasted during deceleration, when kinetic energy is converted into

heat in the friction brakes. Fuel economy could be greatly improved, say researchers, if that braking energy could be captured, stored and later used to help the vehicle speed up, for instance. To make the air hybrid design work, Tsao introduced a few clever modifications to a traditional 2.5 litre V6 engine, including a valve design that allows the engine to not only burn fuel more efficiently, but to compress and expand the air captured during braking as well. When it is compressed, air can store energy that is neither toxic nor explosive. Once the air is expanded, the burst of released energy can be used to help accelerate the car.

The concept is closely tied to that of electric hybrid vehicles, which are becoming an increasingly well-known alternative to traditional automobiles. The additional hardware required includes a battery and a supplemental electric motor, which adds weight to the car and drives up costs. Manufacturers are forced to reduce weight in other ways. Automobile manufacturers are turning to more expensive lightweight materials like aluminium to compensate for the added weight. With an air hybrid thanks to innovative valve design, the air hybrid can achieve similar fuel efficiencies but needs only an air storage unit weighing no more than 30 kilograms. The air hybrid does not require a second propulsion system. This approach allows for significant improvements in fuel economy without the added complexity of the electric hybrid model.

Text 23. Hydrogen Engine

Some have theorized that in the future hydrogen might replace conventional fuels. Furthermore, with the introduction of hydrogen fuel cell technology, the use of internal combustion engines may be phased out. The advantage of hydrogen is that its combustion produces only water. This is unlike the combustion of fossil fuels, which produce carbon dioxide, a known green house gas (GHG), carbon monoxide resulting from incomplete combustion, and other local and atmospheric pollutants such as sulfur dioxide and nitrogen oxides that lead to urban respiratory problems, acid rain, and ozone gas problems. However, free hydrogen for fuel does not occur naturally, burning it liberates less energy than it takes to produce hydrogen in the first place due to the second law of thermodynamics.

Although there are multiple ways of producing free hydrogen, those require converting combustible molecules into hydrogen, so hydrogen does not solve any energy crisis, moreover, it only addresses the issue of portability and some pollution issues. The disadvantage of hydrogen in many situations is its storage. Liquid hydrogen has extremely low density — 14 times lower than water and requires extensive insulation, whilst gaseous hydrogen requires heavy tankage. Although hydrogen has a higher specific energy, the volumetric energetic storage is still roughly five times lower than petrol, even when liquified. The 'Hydrogen on Demand' process, designed by Steven Amendola, creates hydrogen as it is needed, but has other issues, such as the high price of the sodium borohydride, the raw

material. Sodium borohydride is renewable and could become cheaper if more widely produced.

Text 24. Ford Production of Hydrogen ICE

Today Ford began production of a dedicated hydrogen internal combustion engine at its Engine Manufacturing Development Operations in Dearborn Heights, which makes it the first automaker to do so. The engine is a supercharged 6.8-liter V10 that will be used in the E-450 hydrogen-fuelled shuttle bus. Ford will be delivering the vehicle to customers in Florida first, although didn't say how or where said customers would refuel their shuttle bus when necessary.

The V10 engine delivers 235 horsepower and 310 ft-lbs of torque while producing near zero emissions of regulated pollutants and greenhouse gases. That's not a lot of power, but not a lot of pollutants, either. While based on the same V10 that Ford uses in many of its truck and commercial vehicle applications, this unit has many specialized components that optimize it for use with hydrogen as a fuel. Over the years Ford produced a large number of hydrogen-powered concept and experimental vehicles, including a fleet of 30 hydrogen-powered Focus fuel cell vehicles, the Mazda RX-8 Hydrogen RE, and most recently the Super Chief Concept that debuted at the 2006 Detroit Auto Show, which was capable of running on hydrogen, E85 or gasoline.

There are some specialized components in the engine. Valves and valve seats exhibit special hardened materials are used to compensate for hydrogen's reduced lubricating properties compared to gasoline or natural gas. Spark plugs are iridium tipped plugs allow for increased spark plug life. Ignition coils are high energy coil-on-plug coils, to manage unique ignition characteristics. Fuel injectors are designed specifically for hydrogen and high volume fuel rails.

Crank damper is tuned for hydrogen fuel to ensure smooth operation Pistons, connecting rods and piston rings are high output designs to accommodate the higher combustion pressure of hydrogen combustion Head gasket accommodates increased combustion chamber pressures Intake manifold is all-new to accommodate twin screw supercharger and water-to-air intercooler Twin screw supercharger and water-to-air intercooler are added to improve power output and maximize efficiency Engine oil is full-synthetic formulation developed in partnership with BP/Castrol optimized for hydrogen combustion properties.

Text 25. Planetary Automatic Transmission

Automatic transmission uses a set of gears, called a compound planetary gearset that looks like a single planetary gearset but actually behaves like two planetary gearsets combined. It has one ring gear that is always the output of the transmission, but it has two sun gears and two sets of

planets. The picture shows the planets in the planet carrier. Notice how the planet on the right sits lower than the planet on the left. The planet on the right does not engage the ring gear — it engages the other planet. Only the planet on the left engages the ring gear. Inside the planet carrier there are the two sets of planets. The shorter gears are engaged only by the smaller sun gear. The longer planets are engaged by the bigger sun gear and by the smaller planets.

Text 26. Automatic Transmission Gears

In **first gear**, the smaller sun gear is driven clockwise by the turbine in the torque converter. The planet carrier tries to spin counterclockwise, but is held still by the one-way clutch (which only allows rotation in the clockwise direction) and the ring gear turns the output. The small gear has 30 teeth and the ring gear has 72, so the gear ratio is –2.4:1. So the rotation is negative which means that the output direction would be opposite the input direction. But the output direction is really the same as the input direction — this is where the trick with the two sets of planets comes in. The first set of planets engages the second set, and the second set turns the ring gear; this combination reverses the direction. You can see that this would also cause the bigger sun gear to spin; but because that clutch is released, the bigger sun gear is free to spin in the opposite direction of the turbine (counterclockwise).

Second gear transmission does something really neat in order to get the ratio needed for second gear. It acts like two planetary gearsets connected to each other with a common planet carrier. The first stage of the planet carrier actually uses the larger sun gear as the ring gear. So the first stage consists of the sun (the smaller sun gear), the planet carrier, and the ring (the larger sun gear). The input is the small sun gear; the ring gear (large sun gear) is held stationary by the band, and the output is the planet carrier. For this stage, with the sun as input, planet carrier as output, and the ring gear fixed, the formula is 2.2:1. The planet carrier turns 2.2 times for each rotation of the small sun gear. At the second stage, the planet carrier acts as the input for the second planetary gear set, the larger sun gear (which is held stationary) acts as the sun, and the ring gear acts as the output, so the gear ratio is 0.67:1. To get the overall reduction for second gear, we multiply the first stage by the second, 2.2×0.67, to get a 1.47:1 reduction.

Most automatic transmissions have a 1:1 ratio in **third gear**. You'll remember from the previous section that all we have to do to get a 1:1 output is lock together any two of the three parts of the planetary gear. With the arrangement in this gearset it is even easier — all we have to do is engage the clutches that lock each of the sun gears to the turbine. If both sun gears turn in the same direction, the planet gears lock up because they can only spin in opposite directions. This locks the ring gear to the planets and causes everything to spin as a unit, producing a 1:1 ratio. By definition, an **overdrive** has a faster output speed than input speed. It's a speed

increase — the opposite of a reduction. In this transmission, engaging the overdrive accomplishes two things at once. In order to improve efficiency, some cars have a mechanism that locks up the torque converter so that the output of the engine goes straight to the transmission.

In this transmission, when overdrive is engaged, a shaft that is attached to the housing of the torque converter (which is bolted to the flywheel of the engine) is connected by clutch to the planet carrier. The small sun gear freewheels, and the larger sun gear is held by the overdrive band. Nothing is connected to the turbine; the only input comes from the converter housing. Let's go back to our chart again, this time with the planet carrier for input, the sun gear fixed and the ring gear for output. The ratio is 0.67:1. So the output spins once for every two-thirds of a rotation of the engine. If the engine is turning at 2000 rotations per minute, the output speed is 3000 RPM. This allows cars to drive at freeway speed while the engine speed stays slow.

Reverse is very similar to first gear, except that instead of the small sun gear being driven by the torque converter turbine, the bigger sun gear is driven, and the small one freewheels in the opposite direction. The planet carrier is held by the reverse band to the housing. So, according to equations we have 2.0:1. So the ratio in reverse is a little less than first gear in this transmission.

Text 27. Rack-and-Pinion Steering

Rack-and-pinion steering is quickly becoming the most common type of steering on cars, small trucks and SUVs. It is actually a pretty simple mechanism. A rack-and-pinion gearset is enclosed in a metal tube, with each end of the rack protruding from the tube. A rod, called a tie rod, connects to each end of the rack.

The pinion gear is attached to the steering shaft. When you turn the steering wheel, the gear spins, moving the rack. The tie rod at each end of the rack connects to the steering arm on the spindle (see diagram above).

The rack-and-pinion gearset does two things:

1. It converts the rotational motion of the steering wheel into the linear motion needed to turn the wheels.

2. It provides a gear reduction, making it easier to turn the wheels.

When the rack-and-pinion is in a power-steering system, the rack has a slightly different design.

Text 28. Recirculating-Ball Steering

Recirculating-ball steering is used on many trucks and SUVs today. The linkage that turns the wheels is slightly different than on a rack-and-pinion system.

The recirculating-ball steering gear contains a worm gear. You can image the gear in two parts. The first part is a block of metal with a threaded

hole in it. This block has gear teeth cut into the outside of it, which engage a gear that moves the pitman arm (see diagram above). The steering wheel connects to a threaded rod, similar to a bolt, that sticks into the hole in the block. When the steering wheel turns, it turns the bolt. Instead of twisting further into the block the way a regular bolt would, this bolt is held fixed so that when it spins, it moves the block, which moves the gear that turns the wheels. Instead of the bolt directly engaging the threads in the block, all of the threads are filled with ball bearings that recirculate through the gear as it turns. The balls actually serve two purposes. First, they reduce friction and wear in the gear; second, they reduce slop in the gear. Slop would be felt when you change the direction of the steering wheel — without the balls in the steering gear, the teeth would come out of contact with each other for a moment, making the steering wheel feel loose.

Power steering in a recirculating-ball system works similarly to a rack-and-pinion system. Assist is provided by supplying higher-pressure fluid to one side of the block.

Text 29. Four-Wheel Steering

Four-wheel steering (or all wheel steering) is a system employed by some vehicles to increase vehicle stability while maneuvering at high speed, or to decrease turning radius at low speed. In most active four-wheel steering systems, the rear wheels are steered by a computer and actuators. The rear wheels generally cannot turn as far as the front wheels. Alternatively, several systems, including Delphi's Quadrasteer and the system in Honda's Prelude line, allow for the rear wheels to be steered in the opposite direction as the front wheels during low speeds. This allows the vehicle to turn in a significantly smaller radius — sometimes critical for large trucks or vehicles with trailers.

Many modern vehicles offer a form of passive rear steering to counteract normal vehicle tendencies. For example, Subaru used a passive steering system to correct for the rear wheel's tendency to toe-out. On many vehicles, when cornering, the rear wheels tend to steer slightly to the outside of a turn, which can reduce stability. The passive steering system uses the lateral forces generated in a turn (through suspension geometry) and the bushings to correct this tendency and steer the wheels ever-so-slightly to the inside of the corner. This improves the stability of the car, through the turn. This effect is called compliance understeer and it, or its opposite, is present on all suspensions. Typical methods of achieving compliance understeer are to use a Watt's link on a live rear axle, or the use of toe control bushes on a twist beam suspension.

In an active 4ws system all four wheels turn at the same time when you steer. There can be controls to switch off the rear steer and options to steer only the rear wheel independent of the front wheels. At slow speeds (e.g. parking) the rear wheels turn opposite of the front wheels, reducing the turning radius by up to twenty-five percent, while at higher speeds both front

and rear wheels turn alike (electronically controlled), so that the vehicle may change position with less yaw, enhancing straight-line stability. The 'Snaking effect' experienced during motorway drives while towing a caravan is thus largely nullified. Four-wheel steering found its most widespread use in monster trucks, where maneuverability in small arenas is critical, and it is also popular in large farm vehicles and trucks.

General Motors offers Delphi's Quadrasteer in their consumer Silverado/Sierra and Suburban/Yukon. However, only 16,500 vehicles have been sold with this system since its introduction in 2002 through 2004. Due to this low demand, GM will not offer the technology on the 2007 update to these vehicles. Previously, Honda had four-wheel steering as an option in their 1988 — 1994 Prelude, and Mazda also offered four-wheel steering on the 626 and MX6 in 1988. Neither system was very popular, in that whatever improvement they brought to these already excellent-handling vehicles was offset by an unavoidable decrease in sensitivity caused by the increased weight and complexity.

Text 30. History of Suspension

In the early 1900's, cars still rode on carriage springs. After all, early drivers had bigger things to worry about than the quality of their ride — like keeping their cars rolling over the rocks and ruts that often passed for roads. Pioneering vehicle manufacturers were faced early on with the challenges of enhancing driver control and passenger comfort. These early suspension designs found the front wheels attached to the axle using steering spindles and kingpins. This allowed the wheels to pivot while the axle remained stationary. Additionally, the up and down oscillation of the leaf spring was damped by device called a shock absorber.

These first shock absorbers were simply two arms connected by a bolt with a friction disk between them. Resistance was adjusted by tightening or loosening the bolt. As might be expected, the shocks were not very durable, and the performance left much to be desired. Over the years, shock absorbers have evolved into more sophisticated designs. Let's start our discussion of shock absorbers with one of very important point: despite what many people think, conventional shock absorbers do not support vehicle weight. Instead, the primary purpose of the shock absorber is to control spring and suspension movement. This is accomplished by turning the kinetic energy of suspension movement into thermal energy, or heat energy, to be dissipated through the hydraulic fluid.

Shock absorbers are basically oil pumps. A piston is attached to the end of the piston rod and works against hydraulic fluid in the pressure tube. As the suspension travels up and down, the hydraulic fluid is forced through tiny holes, called orifices, inside the piston. However, these orifices let only a small amount of fluid through the piston.

This slows down the piston, which in turn slows down spring and suspension movement. The amount of resistance a shock absorber develops

depends on the speed of the suspension and the number and size of the orifices in the piston. All modern shock absorbers are velocity sensitive hydraulic damping devices — meaning the faster the suspension moves, the more resistance the shock absorber provides. Because of this feature, shock absorbers adjust to road conditions.

Text 31. Full-Contact Disc Brakes

There is a quiet but major revolution happening in the world of brakes, and its being brought about by a Canadian company called NewTech. Rather than the piecemeal improvements we've seen over the last few years, with slight design changes, and materials improvements, the new system is a radical redesign from the ground up. NewTech have designed a disc brake system called 'full contact disc brakes'. They looked at traditional pad and rotor design and figured that the pads only contact about 15 % of the rotor surface at any one time. With a change of design, NewTech have been able to add 5 more pads to the system so that 75 % of the brake rotor is in contact with the pads at any one time.

With traditional pads and rotors, the brake rotor is clamped between the pads. With the NewTech design, the brake rotor itself becomes a floating rotor, similar to those found on motorbikes. It is covered with a 'spider' (the red structure in my renderings below) and the spider has 6 brake pads on the inside of it. The hydraulic system acts on fully circular elastomer composite diaphragm behind the brake disc, mounted in the black structure in the renderings. This had 6 pads on it which push the entire disc out against the 6 pads inside the spider. This provides and even force across the entire disc to push it out and the disc gets an even contact with all 12 pads.

To ensure the brakes remain cool, the system is covered in cooling fins connected to the outer pads to dissipate heat. The inner pads are fitted with a moulded thermal barrier made of a composite material. Special inserts made of a variety of frictional materials are distributed evenly on the entire surface of the pad.

The range of materials is used to ensure performance under diverse conditions. NewTech believe that the system has considerable advantages over conventional brakes with better cooling, higher strength and reduced noise and vibration. NewTech have sold truck and bus versions of these brakes into the haulage and public transport industry, but now Renault is considering introducing this system on its cars in conjunction with a new brake-by-wire system. NewTech's websites can be found here and here.

Text 32. Brake Pad Compounds

Just a quick word on brake pad compounds. Most pads used to use asbestos but we all know what that stuff is like. Today they use all manner of combinations of materials. The pads themselves are made up of a friction material bonded to the backing plate. The brake caliper piston pushes

against the backing plate and the friction material is pushed against the brake rotor. The material combinations typically fall into the following broad categories now.

Organic pads are well-suited for street driving because they wear well, are easy on the ears, don't chew up the rotors and don't spew dust everywhere. They're favoured for your average family saloon because they work well when they're cold. Of course the drawback is that they don't work so well when they get hot.

Semi-metallic/sintered pads make a good compromise between street and track. These seem to be the pad of choice for sportier vehicles such as the Subaru Impreza WRX. They won't work as well as organic pads when they are cold, so you need to be a bit wary of the first couple of stops. Conversely they do work well when hot. Occasionally the weak link in semi-metallic pads is the bonding material that holds the friction pad to the backing plate. There have been occasions where the friction material has come away completely. That's infrequent though.

Metallic pads are typically reserved for racing or the extremely rich. They squeal and dust like crazy, are hard on rotors and don't work well when cold.

Ceramic pads still have metal fibers (about 15 % vs about 40 % for semi-metallic) but they are copper instead of steel and therefore cause less wear and transfer heat better. They don't fade as easily as other pads, cool faster, last longer, and are effectively silent, as the sound they generate is outside of the human range of hearing. Dogs will go crazy thought. The dust created by ceramic pads is also very light in color so your wheels look cleaner.

Text 33. Brake Fluids

As you might know, brake fluid does not compress. It's a good job too — if you put your foot on the brake pedal and it went all the way to the floor, you'd be worried. But that's exactly what can happen if you disregard the 'health' of your brake fluid. Brake fluid is hygroscopic — that means it attracts and soaks up water. This is why it comes in sealed containers when you buy it, and why when the crazy guy four doors down offers you some of the 15 gallons of brake fluid he's had in his garage since the war, you should turn him down. The problem with it being hygroscopic is that if it does start to take on water, bad things can happen.

Your typical DOT 4 brake fluid boils at about 230 °C. Water boils at 100 °C. Imagine your brakes are getting hot because of a long downhill stretch. Whilst the brake fluid is quite OK, the temperature of the brake components might get up over the boiling point of water. If that happens, the water boils out of the brake fluid and forms steam — a compressible gas. Next time you put your foot on the brake, rather than braking, all the pressure in the brake system is taken up with compressing the steam. Your brakes go out, you don't stop. Getting a little more complex, the boiling

point of a liquid goes up with its pressure. So when you step on the brake, the boiling point of the brake fluid might actually go up to 260 °C and the boiling point of the water content might rise up to 121 °C.

This is great, you might think, because now the boiling point is higher than the temperature of the brake fluid. At least it is until you take your foot off the brake again. Now the pressure in the system returns to normal, the boiling points revert to normal and instantly the water boils off into steam again. The symptoms are slightly different now. Under this scenario, the brakes work the first one or two times, but on the third or fourth press, they stop working because now the temperature and pressures have conspired to boil the water. The worst possible scenario is brake-fade combined with air in the system. If this has happened to you, then you're likely reading this page from beyond the grave, because in most accidents where weak brakes become no brakes, there aren't any survivors.

Text 34. Adaptive Cruise Control

Two companies are developing a more advanced cruise control that can automatically adjust a car's speed to maintain a safe following distance. This new technology, called 'adaptive cruise control', uses forward-looking radar, installed behind the grill of a vehicle, to detect the speed and distance of the vehicle ahead of it. Adaptive cruise control is similar to conventional cruise control in that it maintains the vehicle's pre-set speed. However, unlike conventional cruise control, this new system can automatically adjust speed in order to maintain a proper distance between vehicles in the same lane.

This is achieved through a radar headway sensor, digital signal processor and longitudinal controller. If the lead vehicle slows down, or if another object is detected, the system sends a signal to the engine or braking system to decelerate. Then, when the road is clear, the system will re-accelerate the vehicle back to the set speed. The 77-GHz Autocruise radar system made by TRW has a forward-looking range of up to 492 feet (150 meters), and operates at vehicle speeds ranging from 18.6 miles per hour (30 kph) to 111 mph (180 kph).

Delphi's 76-GHz system can also detect objects as far away as 492 feet, and operates at speeds as low as 20 mph (32 kph). Adaptive cruise control is just a preview of the technology being developed by both companies. These systems are being enhanced to include collision warning capabilities that will warn drivers through visual and/or audio signals that a collision is imminent and that braking or evasive steering is needed.

Text 35. Global Positioning System

The Global Positioning System (GPS) is currently the only fully functional Global Navigation Satellite System (GNSS). More than two dozen GPS satellites are in medium Earth orbit, transmitting signals allowing GPS

receivers to determine the receiver's location, speed and direction. Since the first experimental satellite was launched in 1978,

GPS has become an indispensable aid to navigation around the world, and an important tool for map-making and land surveying. GPS also provides a precise time reference used in many applications including scientific study of earthquakes, and synchronization of telecommunications networks.

Developed by the United States Department of Defense, it is officially named NAVSTAR GPS (NAVigation Satellite Timing And Ranging Global Positioning System). The satellite constellation is managed by the United States Air Force 50th Space Wing. The cost of maintaining the system is approximately US $750 million per year, including the replacement of aging satellites, and research and development. Despite this fact, GPS is free for civilian use as a public good. A GPS receiver calculates its position by measuring the distance between itself and three or more GPS satellites. Measuring the time delay between transmission and reception of each GPS radio signal gives the distance to each satellite, since the signal travels at a known speed. The signals also carry information about the satellites' location. By determining the position of, and distance to, at least three satellites, the receiver can compute its position using trilateration[1]. Receivers typically do not have perfectly accurate clocks and therefore track one or more additional satellites to correct the receiver's clock error.

System segmentation. The current GPS consists of three major segments. These are the space segment (SS), a control segment (CS), and a user segment (US).

The space segment is composed of the orbiting GPS satellites, or Space Vehicles (SV) in GPS parlance. The GPS design calls for 24 SVs to be distributed equally among six circular orbital planes. The orbital planes are centered on the Earth, not rotating with respect to the distant stars. The six planes have approximately 55° inclination (tilt relative to Earth's equator) and are separated by 60° right ascension of the ascending mode (angle along the equator from a reference point to the orbit's intersection). Orbiting at an altitude of approximately 20,200 kilometers (12,600 miles or 10,900 nautical miles; orbital radius of 26,600 km (16,500 mi or 14,400 NM)), each SV makes two complete orbits each sidereal day, so it passes over the same location on Earth once each day. The orbits are arranged so that at least six satellites are always within line of sight from almost anywhere on Earth. As of February 2007, there are 30 actively broadcasting satellites in the GPS constellation. The additional satellites improve the precision of GPS receiver calculations by providing redundant measurements. With the increased number of satellites, the constellation was changed to a nonuniform arrangement. Such an arrangement was shown to improve reliability and availability of the system, relative to a uniform system, when multiple

[1] *trilateration* — a method of surveying in which a whole area is divided into triangles, the sides of which are measured, usually by electromagnetic distance measuring for geodetic control or by chain survey for a detailed survey

satellites fail. GPS receivers come in a variety of formats, from devices integrated into cars, phones, and watches, to dedicated devices.

The user's GPS receiver is the user segment of the GPS system. In general, GPS receivers are composed of an antenna, tuned to the frequencies transmitted by the satellites, receiver-processors, and a highly-stable clock (often a crystal oscillator). They may also include a display for providing location and speed information to the user. A receiver is often described by its number of channels: this signifies how many satellites it can monitor simultaneously. Originally limited to four or five, this has progressively increased over the years so that, now, receivers typically have between twelve and twenty channels.

Text 36. Calculating Positions

The coordinates are calculated according to the World Geodetic System — WGS84 coordinate system. To calculate its position, a receiver needs to know the precise time. The satellites are equipped with extremely accurate atomic clocks, and the receiver uses an internal crystal oscillator-based clock that is continually updated using the signals from the satellites. The receiver identifies each satellite's signal by its distinct the **Coarse/Acquisition code**, or **C/A** code pattern, then measures the time delay for each satellite. To do this, the receiver produces an identical C/A sequence using the same seed number as the satellite. By lining up the two sequences, the receiver can measure the delay and calculate the distance to the satellite, called the pseudorange.

The orbital position data from the Navigation Message is then used to calculate the satellite's precise position. Knowing the position and the distance of a satellite indicates that the receiver is located somewhere on the surface of an imaginary sphere centered on that satellite and whose radius is the distance to it. When four satellites are measured simultaneously, the intersection of the four imaginary spheres reveals the location of the receiver. Earth-based users can substitute the sphere of the planet for one satellite by using their altitude. Often, these spheres will overlap slightly instead of meeting at one point, so the receiver will yield a mathematically most-probable position (and often indicate the uncertainty). Calculating a position with the **P(Y)** (the so-called 'anti-spoofing mode', the P code is first encrypted into the **Y-code**) signal is generally similar in concept, assuming one can decrypt it. The encryption is essentially a safety mechanism; if a signal can be successfully decrypted, it is reasonable to assume it is a real signal being sent by a GPS satellite. In comparison, civil receivers are highly vulnerable to spoofing since correctly formatted C/A signals can be generated using readily available signal generators. Receiver Autonomous Integrity Monitoring (RAIM) features will not help, since RAIM only checks the signals from a navigational perspective.

Accuracy and error sources. The position calculated by a GPS receiver requires the current time, the position of the satellite and the measured

delay of the received signal. The position accuracy is primarily dependent on the satellite position and signal delay.

To measure the delay, the receiver compares the bit sequence received from the satellite with an internally generated version. By comparing the rising and trailing edges of the bit transitions, modern electronics can measure signal offset to within about 1 % of a bit time, or approximately 10 nanoseconds for the C/A code. Since GPS signals propagate nearly at the speed of light, this represents an error of about 3 meters. This is the minimum error possible using only the GPS C/A signal.

Position accuracy can be improved by using the higher-speed P(Y) signal. Assuming the same 1 % accuracy, the faster P(Y) signal results in an accuracy of about 30 centimeters. Electronics errors are one of several accuracy-degrading effects outlined in the table below. When taken together, autonomous civilian GPS horizontal position fixes are typically accurate to about 15 meters (50 ft). These effects also reduce the more precise P(Y) code's accuracy.

Atmospheric effects. Changing atmospheric conditions change the speed of the GPS signals as they pass through the Earth's atmosphere and ionosphere. Correcting these errors is a significant challenge to improving GPS position accuracy. These effects are minimized when the satellite is directly overhead, and become greater for satellites nearer the horizon, since the signal is affected for a longer time. Once the receiver's approximate location is known, a mathematical model can be used to estimate and compensate for these errors.

Because ionospheric delay affects the speed of radio waves differently based on frequency, a characteristic known as dispersion, both frequency bands can be used to help reduce this error. Some military and expensive survey-grade civilian receivers compare the different delays in the L1 and L2 frequencies to measure atmospheric dispersion, and apply a more precise correction.

The effects of the ionosphere are generally slow-moving, and can be averaged over time. The effects for any particular geographical area can be easily calculated by comparing the GPS-measured position to a known surveyed location. This correction is also valid for other receivers in the same general location. Several systems send this information over radio or other links to allow L1 only receivers to make ionospheric corrections. The ionospheric data are transmitted via satellite in Satellite Based Augmentation Systems such as WAAS, which transmits it on the GPS frequency using a special pseudo-random number (PRN), so only one antenna and receiver are required.

Humidity also causes a variable delay, resulting in errors similar to ionospheric delay, but occurring in the troposphere. This effect is much more localized, and changes more quickly than the ionospheric effects, making precise compensation for humidity more difficult. Altitude also causes a variable delay, as the signal passes through less atmosphere at higher elevations. Since the GPS receiver measures altitude directly, this is a much simpler correction to apply.

Multipath effects. GPS signals can also be affected by multipath issues, where the radio signals reflect off surrounding terrain; buildings, canyon walls, hard ground, etc. These delayed signals can cause inaccuracy. A variety of techniques, most notably narrow correlator spacing, have been developed to mitigate multipath errors. For long delay multipath, the receiver itself can recognize the wayward signal and discard it. To address shorter delay multipath from the signal reflecting off the ground, specialized antennas may be used. Short delay reflections are harder to filter out since they are only slightly delayed, causing effects almost indistinguishable from routine fluctuations in atmospheric delay.

Multipath effects are much less severe in moving vehicles. When the GPS antenna is moving, the false solutions using reflected signals quickly fail to converge and only the direct signals result in stable solutions.

Ephemeris and clock errors. The navigation message from a satellite is sent out only every 12.5 minutes. In reality, the data contained in these messages tend to be 'out of date' by an even larger amount. Consider the case when a GPS satellite is boosted back into a proper orbit; for some time following the maneuver, the receiver's calculation of the satellite's position will be incorrect until it receives another ephemeris update.

The onboard clocks are extremely accurate, but they do suffer from some clock drift. This problem tends to be very small, but may add up to 2 meters (6 ft) of inaccuracy.

This class of error is more 'stable' than ionospheric problems and tends to change over days or weeks rather than minutes.

Text 37. UV Sensor

Another very clever and well thought out sensor is the UV or sunlight load sensor. UV Sensor, technically known as the SLD, located on the top of the dash, it's purple in colour and a lot of Scorpio owners are intrigued to know what it is and what it does.

Well let's investigate the theory behind it first. All temperature readings that you see on weather reports and forecasts are taken in the shade, they are actually taken from inside a white painted box with louvers called a Stevenson screen.

Say the temperature for example is 21°C and its cloudy, it will feel exactly the same in the shady area of your garden as in an area where if the sun was shining it would be quite hot. Imagine then that the skies clear and now when you walk from the shady to the sunny area of your garden. Your body detects a noticeable difference in temperature as you feel the sun beating down on you. But has the temperature being reported in the shade of the Stevenson screen changed at all? Well hardly, maybe by a couple of degrees, but your body now in full sun will feel the effect of the direct rays of the sun markedly. And basically this is the idea behind the sun load sensor. The temperature sensors in your Scorpio may not be registering much change in the internal ambient temperature when the sun suddenly

comes out, but you will feel the heat of the suns rays on your body and will feel much hotter. The SLD (sun load sensor) measures the intensity of the light falling on it and adjusts the cooling load of the cc to compensate for the suns heat.

So let's just recap. When the cc is set to "Auto" the blower speed is changed continuously depending on the temperature setting, the amount of sunlight falling upon the sun load sensor, the outside temperature and the velocity of the vehicle.

You can of course deselect the auto operation and manually set the fan speed to one of 27 preset speeds. As far as selecting temperatures for the passenger and drivers side these cannot exceed 6c difference, the driver's side always has priority. The cc system always defaults to ac "on" when the ignition is turned, this can be manually switched off if required, after stopping the car the system remembers the settings for approximately one hour after the ignition is switched off. Also "recirculated" air can not be selected for 15 seconds after the car is first started to allow adequate ventilation of the system.

Text 38. Servicing

Just as the rest of your car needs looking after so does the ac system. It's a good idea to have an ac health check once every couple of years. Loss of the r134a refrigerant by natural seepage of between 60g and 130g per year is normal and as it is the refrigerant that carries around the lubricating oil to the ac compressor if you lose too much refrigerant then no oil will reach the compressor and it will seize, they are not cheap! Never has the philosophy 'prevention is better than cure' been more apt.

Do ask for the complete A/C report which will give you vent temps, state of the system, high and low pressure readings, loss of refrigerant etc etc, keep these with your other servicing sheets and you will be able to keep an eye on the state of your cc system over the years giving you good forewarning of any impending problems.

The a/c specialist will evacuate the r134a from the system, weigh it to determine the charge level, it will then be cleaned and any moisture removed. Whilst this is happening the ac system will be drawn into a deep vacuum which should be held for at least 30 minutes drawing any moisture out and checking for leaks. After this time the cleaned refrigerant is gradually re-introduced to the system a bit at a time and topped up with new r134a to the correct level to replace that lost in previous years, oil is also topped up at this time. A UV dye is also inserted so that leak testing can easily be carried out.

You can do an easy check to see if your system is performing to spec. Buy yourself a cheap digital temperature probe. Firstly take an external ambient temperature reading outside the vehicle, make sure that the probe is in the shade and not in direct sunlight, make a not of this temperature. Then insert the probe a couple of inches inside the centre air vent, then

start the engine, make sure that all windows and doors are closed, dial both passenger and drivers temperatures to 'Lo', set the fan speed to maximum speed, press the recirculated air switch to on, set the air vents to face level, run the engine at approx 1500 revs per minute and read off the lowest temperature reading on your digital probe within ten minutes. The diagram below shows centre vent temperatures that you should be getting if your system is within specification. You will notice the correlation between the outside readings and those at the centre vents.

If you don't have Climate Control silently running in the background all the time, make sure that the ac system is run for at least ten minutes every month, this keeps the compressor lubricated and prevents the o rings from drying out. As you are probably well aware the system also filters and removes moisture from the air making it especially useful in the winter for demisting the windows. Pollen filters should be changed at least once a year, more often if you do a lot of your driving in polluted areas, when you put the new pollen, or cabin filters as they are sometimes called, they will be nice and white, when you remove them they can be very dirty even black. If you leave them too long they will eventually completely block up, preventing air flow into entering the cabin.

The filters are very easy to change and are located in the evaporator housing just underneath the windscreen and easily accessed with the hood up, simply undo the clips on the top of the housing, remove the black plastic lid and you will see the filters in front of the evaporator. Before removing them, note exactly which way they are fitted so that you can fit the new ones correctly, you may also want to order a pack of clips for the evaporator lid housing, they are only a few pence and if you were to drop one of the original clips then at least you will have some spare to hand. When fitting the new filters in place be extremely careful not to touch the fins of the evaporator itself, they are very delicate and easily damaged.

From time to time take a look at the ac condenser, this is located in front of the radiator at the front of the car and is of similar appearance, it is important to keep this clean and clear of debris, if this gets clogged by leaves or especially insects in the summer months the cooling ability of the system will be impaired. Take a water hose or preferably a compressed air line to this from time to time and spray straight directly onto the fins to clear any obstructions. Do not spray at an angle as this may cause damage to the fins.

Text 39. ABS Questions

Should I pump the brake pedal when stopping in slippery conditions?

You absolutely should not pump the brake pedal in a car with ABS. Pumping the brakes is a technique that is sometimes used in slippery conditions to allow the wheels to unlock so that the vehicle stays somewhat straight during a stop. In a car with ABS the wheels should never lock

in the first place, so pumping the brakes will just make you take longer to stop. In an emergency stop in a car with ABS, you should apply the brake pedal firmly and hold it while the ABS does all the work. You will feel a pulsing in the pedal that may be quite violent, but this is normal so don't let off the brake.

Do anti-lock brakes really work?

Anti-lock brakes really do help you stop better. They prevent wheels from locking up and provide the shortest stopping distance on slippery surfaces. But do they really prevent accidents? This is the true measure of the effectiveness of ABS systems.

The Insurance Institute for Highway Safety (IIHS) has conducted several studies trying to determine if cars equipped with ABS are involved in more or fewer fatal accidents. It turns out that in a 1996 study, vehicles equipped with ABS were overall no less likely to be involved in fatal accidents than vehicles without. The study actually stated that although cars with ABS were less likely to be involved in accidents fatal to the occupants of other cars, they are more likely to be involved in accidents fatal to the occupants of the ABS car, especially single-vehicle accidents.

There is much speculation about the reason for this. Some people think that drivers of ABS-equipped cars use the ABS incorrectly, either by pumping the brakes or by releasing the brakes when they feel the system pulsing. Some people think that since ABS allows you to steer during a panic stop, more people run off the road and crash.

Some more recent information may indicate that the accident rate for ABS cars is improving, but there is still no evidence to show that ABS improves overall safety.

Text 40. Anti-Lock Braking Systems — ABS

Stop without skidding, and maintain control of the vehicle. That's the premise of ABS. It was first introduced in the 1980's and has been undergoing constant refinement ever since. The system is typically comprised of 4 ABS rings, 4 sensors, an ABS computer and a pressure-management system in the brake line. The ABS rings are attached either to the wheels, or more often, to the brake discs. They look like a notched ring — see the image below. The sensors are magnetic field sensors which are held very close to the ABS rings and can detect the slight change in magnetic field as the teeth on the ring pass them. The pulsing field tells the ABS computer that the wheels are spinning, and how fast they're spinning. When you brake, the wheel rotation starts to slow down.

The ABS computer 'listens' to the input from the sensors and can detect if one wheel is slowing down much quicker than the others — the precursor to the wheel locking up. This all happens in milliseconds, by the way. When the computer detects this condition, the pressure regulator interrupts the pressure in the brake lines by momentarily reducing the pressure so that the brakes give the wheels a chance to keep spinning rather than locking

up. The computer then instructs the regulator to re-apply full pressure and again measures the wheel rotation. This on/off/measure cycle happens around 15 to 30 times a second. If the ABS kicks in, you'll feel it through the brake pedal as a vibration because the pulsing in the brake circuit affects all the components.

Newer generation ABS systems. As technology marches on, so does the control/feedback system used in ABS. It used to be the case that any single wheel approaching lockup would cause the ABS system to pulse the brake pressure for all the wheels. With the latest vehicles, the ABS computer is connected to 4 pressure regulators instead of just the one. This means it can selectively apply pulsed braking only to the wheel(s) that need it. So if three of the tyres are gripping well, but the front-left is beginning to skid, the ABS can unlock the front-left brake and pulse it to try to regain grip. It's all very James Bond.

ABS and skid control. The biggest misconception about ABS is that it will make you stop faster. This is absolutely not true. ABS has nothing to do with stopping power and everything to do with stopping distance and maintaining control of your vehicle, be it a car, truck or motorbike. The problem with skidding whilst braking is that it removes you from ultimate control of where the vehicle is going. On a motorbike, skidding invariably causes highsides, flips and general thoughts of 'huh?' to the rider as he's flying through the air towards certain pain. In a car or truck, skidding stops the vehicle from going where you want it to, and instead makes it straight-line based on the camber of the road, the speed of the vehicle and how much damage it can do to your insurance policy.

Skidding is caused because the wheels lock up. Once they stop rotating, the tyres can no longer grip the road surface and instead begin to skate across it. When that happens, it really makes no difference where the steering is pointing because without grip, steering is useless. As tyres skid, they become subject to dynamic attrition. In other words, if a tyre is rotating and gripping the road, the "stick" factor is much higher than if the wheel is locked and skating across the same surface. With ABS, the idea is that the wheels don't ever lock up, so you they keep turning, the tyres keep gripping. Whilst gripping, you have directional control over the car, so your steering still works, and you are slowing down quicker because the brakes are doing their job. That's where ABS gets its name — Anti-Lock Brakes.

The bone of contention with ABS. So many people think ABS gives them a license to drive faster, because they mistakenly believe that ABS will get them out of any situation. It's yet another technical placebo that has been put into vehicles which is making the standard of driving worse. The more gadgets and "driver aids" that get put into a car, the worse the drivers become because they live in a pink-spectacled world where they believe that the car will get them out of any problem they cause.

Personally I don't like ABS. I don't like the idea of a computer interrupting the connection between my right foot and the brakes. It also doesn't work worth a damn on gravel or in the snow. With regular brakes, in the

snow, you can jam them on and at least stand a chance of the tyres digging in and finding the road surface. Okay so I told you above that skidding tyres are worse than tyres that are gripping, but on snow, all the rules change. Skidding tyres digging down and finding the road surface are w-a-y better than rotating tyres on top of the snow; with ABS the system will do just that — take the brakes off and you'll carry on merrily along on the snow with no chance of slowing down.

The hidden gremlin of ABS — what they don't advertise. If you look at the statistics for crashes, a large percentage of them are "fender benders" — low-speed impacts that only do a little damage and so slow that the vehicle occupants are in no danger. Less than 15mph normally. I'll give you one guess what the typical 'minimum activation speed' is for ABS. That's right.

Your average ABS system is useless much below 15mph. Seriously. Try it yourself. Find an empty road on a slight downhill grade — even better if its on a dewy morning. Run your ABS-equipped car up to about 15mph and jam on the brakes as hard as you can. The car will skid to a stop and the ABS system will remain totally silent.

Aftermarket ABS systems. To the best of my knowledge, there's no such thing. A few years back a couple of companies tried to market what they called ABS systems that could be retrofitted to any vehicle. The product was a cylinder with a pressure-relief valve in it. The idea was that you inserted this system into the brake circuit somewhere. When you stomped on the brakes — symptomatic of locking up the wheels — the pressure relief valve opened and bled off some brake fluid into the cylinder, thus lowering the braking pressure being sent to the wheels. The idea was to take the 'spike' off the initial push of the brake pedal so it wasn't ABS at all. The whole idea of putting something like this into a brake circuit makes me shudder — I wouldn't want to be the person trying to get their insurance and medical claims through after an accident when the investigators found one of these contraptions in their brake line!

Text 41. Automobile Safety

Automobile safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular as pertaining to human life and health. Numerous safety features have been built into cars for years, some for the safety of cars occupants only, some for the safety of others. Road traffic injuries represent about 25 % of worldwide injury-related deaths (the leading cause) with an estimated 1.2 million deaths each year — World Health Organization).

Major factors in accidents include driving under the influence of alcohol or other drugs; inattentive driving; crash compatibility between vehicles; driving while fatigued or unconscious; encounters with road hazards such as snow, potholes, and crossing animals; or reckless driving. Car safety became an issue almost immediately after the invention of the automobile,

when Nicolas-Joseph Cugnot crashed his steam-powered "Fardier" against a wall in 1771.

In the 1940s, SAAB incorporated aircraft safety thinking into automobiles making the Saab 92 the first production car with a safety cage. In 1958, the United Nations established the World Forum for Harmonization of Vehicle Regulations, an international standards body advancing auto safety. Many of the most life saving safety innovations, like seat belts and roll cage construction were brought to market under its auspices. But despite technological advances, the death toll of car accidents remains high: about 40,000 people die every year in the US. While this number increases annually in line with rising population and increased travel, the rate per capita and per vehicle miles travelled decreases. In 1996, the US had about 2 deaths per 10,000 motor vehicles, comparable to 1.9 in Germany, 2.6 in France, and 1.5 in the UK. In 1998, there were 3,421 fatal accidents in the UK, the fewest since 1926. A much higher number of accidents result in permanent disability.

Color. A Swedish study found that pink cars are indeed safer, with black cars being most likely to be involved in crashes. In Auckland, New Zealand, a study found that there was a significantly lower risk of serious injury in silver cars; with higher risks in brown, black, and green cars.

Children. Car safety is especially critical for young children, as car safety is generally designed for normal sized adults. Safety features that could save an adult can actually cause more damage to a child than if the feature was not there. It is important to review with others, who may be supervising the child, the rules for car safety. All children age 12 and under should ride in the back seat. Also children weighing less than 85 lb (40 kg) should be in the back seat. This is especially the case if there are airbags in the front seat, as airbags are only designed to protect adults and may injure children. That is not just an opinion but is also law in many of the US states and other countries. The Center for Injury Research and Prevention at The Children's Hospital of Philadelphia has developed a website for parents and caregivers with extensive information about transporting children safely in automobiles. Child safety locks prevent children from accidentally opening doors from inside the vehicle, even if the door is unlocked. The door, once unlocked, can then be opened only from the outside.

Infants. Newborn babies should be put in a car seat until they weigh at least 20 or 22 pounds (10 or 11 kg). These carriers are designed to be placed in the rear seat and face towards the rear with the baby looking towards the back window. Some of these carriers are 'Convertibles' which can also be used forward facing for older children. With infants, these should only be used facing the rear. Harness straps should be at or below shoulder level. A rear-facing infant restraint must never be put in the front seat of a vehicle with a front passenger air bag. A rear-facing infant restraint places an infant's head close to the air bag module, which can cause severe head injuries or death if the air bag deploys. Modern cars include a switch to turn off the

airbag system of the passenger seat, in which case a child-supporting seat must be installed.

Toddlers over 1 year old and between 10 and 20 kg (20 and 40 pounds) should be placed in rearward facing child seats or convertibles placed in the rear seat. Harness straps should be at or above the child's shoulders.In Scandinavia the recommendation is to use rearward facing seats up to the age of 4 or 5 (size of seat permitting), and in Scandinavia you will find very few children under the age of 4 facing forward. It has been proven many times that it is far safer to face rearward in an accident.

Young children. Children who weigh less than 80 pounds (40 kg), are younger than 8, or are shorter than 4 ft 9 in (1.4 m) are advised to use belt positioning booster seats which raise them to a level that allows seat belts to work effectively. These seats are forward facing and must be used with both lap and shoulder belts. Make sure the lap belt fits low and tight across the lap/upper thigh area and the shoulder belt fits snug crossing the chest and shoulder to avoid abdominal injuries. There are two main types of booster seats. If the car's back seat is lower than the child's ears, a high back booster seat should be used to help protect the child's head and neck. If the car's seat back is higher than the child's ears, a backless booster seat can be used.

Text 42. Active Safety Features

Safety dangers. Main safety dangers for automobiles are the wind (maintaining the direction) and the rain. Other safety dangers include drunk driving, driving when fatigued or unconscious, or driving with distractions inside the car.

Active safety. To make driving safer and prevent accidents from occurring, cars may have the following active safety features:

- Turn signals and brake lights, including Center High Mounted Stop Lamps (CHMSL).
- Variable assist power steering allows assistance to the motorist while parking, but reduces steering effort assistance at motorway speeds.
- Headlight wipers/washers.
- Mercedes style ribbed tailights to prevent snow and grime build-up.
- Dynamic steering response (DSR) corrects the rate of power steering system to adapt it to vehicle's speed and road conditions.
- Traction control (TCS) actuates brakes or reduces throttle to restore traction if driven wheels begin to spin.
- Hill holder.
- Four wheel drive (AWD) with a center differential. Distributing power to all four wheels lessens the chances of wheel spin. It also suffers less from oversteer and understeer than front wheel drive, but more understeer than rear wheel drive.
- Reverse backup sensors, which alert drivers to nearby objects in their path, are installed in some high-end vehicles, but may also be purchased separately.

• Electronic Stability Control (ESC, also known by ESP and other numerous manufacturer-specific names). Uses various sensors to intervene when the car senses a possible loss of control. The car's control unit can reduce power from the engine and even apply the brakes to prevent the car from understeering or oversteering.

• Lateral Support : Lane Departure Warning System (LDWS).

• Directional headlights, which allow the driver to see obstacles ahead in the roadway while cornering.

• Low center of gravity and other conventional features promoting good car handling and braking, and helping to avoid rollover.

• Comfortable suspension and seating to avoid accidents from driver fatigue.

• Large (relative to weight) high performance tires, suited to the weather and road conditions, contribute to braking and handling. Soft high histeresis rubber, tread and cord design are important.

• Visibility for the driver, mirrors, elimination of blind spots and possibly other awareness aids such as radar, wireless vehicle safety communications and night vision.

• Death Brake; there is a move to introduce deadman's braking into automotive application, primarily heavy vehicles, there may also be a need to add penalty switches to *cruise controls*.

• Four wheel steering gives, at the cost of mechanical complexity, quicker, more accurate maneuvers at high speed and/or decreased turning circle at low speed. It may also help stability.

• Adaptive cruise control (ACC).

• AWAKE and intelligent car features.

• Precrash system.

• Seatbelts might also play a minor role in active safety by keeping (via locking of the inertial reel) the driver firm on his/her seat in a high-g turn or deceleration. This has been further developed and patented by Mercedes-Benz in the PreSafe™ technology which provides a synergy between active and passive systems, helping the driver avoid a danger and preparing him/her for an imminent crash.

• Brakes.

• Anti-lock braking system (ABS) (also Emergency Braking Assistance — EBA), often coupled with Electronic brakeforce distribution (EBD), which prevents the brakes from locking and losing traction while braking. This shortens stopping distances in almost all cases.

• Brake assist system (BAS).

• Cornering Brake Control (CBC).

• Dynamic Brake Control (DBC).

• Inboard brakes allow large fade resistant discs or drums, without contributing to unsprung weight and wheel bounce, which degrade braking, handling and ride, and increase mechanical loads.

When an accident is imminent, various passive safety systems work together to minimize damage to the individuals involved. Much research

has been done using crash test dummies to make modern cars safer than ever. Recently, attention has also been given to cars' design regarding the safety of pedestrians in car-pedestrian collisions.

Controversial proposals in Europe would require cars sold there to have a minimum/maximum hood height. This has caused automakers to complain that the requirements will restrict their design choices, resulting in ugly cars. Others have pointed out that a notable percentage of pedestrians in these accidents are drunk. From 2006, the use of '*bull bars*' (known as '*kangaroo bars*' in Australia), in fashion on 4×4s and SUVs, will be illegal.

- Seatbelts (or safety belts) keep a person from being thrown forward or ejected from the vehicle.
- Airbags.
- Front airbags inflate in a medium speed head on collision to cushion the impact of the head to the steering wheel (driver) or dashboard to the (front passenger).
- Side airbags inflate in a side (T-bone) collision to cushion the torso.
- Curtain airbags protect the head and upper body of passengers in a side collision
- Knee airbags inflate in frontal impact collisions to protect the driver's knees and are now available in many newer high end model vehicles.
- Crumple zone technology absorbs the energy of a collision by displacing the impact of a crash and diverting it from the internal (passenger compartment) critical structure of the vehicle.
- Side impact bars for protection against side on collisions.
- Crash compatibility can be improved by matching vehicles by weight and by matching crumple zones with points of structural rigidity, particularly for side-on collisions. Some pairs of vehicle front end structures interact better than others in crashes.
- Cage construction is designed to protect vehicle occupants. Some racing vehicles have a tubular roll cage.
- Reinforced side door structural members.
- Fuel pump shutoff devices turn off gas flow in the event of a collision for the purpose of preventing gasoline fires.
- Active pedestrian protection systems.
- Driver State Sensor — Research, Utilizing cutting edge video processing technology, the system remotely and unobtrusively measures 3D head pose and eyelid motion parameters of the driver.

Text 43. Audi AG

Audi AG is a German automobile manufacturer with headquarters in Ingolstadt, Bavaria, and has been an almost wholly owned (99.7 %) subsidiary of the Volkswagen Group since 1964. The company evolved from both Auto Union and NSU, the former having incorporated the historic Audi company which was originally founded in 1910.

Audi's German tagline is 'Vorsprung durch Technik', meaning 'Advancement Through Technology', implying an advantage because of superior technology. The American tagline is 'Truth in Engineering'. The company traces its origins back to 1899 and August Horch. The first Horch automobile was produced in 1901 in Zwickau. In 1910, Horch was forced out of the company he had founded. He then started a new company in Zwickau and continued using the Horch brand. His former partners sued him for trademark infringement and a German court determined that the Horch brand belonged to his former company. August Horch was forced to refrain from using his own family name in his new car business. Horch immediately called a meeting at the apartment of Franz Fikentscher to come up with a new name for his company.

During this meeting Franz's son was quietly studying Latin in a corner of the room. Several times he looked like he was on the verge of saying something but would just swallow his words and continue working, until he finally blurted out, 'Father — audiatur et altera pars... wouldn't it be a good idea to call it AUDI instead of HORCH?'. 'Horch!' in German means 'Hark!' which is 'Audi' in Latin. The idea was enthusiastically accepted by everyone attending the meeting. It is also popularly (but incorrectly) believed that Audi is an acronym which stands for 'Auto Union Deutschland Ingolstadt'.

Audi started with a 2612 cc (2.6 liter) four cylinder model followed by a 3564 cc (3.6L) model, as well as 4680 cc (4.7L) and 5720 cc (5.7L) models. These cars were successful even in sporting events. August Horch left the Audi company in 1920. The first six cylinder model, 4655 cc (4.7L) appeared in 1924. In 1928, the company was acquired by Jørgen Rasmussen, owner of DKW, who bought the same year the remains of the US automobile manufacturer, Rickenbacker including the manufacturing equipment for eight cylinder engines. These engines were used in Audi Zwickau and Audi Dresden models that were launched in 1929. At the same time, six cylinder and four cylinder (licensed from Peugeot) models were manufactured. Audi cars of that era were luxurious cars equipped with special bodywork.

In 1932, Audi merged with Horch, DKW and Wanderer to form Auto Union. Before World War II, Auto Union used the four interlinked rings that make up the Audi badge today, representing these four brands. This badge was used, however, only on Auto Union racing cars in that period while the member companies used their own names and emblems.

The technological development became more and more concentrated and some Audi models were propelled by Horch or Wanderer built engines. During World War II the Horch/Auto Union produced the Sd-Kfz 222 armored car, which was used in the German army during the war. It was powered by an 81 hp Horch/Auto Union V8 Engine which had a top speed of 50 miles per hour.

Another vehicle which was used in World War II to shuttle German military officials safely was known as the Kraftfahrzeug (KFZ 11) or the Horch Type 80. The military used it as a light transport vehicle. Auto Union

plants were heavily bombed and partly destroyed during World War II. After the war, Zwickau soon became part of the German Democratic Republic and Auto Union headquarters were relocated too. Daimler-Benz acquired 88 per cent of Auto Union and in the next year, 1964, Benz sold the company to Volkswagen.

In September 1965, the model was launched, also 'relaunching' the Audi brand. The model was classified internally as the F103 and sold as simply the 'Audi' (the name being a model designation rather than the manufacturer, which was still officially Auto Union), but later came to be known as the Audi 72. Developments of the model were named for their horsepower ratings and sold as the Audi 60, 75, 80, and Super 90. These models sold until 1972. In 1969, Auto Union merged with NSU, based in Neckarsulm near Stuttgart. In the 1950s NSU had been the world's largest manufacturer of motorcycles but had moved on to produce small cars like the NSU Prinz (the TT and TTS versions are still popular as vintage race cars). NSU then focused on new rotary engines according to the ideas of Felix Wankel. In 1967, the new NSU Ro 80 was a space-age car well ahead of its time in technical details such as aerodynamics, light weight, and safety, but teething problems with the rotary engines put an end to the independence of NSU. Today the Neckarsulm plant is used to produce the larger Audi models.

The mid-sized car that NSU had been working on, the K70, was intended to slot between the rear-engined Prinz models and the futuristic Ro 80. However, Volkswagen took the K70 for its own range, spelling the end of NSU as a separate brand.

Text 44. The Modern Era of Audi

The new merged company was known as 'Audi NSU Auto Union AG', and saw the emergence of Audi as a separate brand for the first time since the pre-war era. Volkswagen introduced the Audi brand to the United States for the 1970 model year. The first new car of this regime was the Audi 100 of 1968. This was soon joined by the Audi 80/Fox (which formed the basis for the 1973 Volkswagen Passat) in 1972 and the Audi 50 (later, rebadged as the Volkswagen Polo) in 1974.

The Audi image at this time was a conservative one, and so, a proposal from chassis engineer Jörg Bensinger was accepted to develop the four-wheel drive technology in Volkswagen's Iltis military vehicle for an Audi performance car and rally racing car. The performance car, introduced in 1980, was named the 'quattro' a turbocharged coupé which was also the first German large-scale production vehicle to feature permanent all-wheel drive through a center differential (not counting the earlier British Jensen FF, produced in small numbers). Commonly referred to as the 'Ur-Quattro' (the 'Ur-' prefix is a German augmentative used, in this case, to mean 'original' and is also applied to the first generation of Audi's S4 and S6 sport sedans, as in 'UrS4' and 'UrS6'), few of these vehicles were produced (all hand-built

by a single team) but the model was a great success in rallying. Prominent wins proved the viability of all-wheel drive racecars, and the Audi name became associated with advances in automotive technology.

In 1985, with the Auto Union and NSU brands effectively dead, the company's official name was now shortened to simply 'Audi AG'. In 1986, as the Passat-based Audi 80 was beginning to develop a kind of 'grandfather's car' image, the type 89 was introduced. This completely new development sold extremely well. However, its modern and dynamic exterior belied the low performance of its base engine, and its base package was quite spartan (even the passenger-side mirror was an option.) In 1987, Audi put forward a new and very elegant Audi 90, which had a much superior set of standard features. In the early nineties, sales began to slump for the Audi 80 series, and some basic construction problems started to surface.

This decline in sales was not helped in the USA by a 60 Minutes report which purported to show that Audi automobiles suffered from 'unintended acceleration'. The 60 Minutes report was based on customer reports of acceleration when the brake pedal was pushed. Independent investigators concluded that this was most likely due to a close placement of the accelerator and brake pedals (unlike American cars), and the inability, when not paying attention, to distinguish between the two. (In race cars, when manually downshifting under heavy braking, the accelerator has to be used in order to match revs properly, so both pedals have to be close to each other to be operated by the right foot at once, toes on the brake, heel on the accelerator.) This did not become an issue in Europe, possibly due to more widespread experience among European drivers with manual transmissions.

60 Minutes ignored this fact and rigged a car to perform in an uncontrolled manner. The report immediately crushed Audi sales, and Audi renamed the affected model (The 5000 became the 100/200 in 1989, as it was elsewhere). Audi had contemplated withdrawing from the American market until sales began to recover in the mid-1990s. The turning point for Audi was the sale of the new A4 in 1996, and with the release of the A4/6/8 series, which was developed together with VW and other sister brands (so called 'platforms').

Currently, Audi's sales are growing strongly in Europe. 2004 marked the 11th straight increase in sales, selling 779,441 vehicles worldwide. Record figures were recorded from 21 out of about 50 major sales markets. The largest sales increases came from Eastern Europe (+19.3%), Africa (+17.2%) and the Middle East (+58.5%). In March 2005, Audi is building its first two dealerships in India following its high increase in sales in the region.

Audi has recently started offering a computerised control system for its cars called Multi Media Interface (MMI). This comes amid criticism of BMW's iDrive control, essentially a rotating control knob designed to control radio, satellite navigation, TV, heating and car controls with a screen. MMI has been widely reported to be an improvement on BMW's iDrive. (BMW has since made their iDrive more user friendly.)

Text 45. Technology of Audi

Audi produces 100 % galvanized vehicles to prevent corrosion. Along with other precautionary measures, the thus achieved full-body zinc coating has proved to be very effective in preventing rust and corrosion perforation. The body's resulting durability even surpassed Audi's own expectations, causing the manufacturer to extend its original 10-year warranty against corrosion perforation to currently 12 years. An all-aluminium car was brought forward by Audi, and in 1994 the Audi A8 was launched, which introduced aluminum space frame technology. Audi introduced a new series of vehicles in the mid-nineties and continues to pursue leading-edge technology and high performance.

The all-aluminum concept was extended to the company's new subcompact, the Audi A2 which was launched in 2001, although this model was withdrawn from production late in 2005 as the costs of producing an all-aluminium small car proved too high for many buyers looking for a small semi-luxurious car. The aluminium body has proved better suited to larger executive models such as the large A8 saloon.

In all its post Volkswagen-era models, Audi has firmly refused to adopt the traditional rear wheel drive layout favoured by its two arch rivals Mercedes-Benz and BMW, favouring either front wheel drive or all wheel drive. To achieve this, Audi has usually engineered its cars with a longitudinally mounted engine mounted in an 'overhung' position over the front wheels — in front of the axle line. While this allows for equal length driveshafts (therefore combatting torque steer), and the easy adoption of all-wheel drive, it goes against the ideal 50/50 weight distribution. For this reason, most still believe that BMW has the edge over Audi in terms of dynamic prowess, although this will be addressed with the forthcoming A5 coupe in 2007, which will feature the engine mounted behind the front wheels.

In the 1970s, two vehicle manufacturers Audi and Subaru designed their own all wheel drive systems in passenger vehicles. In the 1980s, all-wheel drive systems in cars became a fad, and other German manufacturers like Porsche, BMW and Mercedes-Benz offered all-wheel drive systems in their cars to compete in the marketplace, along with GM, Ford, Toyota and others. Unfortunately, the all-wheel drive system in the Mercedes-Benz vehicles were riddled with problems right from the design sheet.

The system also was not popular in Porsche vehicles because owners wanted the traditional performance of the rear wheel drive they got used to in older Porsches. Although Porsche and Mercedes-Benz offer all-wheel-drive systems in some cars and trucks today, neither manufacturer is as well-known for all-wheel-drive technology as is Audi. Today, after over 25 years of class-leading technology and engineering, the name quattro is an identifiable symbol and trademark that shows would-be competitors the level of quality they have to achieve in order to attempt to compete with Audi's all-wheel-drive. Unfortunately, Audi have recently applied the quat-

tro badge to models such as the A3 and TT which do not actually use the quattro four-wheel drive system, but the Swedish Haldex 4WD system.

In the 1980s, Audi was the champion of the inline 5 cylinder, 2.1/2.2 L engine as a longer lasting alternative to more traditional 6 cylinder engines. This engine was used not only in production cars but also in their race cars. The 2.1L inline 5 cylinder engine was used as a base for the rally cars in the 1980s, providing well over 400 horsepower (298kW) after modification. Before 1990, there were engines produced with a displacement between 2.0L and 2.3L. This range of engine capacity was a good combination of good fuel economy (which was on the mind of every motorist in the 1980s) and, of course, a good amount of power.

Through the early 1990s, Audi began to move more towards the position of being a real competitor in its target market against global luxury leaders Mercedes-Benz and BMW. This began with the release of the Audi V8 in 1990. It was essentially a new engine fitted to the Audi 100/200, but with noticeable bodywork differences. Most obvious was the new grille that was now incorporated in the bonnet.

By 1991, Audi had the 4 cylinder Audi 80, the 5 cylinder Audi 90 and Audi 100, the turbocharged Audi 200 and the Audi V8. There was also a coupe version of the 80/90 with both 4 and 5 cylinder engines.

Although the five cylinder engine was a successful and very robust powerplant, it was still a little too different for the target market. With the introduction of an all-new Audi 100 in 1992, Audi introduced a 2.8L V6 engine. This engine was also fitted to a face-lifted Audi 80 (all 80 and 90 models were now badged 80 except for the USA), giving this model a choice of 4, 5 and 6 cylinder engines, in sedan, coupe and cabriolet body styles.

The 5 cylinder was soon dropped as a major engine choice; however, a turbocharged 230hp (169kW) version remained. The engine, initially fitted to the 200 quattro 20V of 1991, was a derivative of the engine fitted to the Sport Quattro. It was fitted to the Audi Coupe and named the S2 and also to the Audi 100 body, and named the S4. These two models were the beginning of the mass-produced S series of performance cars.

The next major model change was in 1995 when the Audi A4 replaced the Audi 80. The new nomenclature scheme was applied to the Audi 100 to become the Audi A6 (with a minor facelift). This also meant the S4 became the S6 and a new S4 was introduced in the A4 body. The S2 was discontinued. The Audi Cabriolet continued on (based on the Audi 80 platform) until 1999, gaining the engine upgrades along the way.

A new A3 hatchback model (sharing the Volkswagen Golf Mk.4's platform) was introduced to the range in 1996, and the radical TT coupe and roadster were debuted in 1998 based on the same underpinnings. Another interesting model introduced was the Mercedes-Benz A-Class competitor, the Audi A2. The model sold relatively well in Europe, however, the A2 was discontinued in 2005 and Audi decided not to develop an immediate replacement. The engines available throughout the range were now a 1.4L,

1.6L and 1.8L 4 cylinder, 1.8L 4-cylinder turbo, 2.6L and 2.8L V6, 2.2L turbo-charged 5 cylinder and the 4.2L V8. The V6s were replaced by new 2.4L and 2.8L 30V V6s in 1998, with marked improvement in power, torque and smoothness. Further engines were added along the way, including a 3.7L V8 and 6.0L W12 for the A8.

At the turn of the century, Audi introduced the direct-shift gearbox, or DSG, a manual transmission drivable like an automatic transmission. The system includes dual electrohydraulically controlled clutches instead of a torque converter. This is implemented in some Volkswagen Golf, Audi A3 and TT models. The engine range was continually upgraded, with a 2.7L twin turbo V6 being offered in the Audi S4, A6 and allroad, while the 2.8L V6 was replaced by a 3.0L unit.

In 2001, Audi released a high performance version of the A8, dubbed S8. It featured a 360-horsepower 4.2L V8 with 317 torque.

New models of the A3, A4, A6 and A8 have been introduced, with the aging 1.8 litre engine now having been 6.0 replaced by new FSI (Fuel Stratified Injection) engines. Nearly every petrol model in the range now incorporates this fuel-saving technology, including the following:

1.6 litre 4 cylinder 115bhp, 2.0 litre 4 cylinder 150bhp (slowly being phased out in order to make way for TSI engines — see section below), 2.0 litre 4 cylinder 200bhp, 2.0 litre 4 cylinder 220bhp, 3.2 litre V6 250-260bhp, 4.2 litre V8 350bhp, 4.2 litre V8 414bhp, 5.2 litre V10 450bhp.

TSI technology was introduced to the Volkswagen Golf early in 2006. These engines use, initially at least, a capacity of 1.4 litres combined with both a turbo- and supercharger to produce a high power output, with lower levels of harmful carbon dioxide emissions and improved fuel economy when compared with a non-turbo or supercharged engine of a high capacity, such as 2.0 litres. The 1.4 litre TSI engine currently on sale in VW's Golf produces outputs of 140 and 170bhp. These engines have proved popular amongst the motoring press in Britain and could soon be filtered into the Audi range, with a possibility of featuring in the A3 and A4 models, as well as maybe featuring in SEAT and Skoda's model ranges sometime soon. Audi has publicly set a goal to surpass BMW and the luxury and safety leaders Mercedes-Benz in global sales by 2015 and have made giant strides to the achievement of this goal since.

Text 46. Ford Motor Company

Ford Motor Company is an American multinational corporation and the world's third largest automaker after Toyota and General Motors, based on worldwide vehicle sales. In 2006, Ford was the second-ranked automaker in the US with a 17.5 % market share, behind General Motors (24.6 %) but ahead of Toyota (15.4 %) and Daimler Chrysler (14.4 %). Ford was also the seventh-ranked American-based company in the 2007 Fortune 500 list, based on global revenues of $160.1 billion. In 2006, Ford produced about 6.6 million automobiles, and employed about 280,000 employees at about

100 plants and facilities worldwide. In 2007, Ford had more quality awards from J.D Power than any other automaker.

History. Based in Dearborn, Michigan, a suburb of Detroit, the automaker was founded by Henry Ford and incorporated in June 16, 1903. Ford now encompasses many global brands, including Lincoln and Mercury of the US, Jaguar and Land Rover of the UK, and Volvo of Sweden. Ford also owns a one-third controlling interest in Mazda.

Ford has been one of the world's ten largest corporations by revenue and in 1999 ranked as one of the world's most profitable corporations, and the number two automaker worldwide. Since 2000, Ford has not fared as well, having steadily lost market share in the US since 1995.

Ford introduced methods for large-scale manufacturing of cars and large-scale management of an industrial workforce, especially elaborately engineered manufacturing sequences typified by moving assembly lines. Henry Ford's combination of highly efficient factories, highly paid workers, and low prices revolutionized manufacturing and came to be known around the world as Fordism by 1914.

Ford was launched in a converted factory in 1903 with $28,000 in cash from twelve investors, most notably John Francis Dodge and Horace Elgin Dodge who would later found the Dodge Brothers Motor Vehicle Company During its early years, the company produced just a few Model T's (1st production car ever made) a day at its factory on Mack Avenue in Detroit, Michigan. Groups of two or three men worked on each car from components made to order by other companies. Henry Ford was 40 years old when he founded the Ford Motor Company, which would go on to become one of the largest and most profitable companies in the world, as well as being one of the few to survive the Great Depression. The largest family-controlled company in the world, the Ford Motor Company has been in continuous family control for over 100 years.

Text 47. New Directions for the Twenty-First Century

During the mid to late 1990s, Ford sold large numbers of vehicles, in a booming American economy with soaring stock market and low fuel prices. With the dawn of the new century, legacy healthcare costs, higher fuel prices, and a faltering economy led to falling market shares, declining sales, and sliding profit margins. Most of the corporate profits came from financing consumer automomobile loans through Ford Motor Credit Company. By 2005, corporate bond rating agencies had downgraded the bonds of both Ford and GM to junk status, citing high US health care costs for an aging workforce, soaring gasoline prices, eroding market share, and dependence on declining SUV sales for revenues. Profit margins decreased on large vehicles due to increased 'incentives' (in the form of rebates or low interest financing) to offset declining demand.

In the face of falling truck and SUV sales, Ford moved to introduce a range of new vehicles, including 'Crossover SUVs' built on unibody car

platforms, rather than body-on-frame truck chasses. Ford also developed alternative fuel and high efficiency vehicles, such as the Escape Hybrid.

In December 2006, the company raised its borrowing capacity to about $25 billion, placing substantially all corporate assets as collateral to secure the line of credit. Chairman Bill Ford has stated that 'bankruptcy is not an option', but economists have stated that the company's impending contract renewal with the United Auto Workers in the summer of 2007 could be brutal. The UAW has vowed to attempt to retain the jobs banks, a system which retains idled workers on the payroll, rather than laying them off, in order to maintain contracted US employment levels. The automaker reported a net loss of $12.7 billion during 2006, and has estimated that it will not return to profitability until 2009. Today, Ford Motor Company manufactures automobiles under several names including Lincoln and Mercury in the United States. In 1958, Ford introduced a new marque, the Edsel, but poor sales led to its discontinuation in 1960. Later, in 1985, the Merkur brand was introduced; it met a similar fate in 1989.

Ford has major manufacturing operations in Canada, Mexico, the United Kingdom, Germany, Brazil, Argentina, Australia, the People's Republic of China, and several other countries, including South Africa where, following divestment during apartheid, it once again has a wholly owned subsidiary. Ford also has a cooperative agreement with Russian automaker GAZ.

Text 48. Renault

Renault S.A. is a French vehicle manufacturer producing cars, vans, buses, tractors, and trucks. The company is well known for numerous revolutionary designs, security technologies and motor racing. When its cars were exported to the United States during the 1950s and 1960s, the name was commonly mispronounced as 'ren-alt' to and by the American public, and the Americanized pronunciation continues in common usage, though the original French has gained significant ground over recent years. In the United Kingdom it is pronounced 'ren-o' though the French pronunciation is closer to 'ruh-no'.

History. Producing cars since late 1898, the Renault corporation was founded in 1899 as Société Renault Frères by Louis Renault, his brothers Marcel and Fernand, and his friends Thomas Evert and Julian Wyer. Louis was a bright, aspiring young engineer who had already designed and built several models before teaming up with his brothers, who had honed their business skills working for their father's textiles firm. While Louis handled design and production, Marcel and Fernand handled company management.

The first Renault car, the Renault Voiturette 1CV was sold to a friend of Louis' father after giving him a test ride on December 24, 1898. The client was so impressed with the way the tiny car ran and how it climbed the streets that he bought it.

The brothers immediately recognised the publicity that could be obtained for their vehicles by participation in motor racing and Renault made itself known through achieving instant success in the first city-to-city races held in Switzerland, resulting in rapid expansion for the company. Both Louis and Marcel Renault raced company vehicles, but Marcel was killed in an accident during the 1903 Paris — Madrid race. Although Louis Renault never raced again, his company remained very involved, including their Renault AK 90CV winning the first ever Grand Prix motor racing event in 1906. Louis was to take full control of the company as the only remaining brother in 1906 when Fernand retired for health reasons.

The Renault reputation for innovation was fostered from very early on. In 1899, Renault launched the first production sedan car as well as patenting the first turbocharger. At the time, cars were very much luxury items, and the price of the smallest Renaults available being 3000 francs reflected this; an amount it would take ten years for the average worker at the time to earn. As well as cars, Renault manufactured taxis, buses and commercial cargo vehicles in the pre-war years, and during World War I (1914 — 1918) branched out into ammunition, military airplanes and vehicles such as the revolutionary Renault FT-17 tank. Renault became the world's leading manufacturer of airplane engines, and the success of the company's military designs were such that Renault himself was honoured by the Allies for his company's contributions to their victory. By the end of the war, Renault was the number one private manufacturer in France.

Text 49. Renault between the World Wars (1919 — 1938)

Louis Renault enlarged the scope of his company after 1918, producing agricultural and industrial machinery. However, Renault struggled to compete with the increasingly popular small, affordable 'people's cars', while problems with the stock market and the workforce also adversely affected the company's growth. Renault also had to find a way to distribute its vehicles more efficiently. In 1920, he signed one of its first distribution contracts with Gustave Gueudet, an entrepreneur from northern France.

The pre-First World War cars had a distinctive front shape caused by positioning the radiator behind the engine to give a so called 'coalscuttle' bonnet. This continued through the 1920s and it was not until 1930 that all models had the radiator at the front. The bonnet badge changed from circular to the familiar and continuing diamond shape in 1925. Renault models were introduced at the Paris Motor Show which was held in September or October of the year. This has lead to a slight confusion as to vehicle identification. For example a '1927' model was mostly produced in 1928.

Renault produced a range of cars from small to very large. For example in 1928 which was the year when Renault produced 45,809 cars the range of 7 models started with a 6 cv, a 10 cv, the Monasix, 15 cv, the Vivasix,

the 18/24 cv and the 40 cv. There was a range of factory bodies, of up to 8 styles, and the larger chassis were available to coachbuilders. The number of a model produced varied with size. The smaller were the most popular with the least produced being the 18/24 cv. The most expensive factory body style in each range was the closed cars. Roadsters and tourers (torpedoes) were the cheapest. The London operation was very important to Renault in 1928. The UK market was quite large and from there 'colonial' modified vehicles were dispatched. Lifted suspensions, enhanced cooling and special bodies were common on vehicles sold to the colonies. Exports to the USA by 1928 had almost reduced to zero from their high point prior to WW1 when to ship back a Grand Renault or similar high class European manufactured car was common.

A NM 40 cv Tourer had a USA list price of over $4,600 being about the same as a V12 Cadillac Tourer. Closed 7 seat limousines started at $6,000 which was more expensive than a Cadillac V16 Limousine. The whole range was conservatively engineered and built. The newly introduced 1927 Vivasix, model PG1, was sold as the 'executive sports' model. Lighter weight factory steel bodies powered by a 3180 cc six cylinder motor provided a formula that went through to the Second World War.

The 'de Grand Luxe Renaults', that is any with over 12 foot wheelbase (3.68 m), were produced in very small numbers in two major types — six and eight cylinder. The 1927 six cylinder Grand Renault models NM, PI and PZ introduced the new three spring rear suspension that considerably aided road holding that was needed as with some body styles over 90mph was possible. The 8 cylinder Reinastella was introduced in 1929. This model lead on to a range culminating in the 1939 Suprastella. All Grand Renaults from 1923 are classed as classics by CCCA. Coachbuilders included Kellner, Labourdette, J. Rothschild et Fils and Renault bodies. Closed car Renault bodies were often trimmed and interior wood work completed by Rothschild.

Renault also introduced in 1928 an upgraded specification to the larger cars designated 'Stella'. Vivastella's and Grand Renaults had upgraded interior fittings and had a small star fitted above the front hood Renault diamond. This proved to be a winning marketing differentiator and in the 1930's all cars changed to the Stella suffix from the previous two alpha character model identifiers. The Grand Renaults were built using a considerable amount of aluminium. Engines, brakes, transmissions, floor and running boards and all external body panels were aluminium. Unfortunately of the few that were built many went to scrap to aid the War effort.

Text 50. Renault during the World War II and after (1939 — 1971)

During World War II, Louis Renault's factories worked for Nazi Germany producing trucks with work on cars officially forbidden. He was, for

this reason, arrested during the liberation of France in 1944 and died in prison before having prepared his defense. An autopsy later showed that his neck had been broken, suggesting that he was murdered. His industrial assets were seized by the provisional government of France. The Renault factories became a public industry (known as Régie Nationale des Usines Renault) under the leadership of Pierre Lefaucheux.

In the years immediately following its nationalisation Renault experienced something of a resurgence, led by the rear engine 4CV model, which was launched in 1946 and proved itself a capable rival for cars such as the Morris Minor and Volkswagen Beetle, its success (more than half a million sold) making sure it remained in production until 1961. There was also a large mechanically conventional 2-litre 4-cylinder car, the Renault Fregate, from 1951 to 1960.

As with earlier Renault models, the company made extensive use of motor racing to promote the 4CV, the car winning both the Le Mans 24 Hours and Mille Miglia races as well as the Monte Carlo rally. However, despite the success of its flagship model, the company continued to be blighted by labor unrest, and indeed continued to be well into the 1980s. The 4CV's replacement, the Dauphine, sold extremely well as the company expanded production and sales further abroad, including Africa and North America. The car did not sell well in North America and it was outdated by the start of the 1960s. In an attempt to revive its flagging fortunes, Renault launched two cars which were to become phenomenally successful — the Renault 4 and Renault 8 in 1961 and 1962 respectively.

The 4 in particular was to continue in production until 1992. Both cars continued Renault's motor racing traditions with great success in rallying, a tradition which was further upheld by collaborations with the Alpine company (which most famously produced the Renault-powered Alpine A110). As well as the 4 and 8, the company achieved success with the more upmarket Renault 16 launched in 1966, which continued Renault's reputation for innovation by being the world's first hatchback larger than subcompact size.

Text 51. Renault and Modern Era (1972 — 1980)

The new Renault corporate logo introduced in 1972, as part of the major brand revamp carried out to coincide with the launch of the Renault 5 hatchback. The company's compact and economical Renault 5 model, launched in 1972, was another success, particularly in the wake of the 1973 energy crisis. The 5 remained in production until 1984 when it was replaced by the Super 5. The formula was much the same however, and the Super 5 inherited its styling lines from its father (however with a transversal engine, as opposed to the longitudinal engine inherited by the first generation Renault 5 from the Renault 4). Endangered like all of the motor industry by the energy crisis, during the mid seventies the already expansive company diversified further into other industries and continued to expand globally,

including into South East Asia. The energy crisis also provoked Renault's attempt to reconquer the North American market; despite the Dauphine's success in the United States in the late 1950s, and an unsuccessful car-assembly project in Saint-Bruno-de-Montarville, Québec (1964 — 1972), Renault had virtually disappeared from North America by the 1970s.

However, in the early part of the decade, when the energy crisis-hit continent required smaller, more economical cars, Renault began to make plans to return through a collaborative partnership with the American manufacturer American Motors Corporation (AMC). From 1962 to 1967, Renault assembled complete knock down (CKD) kits of the Rambler Classic sedans in its factory in Belgium. Renault did not have large or luxury cars in its product line and the 'Rambler Renault' was aimed as an alternative to the Mercedes-Benz 'Fintail' cars. Similar to the fate of some of these Mercedes cars at the time, many of these 'American' Renaults finished their life working as taxis. Later, Renault would continue to make and sell a hybrid of AMC's Rambler American and Rambler Classic called the Renault Torino in Argentina (sold through IKA-Renault). Renault partnered with AMC on other projects, such as development of a rotary concept engine in the late 60s, and would eventually own AMC in 1980.

This was one of a series of collaborative ventures undertaken by Renault in the late 1960s and 1970s, as the company established subsidiaries in Eastern Europe, most notably Dacia in Romania, and South America (many of which remain active to the present day) and forged technological cooperation agreements with Volvo and Peugeot (for instance, for the development of the PRV V6 engine, which was used in Renault 30, Peugeot 604, and Volvo 260 in the late 1970s.).

In the mid 1960s an Australian arm, Renault Australia, was setup in Heidelberg, Melbourne, which would close in 1981. Interestingly Renault Australia did not just concentrate on Renaults, they also built and marketed Peugeots as well. From 1977, they assembled Ford Cortina station wagons under contract — the loss of this contract led to the closure of the factory. In North America, Renault formed a partnership with AMC, loaning AMC operating capital and buying a small percentage of the company in late 1979. Jeep was keeping AMC afloat until new products, particularly the XJ Cherokee, could be launched. When the bottom fell out of the 4×4 truck market in early 1980 AMC was in danger of going bankrupt. To protect its investment Renault bailed AMC out with a big cash influx — at the price of a controlling interest in the company — 47.5 %. Renault quickly replaced some top positions in AMC with their own people.

The Renault-AMC partnership also resulted in the marketing of Jeep vehicles in Europe. Some consider the Jeep XJ Cherokee as a joint AMC/Renault project since some early sketches of the XJ series was done as a collaboration of both Renault and AMC engineers (AMC insisted that the XJ Cherokee was designed by AMC personnel; however, a former Renault engineer designed the Quadra-Link front suspension for the XJ series). The Jeep also used wheels and unique rocking seats from Renault. Part

of AMC's overall strategy when the partnership was first discussed was to save manufacturing cost by using Renault sourced parts when practical, and some engineering expertise. This led to the improvement of the venerable AMC in-line six — a Renault/Bendix based port electronic fuel injection system (usually called Renix) that transformed it into a modern, competitive powerplant with a jump from 110 hp to 177 hp with less displacement (4.0L vs 4.2L).

The Renault-AMC marketing effort in passenger cars was not as successful compared to the popularity for Jeep vehicles. This was because by the time the Renault range was ready to become established in the American market, the second energy crisis was over, taking with it much of the trend for economical, compact cars.

Renault sold some interesting models in the USA in the 1980s, especially the simple looking but fun Renault Alliance GTA (Renault 9) and GTA convertible — a real automatic-top convertible with a simple but clean euro-style design featuring a gently sloping hood, as well as a 2.0L engine — big for a car of its class; and the ahead-of-its-time Renault Fuego coupe; Renault sold other models in the US during the 1980s.

However, Renault sold AMC to Chrysler in 1987 after the assassination of Renault's chairman, Georges Besse. The Renault Medallion (Renault 21 in Europe) sedan and wagon was sold from 1987 to 1989 through Jeep-Eagle dealerships. Jeep-Eagle was the new division Chrysler created out of the former American Motors. However, Renault products were no longer imported into the United States after 1989.

A completely new full-sized 4-door sedan, the Eagle Premier, was developed during the partnership between AMC and Renault. The Premier design, as well as its state-of-the-art manufacturing facility in Bramalea, Ontario, Canada, were the starting point for the sleek LH sedans such as the Eagle Vision and Chrysler 300M.

In the late seventies and early eighties, Renault increased its involvement in motorsport, with novel inventions such as turbochargers in their Formula One cars. The company's road car designs were revolutionary also — the Renault Espace was one of the first minivans and was to remain the most well-known minivan in Europe for at least the next two decades. The second-generation Renault 5, the European Car of the Year-Winning Renault 9, and the most luxurious Renault 25 were all released in the early 1980s, building Renault's reputation, but at the same time the company suffered of poor product quality which reflected badly to the image of the brand and the ill-fated Renault 14 is seen by many as the culmination of these problems in the early 1980s.

GRAMMAR REVIEW

«Грамматические комментарии» не представляют собой полного курса грамматики английского языка, они также не являются справочником по грамматике. Сюда вошли сведения по отдельным вопросам грамматики английского языка, обычно вызывающие затруднения у студентов в их понимании и переводе. При отборе грамматических трудностей авторы исходили из грамматического материала, который содержится в текстах данного учебного пособия.

§ 1. Общая характеристика системы видо-временных форм глагола

Отличительной чертой английского глагола является развитая система видо-временных форм. Она представлена тремя временами (*The Present*, *The Past*, *The Future*), повторяющимися в четырех группах (*Simple*, *Continuous*, *Perfect*, *Perfect Continuous*).

Времена группы Simple

Времена группы *Simple* обозначают действие обычное, закономерное, периодически повторяющееся, которое регулярно происходит, происходило или будет происходить в настоящем, прошедшем и будущем. Точный момент протекания действия не определен.

I go to the Institute every day.	Я хожу в институт каждый день.
I went to the Institute yesterday.	Я ходил в институт вчера.
I shall go to the Institute tomorrow.	Я пойду в институт завтра.

Формы *Simple* употребляются также для выражения состояния, постоянного свойства объекта и констатации факта:

John is my friend.	Джон — мой друг.
Water boils at 100 degrees.	Вода кипит при температуре 100 градусов.
I was born in 1977.	Я родился в 1977 году.

С временами группы *Simple* часто употребляются наречия неопределенного времени: *always*, *usually*, *sometimes*, *often*, *every day*.

Present Simple V + s (Do/does)

Глагол без частицы *to*, в 3-ем лице ед. ч. добавляется окончание *-s*. Для образования вопросительного и отрицательного предложения используются вспомогательные глаголы *do/does*, причем в вопроси-

тельном предложении эти глаголы стоят *перед подлежащим*, в отрицательном — *между* подлежащим и сказуемым:

They speak French.	She speaks English well.
Do they speak French?	Does she speak English well?
They don't speak well.	She doesn't speak English well.

Past Simple V+ed/2 (Did+V1)

Правильный глагол без частицы *to* + окончание *-ed*, неправильный глагол — во 2-й форме. Для образования вопросительной и отрицательной форм используется вспомогательный глагол *did*, после которого основной глагол ставится в первой/начальной форме:

He worked at a plant last year.	Он работал на заводе в прошлом году.
Did he work at a plant last year.	Он работал на заводе в прошлом году?
He didn't work at a plant last year.	Он не работал на заводе в прошлом году.

Future Simple shall/will+V

Shall — для местоимений 1-го лица, ед. и мн.ч., **will** — для всех остальных лиц + основной глагол в начальной форме без частицы *to*:

He will work in the library.	Он будет работать в библиотеке.
Will he work in the library?	Он будет работать в библиотеке?
He will not (won't) work in the library.	Он не будет работать в библиотеке.

Времена группы Continuous

Времена группы *Continuous* обозначают длительное действие, которое происходит, происходило или будет происходить в точно указанный момент или период в настоящем, прошедшем либо будущем (*now*, *at 5 o'clock yesterday*, *tomorrow*, *when I came/come*).

What are you doing now?	Что ты делаешь?
I was doing my homework at 5 o'clock yesterday.	Я делал уроки в 5 часов вчера.
I shall be doing my homework tomorrow when my father comes home.	Я буду делать уроки завтра, когда отец придет домой.

Особенностью времен группы *Continuous* является то, что все они, включая *the Past Continuous*, выражают незаконченное действие, и, следовательно, переводятся глаголом несовершенного вида.

The Present Continuous может употребляться для выражения запланированного действия в будущем:

I am leaving for Moscow next week.	Я уезжаю в Москву на следующей неделе.

В *Continuous* не употребляются глаголы, выражающие чувства, восприятие и желание: *to want*, *to like*, *to love*, *to wish*, *to see*, *to hear*, *to feel*, *to notice*, *to know*, *to understand*, *to remember*, *to recognize*, *to forget*, *to seem*, *to be*, etc. Как правило, они стоят в одном из времен группы Simple.

Present Continuous **am, is, are + Ving**

He is reading a book now.	Он читает сейчас книгу.
Is he reading a book now?	Он читает сейчас книгу?
He is not reading a book now.	Он не читает сейчас книгу.

Past Continuous **was/were + Ving**

She was writing a composition last evening.	Она писала сочинение вчера вечером.
Was she writing a composition last evening?	Она писала сочинение вчера вечером?
She was not writing a composition last evening.	Она не писала сочинение вчера вечером.

Future Continuous **shall/will + be + Ving**

They will be waiting for you tomorrow.	Они будут ждать вас завтра утром.
Will they be waiting for you tomorrow?	Они будут ждать вас завтра утром?
They will not be waiting for you tomorrow.	Они не будут ждать вас завтра утром.

Времена группы Perfect

Времена группы *Perfect* употребляются для выражения действий, свершившихся к определенному моменту в настоящем, прошедшем и будущем. Момент может быть указан с помощью наречий: *just*, *already*, *yet*, *ever*, *never*, *lately*, предлогов *for*, *since*, *by*, *before*, словосочетаний *this week*, *this month*, *this year* (*the Present Perfect*) либо обозначен другим действием (*the Past Perfect и the Future Perfect*).

I've just written the letter.	Я только что написал письмо.
I had already written the letter when my brother came (by the time of his arrival, by 5 o'clock yesterday).	Я уже написал письмо, когда пришел брат (ко времени его приезда, к 5 часам вечера).

I shall have written the letter before my brother comes (by 5 o'clock tomorrow).	Я напишу письмо прежде, чем придет мой брат (к пяти часам завтра).

Present Perfect **have/has + V3**

Вспомогательный глагол *to have* — для всех местоимений, *has* — для 3-го лица ед.ч. и *participle II* неправильных глаголов или *V+ed* правильных глаголов. Вспомогательные глаголы *have/has* также служат для образования вопросительной и отрицательной формы:

They have already translated the article, you may take it.	Они уже перевели статью, вы можете ее забрать.
Have they translated the article yet?	Они уже перевели статью?
They haven't translated the article yet.	Они еще не перевели статью.

Past Perfect **had + V3**

She had prepared her exercise by 5 o'clock.	Она сделала упражнение к 5 часам.
Had she prepared her exercise by 5 o'clock?	Она сделала упражнение к 5 часам?
She hadn't prepared her exercise by 5 o'clock.	Она не сделала упражнение к 5 часам.

Future Perfect **shall/will + V3**

I shall have returned you your book by next Saturday.	Я верну вам вашу книгу к следующей субботе.

Примечание: Для выражения завершенного действия в придаточных предложениях времени и условия, относящихся к будущему, употребляется *Present Perfect* вместо *Future Perfect*:

I shall return the dictionary to you after I have translated the article.	Я верну вам словарь, после того как переведу статью.
Keep my dictionary until you have translated the article.	Оставь у себя мой словарь, пока не переведешь статью.

§ 2. Страдательный залог (The Passive Voice)

Глагол в страдательном залоге выражает действие, которое направлено на предмет или лицо, выраженное подлежащим.

Страдательный (пассивный) залог представляет собой сложную аналитическую форму, которая образуется при помощи вспомогательного глагола *to be* в соответствующем времени, лице и числе и причастия прошедшего времени смыслового глагола (*to be* + *participle* II).

Страдательный залог употребляется только с переходными глаголами. Употребление времен в страдательном залоге соответствует правилам употребления этих же времен в действительном залоге.

	Simple	Continuous	Perfect
Present	I am He She — is It We You — are They — done	I am He She — is It We You — are They — done	I have He She — has It We You — have They — done
Past	I He She It — was We You — were They — done	I He She It — was We You — were They — being done	I He She It — had been done We You They
Future	I We — shall She It He — will You They — be done		I We — shall She It He — will You They — have be done

При преобразовании предложений из действительного залога в страдательный необходимо помнить следующее:

а) глагол в страдательном залоге ставят в том же времени, что и в действительном. Лицо и число может меняться, так как меняется подлежащее:

I translate texts every day.	Я перевожу тексты каждый день.
Texts are translated every day.	Тексты переводятся каждый день.

б) дополнение в действительном залоге будет подлежащим в страдательном и наоборот.

They build new houses in our street.	Они строят новые дома на нашей улице.
New houses are built in our street.	На нашей улице строятся новые дома.

в) если в предложении действительного залога имеется два дополнения, то любое из них может быть подлежащим в страдательном залоге. При этом дополнение, выраженное местоимением в косвенном падеже, в действительном залоге ставится в именительном падеже. Местоимение, указывающее на носителя действия в страдательном залоге, ставится в объектном падеже:

Nick gave me an interesting book.	Николай дал мне интересную книгу.
An interesting book was given to me.	Мне дали интересную книгу.
I was given an interesting book to read.	Мне дали интересную книгу.

г) дополнение с предлогом *by* в страдательном залоге часто опускается, если оно выражено личным местоимением:

He showed me the plan.	Он показал мне план.
The plan was shown to me (by him).	Мне показали план.

д) если сказуемое действительного залога выражено сочетанием модального глагола с инфинитивом, то в страдательном залоге ему соответствует сочетание того же модального глагола с инфинитивом в страдательном залоге.

I can't answer your question.	Я не могу ответить на ваш вопрос.
Your question can't be answered.	На ваш вопрос невозможно ответить.
He must clean the room.	Он должен убрать в комнате.
The room must be cleaned.	В комнате необходимо убрать.

Перевод глаголов в страдательном залоге на русский язык

Существует несколько способов перевода английской конструкции страдательного залога на русский язык.

1. Соответствующей страдательной конструкцией:

Many houses were destroyed by the fire.	Огнем было уничтожено много домов.

2. Возвратной формой глагола в соответствующем времени:

The house is being built in our street. Дом строится на нашей улице.

3. Глаголом в действительном залоге в 3-м лице множественного числа с неопределенно-личным значением:

The question has been discussed.	Вопрос уже обсудили.
The child is being dressed.	Ребенка одевают.

Если позволяет контекст и русская грамматика, одну и ту же страдательную конструкцию можно перевести двумя или тремя вышеуказанными способами (строят, строится и т. п.)

Поскольку в английском языке страдательный залог употребляется гораздо чаще, чем в русском, существует ряд случаев, представляющих определенную трудность при переводе. К ним относятся следующие:

1. Если в страдательном залоге указан «носитель действия» (*by somebody*), то при переводе может употребляться личная форма глагола действительного залога:

The news is brought by my sister.	Новость принесла моя сестра.

2. Если сказуемое в страдательной конструкции выражено глаголом с предлогом, то подлежащее переводят дополнением с соответствующим предлогом, а сказуемое — неопределенно-личной формой глагола:

The doctor has been sent for.	За доктором послали.
The child is being looked after.	За ребенком присматривают.

3. После ряда глаголов (*to give*, *to help*, *to send*, *to tell*, *to show*, *to ask*, *to see*, *to teach*) подлежащее в английском языке переводят существительным или местоимением в дательном или винительном падеже, а сказуемое — неопределенно-личной формой глагола.

My friend was asked to come to the party.	Моего друга попросили прийти на вечер.
I wasn't told about it.	Мне об этом не сказали.

4. Безличные конструкции переводят следующим образом:

It is known that ...	Известно, что...
It is said that ...	Говорят, что...
It is expected that ...	Ожидают, что...
It should be mentioned that ...	Следует упомянуть, что...

§ 3. Согласование времен (The Sequence of Tenses)

Правило согласования времен в английском языке представляет определенную зависимость времени глагола в придаточном предложении (главным образом дополнительном) от времени глагола в главном предложении. В русском языке такой зависимости не существует.

Основные положения согласования времен сводятся к следующему:

1. Если сказуемое главного предложения выражено глаголом в настоящем или будущем времени, то сказуемое придаточного предложения может стоять в любом времени, которое требуется по смыслу:

He knows she studies English.	Он знает, что она изучает английский.
He knows she will study English.	Он знает, что она будет изучать английский.
He knows she studied English.	Он знает, что она изучала английский.

2. Если сказуемое главного предложения стоит в прошедшем времени, то сказуемое придаточного предложения должно стоять в одном из прошедших времен. Выбор конкретной видо-временной формы определяется тем, происходит ли действие в придаточном предложении одновременно с главным, предшествует ему либо будет происходить в будущем:

He knew she studied English.	Он знал, что она изучает английский.
He knew she would study English.	Он знал, что она будет изучать английский.
He knew she had studied English.	Он знал, что она изучала английский.

В ряде случаев правило согласования времен не соблюдается:

а) если сказуемое придаточного предложения выражено модальными глаголами *must*, *should*, *ought* и инфинитивом:

He told us that he should leave immediately.	Он сказал, что должен уехать немедленно.
I knew he must visit his sick friend.	Я знал, что он должен навестить своего больного друга.

б) если сказуемое придаточного предложения выражает общеизвестный факт:

The pupils were told that the Earth goes round the Sun, and the Moon goes round the Earth.	Ученикам сказали, что Земля вращается вокруг Солнца, а Луна вокруг Земли.

в) в придаточных определительных, а также в предложениях, которые вводятся союзом *than*, *as...that*, *as...as*, *less than*:

Last year I worked less than I work now.	В прошлом году я работал меньше, чем (работаю) сейчас.

§ 4. Косвенная речь (Reported Speech)

Правило согласования времен особенно часто соблюдается в косвенной речи, то есть когда мы своими словами пересказываем содержание того, что было сказано другими. Сравните:

He said, 'I shall do it tomorrow.'	Он сказал: «Я сделаю это завтра».
He said, that he would do it the next day.	Он сказал, что сделает это завтра.
Mary said to me, 'I worked at this office.'	Мери сказала мне: «Я работала в этом учреждении».
Mary told me, that she had worked at that office.	Мери сказала мне, что работала в этом учреждении.
He said, 'I can speak to you now.'	Он сказал: «Сейчас я могу с тобой поговорить».

He said he could speak to me then.	Он сказал, что может поговорить со мной сейчас.

Как видно из примеров, при преобразовании утвердительных предложений из прямой речи в косвенную, производятся следующие изменения:

а) может употребляться союз *that*;

б) изменяются времена глаголов в соответствии с правилами согласования времен;

в) заменяются местоимения в зависимости от смысла;

г) глагол *to say*, за которым следует дополнение, заменяется глаголом *to tell* (без предлога *to*);

д) заменяются наречия места и времени:

today — that day	last year — the year before
yesterday — the day before	now — then
tomorrow — the next day	these — those
... ago — ... before	next ... — the following ...
this — that ...	here — there

Общие вопросы вводятся союзами *if*, *whether* (частица *ли*), порядок слов вопросительного предложения заменяется порядком слов утвердительного предложения:

He asked me, 'Do you know my telephone number?'	Он спросил меня: «Ты знаешь мой номер телефона?»
He asked me if I knew his telephone number.	Он спросил меня, знаю ли я номер его телефона.

Специальные вопросы вводятся тем же вопросительным словом, с которого начинается прямая речь, порядок слов становится прямым (утвердительное предложение):

He asked me, 'When will you come to my place?'	Он спросил меня: «Когда ты придешь ко мне?»
He asked me when I would come to his place.	Он спросил меня, когда я к нему приду.

При преобразовании прямой речи в косвенную глаголы в *повелительном наклонении* остаются в форме инфинитива:

He said to me, 'Give me your pen'.	Он сказал мне: «Дай мне свою ручку».
He asked me to give him my pen.	Он попросил меня дать ему мою ручку.

§ 5. Причастие (The Participle)

Причастие — это неличная форма глагола, сочетающая свойства глагола, прилагательного и наречия. В английском языке различают два причастия: *participle I* и *participle II*.

Participle I соответствует русскому причастию с суффиксами *-ущ*, *-ющ*, *-ащ*, *-ящ*, (*asking* — спрашивающий, *writing* — пишущий), а также деепричастию несовершенного вида с суффиксами *-а*, *-я*, (*going* — идя, *crying* — плача) или совершенного вида с суффиксом *-в* (*seeing* — увидев).

Participle II является страдательным причастием прошедшего времени (*forgotten song* — забытая песня).

Participle I, может иметь формы относительного времени и залога.

	Active	**Passive**
Present Participle	writing	being written
Perfect Participle	having written	having been written
Participle II		written

Формы *present participle* употребляются для обозначения действия, одновременного с действием глагола в личной форме:

Being late I took a taxi.	Так как я опаздывал, я взял такси.
I heard the problem being discussed.	Я слышал, как обсуждали эту проблему.
Not knowing her address, I can't send her a letter.	Не зная ее адреса, я не могу послать ей письмо.

Формы *perfect participle* употребляются для обозначения действия, предшествующего действию глагола в личной форме:

Having passed the exams he went to the Crimea.	Сдав экзамены, он уехал в Крым.

Причастия от глаголов *hear*, *see*, *notice*, *learn*, *understand*, *realize*, *come*, *arrive* и некоторых других имеют неперфектную форму, если выражаемое ими действие непосредственно предшествует действию глагола-сказуемого.

Hearing the news, I called him up at once.	Услышав эти новости, я сразу же позвонил ему.

Participle II имеет только одну форму, которая совпадает с третьей формой глагола.

Кроме глагольных свойств, причастие обладает свойствами прилагательного и наречия. Как и прилагательное, оно может выполнять функцию определения и стоять перед определяемым словом или после него. В последнем случае оно образует обособленный причастный оборот:

Everybody looked at the dancing girl.	Все посмотрели на танцующую девочку.
All people living in this house are students.	Все люди, живущие в этом доме, студенты.

Предикативные причастные обороты

Предикативные причастные обороты выступают в роли сложного дополнения и сложного обстоятельства.

Причастный оборот представляет собой существительное в общем падеже или личное местоимение в объектном падеже + причастие. В сложном дополнении употребляется неперфектная форма причастия I (*doing*, *being done*) и причастие II (*done*). Сложное дополнение употребляется:

1. После глаголов, выражающих физическое восприятие: *see*, *hear*, *watch*, *notice* ...

I saw *him photographing* the monument.	Я видел, как он фотографировал этот памятник.
I saw *the monument being photographed*.	Я видел, как фотографировали этот памятник.

После глаголов, выражающих желание: *want*, *wish*, *would like*:

I want the letter to be posted at once.	Я хочу, чтобы письмо было отправлено немедленно.
The family wanted the case investigated by somebody else.	Родственники хотели, чтобы дело расследовал кто-нибудь другой.

2. После глагола *to have* в конструкции *have smth done*. Конструкция означает, что действие производиться не лицом-подлежащим, а кем-либо другим.

I *had* my suit *cleaned*.	Мне почистили костюм.
He *had* his flat *redecorated*.	Ему сделали ремонт квартиры.

Глагол *have* в этой конструкции может употребляться в различных временных формах:

I *am having* my car *repaired*.	Мне ремонтируют машину.
I'*ve* just *had* my car *repaired*.	Мне только что отремонтировали машину.

Существительное в общем падеже / личное местоимение в именительном падеже / безличное местоимение it / вводное *there* + причастие — называется **независимым причастным оборотом**.

В русском языке аналогичной конструкции не существует. Независимый причастный оборот по значению соответствует придаточному предложению. Подлежащим в таком предложении является существительное или местоимение, к которому относится английское причастие.

На русский язык независимые причастные обороты переводятся обычно предложениями (чаще придаточными с союзами *так как*, *после того как*, *если*, *когда*). Если оборот стоит в конце предложения, то его переводят самостоятельным предложением с союзами *а*, *причем*, *в то время как*:

The situation being favourable, they bought the shares.	Так как ситуация была благоприятной, они купили эти акции.
The weather being fine, we went for a walk.	Так как погода была хорошая, мы отправились на прогулку.
My mother was cooking dinner, my sister helping her.	Моя мама готовила обед, а сестра ей помогала.

§ 6. Инфинитив (Infinitive)

Инфинитив — неличная форма глагола, обладающая признаками глагола и существительного. Формальным признаком инфинитива является частица *to*. Чаще всего инфинитив употребляется после глагола в личной форме, либо после модального глагола.

Формы инфинитива

	Active	Passive
Indefinite	to ask	to be asked
Continuous	to be asking	—
Perfect	to have asked	to have been asked
Perfect Continuous	to have been asking	—

The Indefinite Infinitive (простой инфинитив) выражает действие, происходящее одновременно с действием глагола-сказуемого или непосредственно следующее за ним.

He wants to ask you a question.	Он хочет задать вам вопрос.
He wants to be asked a question.	Он хочет, чтобы ему задали вопрос.

The Continuous Infinitive подчеркивает длительность действия, происходящего одновременно с действием глагола-сказуемого.

I am glad to be working with you.	Я рад, что работаю с вами.

The Perfect Infinitive выражает действие, которое произошло раньше действия, выраженного глаголом-сказуемым:

I am sorry to have troubled you.	Извините, что побеспокоил вас.

В предложении инфинитив может выполнять функции: подлежащего, части сказуемого, прямого дополнения, обстоятельства цели и определения:

To read much is to know much.	Много читать — много знать.
I want to buy a new TV set.	Я хочу купить новый телевизор.
Give me something to read. (определение)	Дай мне что-нибудь почитать.

He is too young to understand it. (обстоятельство)	Он слишком молод, чтобы понять это.

Инфинитив может также употребляться в функции сложного дополнения и сложного подлежащего, образуя при этом соответствующие обороты: объектный инфинитивный оборот (the Objective-with-the-Infinitive Construction) и субъектный инфинитивный оборот (the Subjective-with-the-Infinitive Construction).

Объектный инфинитивный оборот: существительное в именительном падеже либо местоимение в объектном и инфинитив. Причем действие, выраженное инфинитивом, выполняет сам объект, а не подлежащее главного предложения:

I have never heard *her sing*.	Я никогда не слышал, как она поет.
I want *him to come*.	Я хочу, чтобы он пришел.

После глаголов *to want*, *to expect*, *to consider*, *to wish*, *to prefer*, *to know*, *to ask*, *should* (*would*) *like* инфинитив употребляется с частицей *to*.

После глаголов, выражающих физическое восприятие, *to see*, *to watch*, *to hear*, *to feel*, а также *to make*, *to let* частица *to* не употребляется.

Субъектный инфинитивный оборот состоит из субъекта (существительного или личного местоимения в именительном падеже) и инфинитива, следующего за сказуемым. Действие, выраженное инфинитивом, выполняет субъект, который является в предложении подлежащим. Сказуемое может быть выражено глаголами *to think*, *to know*, *to suppose*, *to hear*, *to see*, *to say*, *to report*, *to describe*, *to order*, в страдательном залоге, а также глаголами *to seem*, *to happen*, *to appear* в действительном залоге. Предложения с субъектным инфинитивным оборотом соответствуют русским неопределенно-личным предложениям типа *говорят*, *что* ...; *думают*, *что*...; *сообщается*, *что*...; *известно*, *что*... и т.д.:

He is said to know several foreign languages.	Говорят, что он знает несколько иностранных языков.
He is known to be writing a new novel.	Известно, что он пишет новый роман.

В английском языке имеется также инфинитивный оборот с предлогом *for*. Он состоит из существительного (или местоимения), перед которым стоит предлог *for*, и инфинитива. Этот оборот может употребляться в качестве сложного подлежащего (с вводным *it*), именной части сказуемого, сложного дополнения, определения и обстоятельства:

It is difficult for me to translate this text.	Мне трудно перевести этот текст.
I've brought two books for my son to read.	Я принесла сыну две книги почитать.

§ 7. Герундий (Gerund)

Герундий — это неличная форма глагола, сочетающая свойства глагола и существительного. Соответствующей формы в русском языке нет. По значению к герундию близки такие русские отглагольные существительные как *чтение*, *ожидание* и т. п. К глагольным свойствам относится наличие форм залога и относительного времени (таких же, как и у причастия), возможность иметь дополнение и определяться наречием. Как и существительное, герундий может быть в предложении подлежащим, частью составного сказуемого, прямым и предложным дополнением, определением, обстоятельством. Ему могут предшествовать определители: местоимения и существительные в притяжательном падеже, предлоги, что не характерно для причастия:

	Active	**Passive**
Indefinite	doing	being done
Perfect	having done	having been done

Герундий как прямое дополнение употребляется после таких глаголов как *to like*, *to need*, *to prefer*, *to remember*, *to enjoy*.

I enjoy *listening* to music. — Я люблю слушать музыку.

Герундий как **предложное дополнение** может употребляться после любого глагола с предлогом: *to thank for*, *to be responsible for*, *to be fond of*, *to be tired of*, *to look forward to*, *to be interested in*:

He is fond of *playing* chess. — Он увлекается игрой в шахматы.

Герундий как **определение** употребляется после абстрактных существительных с предлогами: *the idea of*, *importance of*, *way of*, *experience in*, *interest in*, *reason for*:

I saw no other way of *doing* it. — Я не видел другого способа сделать это.

Герундий как **обстоятельство** употребляется всегда с предлогом. В функции обстоятельства времени он употребляется с предлогами *after*, *before*, *on*, образа действия — *by*, *without*, *instead of*, *besides*:

Before *having* dinner you must wash your hands. — Перед обедом необходимо мыть руки.

Герундий как часть сказуемого употребляется после глаголов *to stop*, *to finish*, *to continue*, *to go on*, *to keep on*, *to begin*, *to start*.

Go on *reading* the text. — Продолжайте читать текст.

После глаголов и сочетаний *to like*, *to begin*, *to start*, *to continue*, *to hate*, *to prefer*, *to forget*, *to remember*, *to stop*, *to intend*, *it is of no*

use, *it is useless*, *it is no good* возможно употребление как герундия, так и инфинитива:

It began raining / it began to rain early in the morning.	Дождь начал идти рано утром.
It is no use talking / it is no use to talk about it.	Бесполезно говорить об этом.

После глаголов *to finish*, *to go on to keep on*, *to enjoy*, *to excuse*, *to forgive*, *to mind*, *to imagine*, *to give up*, а также после словосочетаний *it is worth*, *can't help*, *to feel like*, *to look like* употребляется только герундий.

На русский язык герундий может переводиться отглагольным существительным, неопределенно-личной формой глагола, деепричастием и придаточным предложением.

Герундий в сочетании с существительным в общем или притяжательном падеже или местоимением в притяжательном или объектном падеже образует герундиальный оборот, выполняющий любую функцию в предложении, свойственную герундию. На русский язык данный оборот переводится придаточным предложением с союзами *что* (*чтобы*) с предшествующими ему местоимениями *то*, *тем что*, *как:*

Thank you for your answering my letter.	Спасибо за то, что ответили на мое письмо.
I dislike my relatives interfering into my affaires.	Мне не нравится то, что родственники вмешиваются в мои дела.

§ 8. Модальные глаголы (Modal Verbs)

Модальные глаголы обозначают не действия, а отношение к ним. С помощью модальных глаголов говорящий показывает, что он считает то или иное действие возможным или невозможным, обязательным или необязательным, вероятным или маловероятным.

К модальным глаголам относятся: *can*, *may*, *must*, *should*, *need*. Кроме того, модальные значения могут быть выражены глаголами *to be*, *to have*.

Present	Past	Future
can	could	will be able to
may	might was / were allowed to	will be allowed to
must	had to	will have to

Признаки модальных глаголов

1. Модальные глаголы не имеют окончания *-s* в 3-м лице ед.ч.
2. Не образуют неличных форм (причастия, инфинитива, герундия).
3. После модальных глаголов, как правило, стоит смысловой глагол без частицы *to*.
4. Вопросительную и отрицательную формы они образуют самостоятельно.
5. Модальные глаголы могут употребляться со всеми формами инфинитива в зависимости от времени совершения действия. Если действие относится к настоящему времени, употребляется простой инфинитив или инфинитив продолженной формы (Continuous). Если действие относится к прошлому, употребляется перфектный инфинитив.

He can swim.	Он может плавать.
He can be swimming now.	Возможно, он плавает сейчас.
He could have helped her.	Он мог бы помочь ей.

Can

Модальный глагол **can** имеет формы: **can** — для настоящего времени; **could** — для прошедшего времени, сослагательного наклонения, формы вежливости.

Can может выражать:

а) умственную и физическую возможность, умение выполнить действие, выраженное инфинитивом стоящего за ним глагола:

I can read English books.	Я могу читать английские книги.
I can't ride a bicycle.	Я не могу ездить на велосипеде.

б) разрешение, запрещение (в отрицательных) и неуверенность (в вопросительных) предложениях:

You can use my dictionary.	Ты можешь пользоваться моим словарем.
You can't do such things to your friends.	Ты не смеешь так поступать с друзьями.
Can it be possible?	Разве это возможно?

Must

Модальный глагол *must* имеет только одну форму, которая употребляется в настоящем времени и не изменяется в косвенной речи. В прошедшем и будущем времени для выражения долженствования вместо *must* употребляется глагол *to have* с частицей *to* (*had to*, *shall/will have to*).

Must может выражать:

а) необходимость, обязанность, долг:

Drivers must stop when they see the red light.	Водители должны останавливаться на красный свет.

б) запрещение (в отрицательных предложениях):

You must not park the car here.	Вы не должны парковать здесь свою машину.

в) настойчивый совет, приказ:

You must excuse. You were wrong.	Вам следует извиниться. Вы были не правы.

To have to

Модальный глагол *to have to* может употребляться в настоящем, прошедшем и будущем временах, образуя вопросительную и отрицательную формы по общему правилу (с помощью вспомогательных глаголов *do*, *does*, *did*):

We have to wait as the manager is out.	Мы должны ждать, потому что менеджера нет.
Do we have to wait?	Мы должны ждать?
We don't have to wait.	Мы не должны ждать.

Модальный глагол *to have* выражает обязанность и необходимость, обусловленную обстоятельствами:

I didn't want to go there but I had to. Я не хотел идти туда, но мне пришлось.

To be to

Модальный глагол *to be* употребляется в двух формах — *the present* and *the past indefinite* и всегда с частицей *to*:

We are to meet at the station.	Мы должны встретиться на станции.

To be может выражать:

а) предварительную договоренность, планируемое действие:

Mary and John are to marry in June.	Мери и Джон поженятся в июне.

б) приказы, распоряжения:

Robert is to take his exams next month.	Роберт должен сдавать свои экзамены в следующем месяце.

May

Модальный глагол *may* имеет формы: *may* — для настоящего времени (*могу*, *может* и т.д.); *might* — для прошедшего времени (*мог*, *могли*), сослагательного наклонения (*мог бы*, *могли бы*).

Глагол *may* может выражать:

а) разрешение, позволение совершить какое-либо действие:

You may take my book.	Ты можешь взять мою книгу.
May I come in?	Можно войти?

б) предположение, основанное на неуверенности:

He might not come.	Возможно, он не придет.
It may start raining.	Вероятно, пойдет дождь.

Форма *might* может выражать упрек или неодобрение:

You might have told him about it.	Ты мог бы сказать ему об этом.

Should, ought

Модальные глаголы *should* и *ought* имеют только одну форму, которая употребляется в настоящем времени и не изменяется в косвенной речи.

Глаголы *should* и *ought* практически имеют одни и те же значения и различаются лишь тем, что *ought* употребляется с частицей *to*, а *should* — без нее. Они могут выражать:

а) совет или рекомендацию (*следует*, *должен*):

You ought to be more attentive.	Вам следует быть более внимательным.
You shouldn't watch TV so much.	Вам не следует так много смотреть телевизор.

б) недоумение, удивление, возмущение. В этом случае *should* придает эмоциональную окраску высказыванию, не выражая модальности:

Why should I go there?	С какой стати мне туда идти?
How should I know?	Откуда мне знать?

Need

Модальный глагол *need* имеет только одну форму. Он употребляется преимущественно в отрицательных предложениях и выражает ненужность совершения действия:

You needn't come so early.	Вам незачем приходить так рано.

Need может употребляться и как смысловой глагол со значением *нуждаться в чем-либо*:

He needs a long rest.	Ему нужен продолжительный отдых.

§ 9. Придаточные предложения

Обстоятельственные придаточные предложения (The Adverbial Clauses)

Обстоятельственные придаточные предложения выполняют сложном предложении функцию различных обстоятельств. По своему значению они делятся на обстоятельственные предложения времени,

места, образа действия, причины, цели, следствия, уступительные, степени и сравнения, условия.

Придаточные предложения времени (Adverbial Clauses of Time)

Придаточные предложения времени отвечают на вопросы *when*? (*когда*?) *since when*? (*с каких пор*?) *how long*? (*как долго*?).

Придаточные предложения времени соединяются с главным предложением союзами: *when* (*когда*), *while* (*в то время как*), *before* (*перед тем как*, *до того как*, *перед*), *after* (*после того как*), *as soon as* (*как только*), *as* (*когда*, *в то время как*, *по мере того как*), *till*, *until* (*пока*, *до тех пор пока не*), *as long as* (*пока*, *до тех пор пока*), since (*с тех пор как*) и др.:

I saw many places of interest *when* I was in Moscow.	Я осмотрела много достопримечательностей, когда была в Москве.
As soon as I get this book I'll give it to you.	Как только я достану эту книгу, я дам ее вам.
We have not seen him *since* he went to the North.	Мы его не видели с тех пор, как он уехал на Север.
I shall stay here *until* you come back.	Я останусь здесь до тех пор пока вы не вернетесь.
She came *after* I left.	Она пришла после того, как я ушла.

Примечание. В придаточных предложениях времени, будущее время не употребляется: *Future Indefinite* заменяется *Present Indefinite*, *Future Continuous — Present Continuous*, а *Future Perfect — Present Perfect*:

While you are working I shall be reading this book.	Пока вы будете работать, я почитаю эту книгу.
I shall come to see you *when* I have time.	Я зайду к вам, когда у меня будет время.
I shall be free *after* I have passed my examinations.	Я буду свободен после того, как сдам экзамены.

Придаточные предложения места (Adverbial Clauses of Place)

Придаточные предложения места отвечают на вопросы *where*? (*где*? *куда*?) *from where*? (*откуда*?) и присоединяются к главному предложению союзными словами *where* (*где*, *куда*), *wherever* (*где бы ни*, *куда бы ни*):

I shall go *where* I was born.	Я поеду туда, где я родился.
You must work well *wherever* you go.	Вы должны хорошо работать, куда бы вы ни поехали.

Придаточные предложения образа действия (Adverbial Clauses of Manner)

Придаточные предложения образа действия отвечают на вопрос **how?** (*как? каким образом?*) и присоединяются к главному предложению союзами **as** (*как*), **as if**, **as though** (*как будто*, *как если бы*):

She looked at me *as if* she had never seen me before.	Она посмотрела на меня так, как будто никогда не видела меня раньше.
Pronounce the word *as* the teacher did it.	Произнесите это слово так, как произнес его преподаватель.

Придаточные предложения причины (Adverbial Clauses of Cause)

Придаточные предложения причины отвечают на вопрос *why?* (*почему?*) и присоединяются к главному предложению союзами *because* (*потому что*), *as* (*так как*), *since* (*так как*):

As the weather was fine, we went to the woods.	Так как погода была хорошая, мы пошли в лес.
I could not come *because* I fell ill.	Я не смог прийти, так как заболел.

Придаточные предложения цели (Adverbial Clauses of Purpose)

Придаточные предложения цели отвечают на вопросы *what?* (*зачем? для чего?*), *for what purpose?* (*с какой целью?*) и указывают, с *какой* целью совершается действие главного предложения. Придаточные предложения цели присоединяются к главному предложению союзами *so that*, *in order that* (*чтобы*, *для того чтобы*):

You must read clearly *so that* (*in order that*) other students may understand you well.	Вы должны читать отчетливо, чтобы другие студенты могли хорошо вас понять.

Придаточные предложения следствия (Adverbial Clauses of Result)

Придаточные предложения следствия присоединяются к главному предложению союзом *so that* (*так что*). Вместо *so that* в разговорной речи часто употребляется *so*:

The water was so cold *that* we didn't want to go swimming.	Вода была такая холодная, что нам не хотелось купаться.

It rained so heavily (*that*) we didn't go out.	Дождь был такой сильный, что мы не выходили на улицу.

Придаточные уступительные предложения (Adverbial Clauses of Concession)

Придаточные уступительные предложения соединяются с главным предложением союзами *though*, *although* (*хотя*), *however* (*как бы ни*), *whoever* (*кто бы ни*), *whatever* (*что бы ни*), *whichever* (*какой бы ни*):

Although (*though*) my Granny is seventy she is quite well.	Хотя моей бабушке семьдесят лет, она вполне здорова.
However busy I am, I shall come to see you.	Как бы я ни был занят, я зайду к вам.

Придаточные предложения сравнения (Adverbial Clauses of Comparison)

Придаточные предложения сравнения вводятся союзами: **than** (*чем*), *as...as* (*так* (*такой*) *же... как*), *not so...as* (*не так* (*такой*)... *как*), *the...the* (*чем... тем*):

There are more good students in our group *than* in your group.	В нашей группе больше хороших студентов, чем в вашей.
My room is *as* light *as* yours.	Моя комната такая же светлая, как ваша.
My room is *not so* light *as* yours.	Моя комната не такая светлая, как ваша.
The longer I listened to this song, *the* more I liked it.	Чем больше я слушал эту песню, тем больше она мне нравилась.

§ 10. Условные предложения (Conditional Sentences)

Придаточные предложения условия обычно соединяются с главным предложением союзами *if* (*если*), *unless* (*если не*). *If* является наиболее употребительным союзом, вводящим придаточные предложения условия:

If you ask him, he will help you.	Если вы его попросите, он вам поможет.
Unless it rains, we shall go swimming.	Если не будет дождя, мы пойдем купаться.

В английском языке условные предложения подразделяются на три типа:

I тип условных предложений выражает осуществимое условие, относящееся к настоящему, прошедшему или будущему времени:

If it gets dark, we switch the light on.	Если становиться темно, мы зажигаем свет.
If it got dark, we switched the light on.	Если становилось темно, мы зажигали свет.
If it gets dark, we shall switch the light on.	Если станет темно, мы зажжем свет.

II тип условных предложений составляют предложения, выражающие маловероятное условие, относящееся к настоящему или будущему времени.

В условных предложениях II типа глаголы главного и придаточного предложений употребляются в сослагательном наклонении. В главном предложении употребляются вспомогательные глаголы *should* или *would* + *инфинитив* смыслового глагола, в придаточном предложении употребляется форма сослагательного наклонения, совпадающая с *Past Indefinite*. При переводе условных предложений II типа на русский язык употребляются глаголы с частицей *бы:*

If I had time I *should go* to the cinema.	Если бы у меня было время, я бы пошла в кино.

В условных предложениях II типа употребляется форма глагола *were* для всех лиц (в разговорной речи в 1-м и 3-м лицах единственного числа сохраняется форма *was*):

If I were you I should go to the Russian Museum.	На твоем бы месте я бы пошла в Русский музей.

III тип условных предложений составляют предложения, выражающие неосуществимые предположения, относящиеся к прошедшему времени. В условных предложениях III типа глагол главного предложения стоит в форме *should* (*would*) + *Infinitive Perfect*, а глагол условного придаточного предложения — в форме сослагательного наклонения, совпадающего с *Past Perfect*.

При переводе условных предложений III типа на русский язык также употребляются глаголы с частицей *бы:*

If you had listened to me carefully, you would not have asked me such questions.	Если бы вы слушали меня внимательно, вы бы не задавали мне таких вопросов.

Бессоюзное присоединение условных придаточных предложений

Условные предложения II типа с глаголами *to be* и *to have* и все условные предложения III типа могут присоединяться к главному бессоюзным способом. В этих случаях в условных придаточных предложениях применяется обратный порядок слов:

Had you told me about it before, I should have helped you.	Если бы вы казали мне об этом раньше, я бы вам помог.
Were I free now, I should go to the sea-side.	Если бы я был свободен сейчас, я бы поехал на море.

§ 11. Сослагательное наклонение (Subjunctive Mood)

1. Рассмотрим функции еще двух глаголов — **should** и **would.**

1) глаголы *should* и *would* сочетаются только с инфинитивом (без частицы *to*);

2) глаголы *should* и *would* в качестве вспомогательных выполняют две функции, а именно:

а) употребляются в дополнительных придаточных предложениях для выражения *Future-in-the-Past* по правилу согласования времен;

б) служат для образования сослагательного наклонения;

3) глаголы *should* и *would* могут выступать в качестве модальных глаголов.

2. Сослагательное наклонение выражает предполагаемое, условное или желаемое действие. В английском языке сослагательное наклонение может выражаться:

1) простыми формами: *be*, *were*, *know* и т. д.;

2) аналитическими формами: *should come*, *should have come*, *would know*, *would have known*, *could take*, *could have taken* и т. д.

Глагол в перфектной форме сослагательного наклонения (*should have taken* и т. п.) передает относящееся к прошедшему действие, осуществление которого уже невозможно:

They would have done it, if they had obtained the necessary equipment.	Они бы сделали это, если бы получили необходимое оборудование.

В английской научно-технической литературе сослагательное наклонение в основном употребляется:

1) в придаточных предложениях без подлежащих после безличных оборотов типа: *it is necessary*, *it is important*, *it is desirable*:

It is necessary that they *should apply* the new method.	Необходимо, чтобы они применили новый метод.

2) придаточных предложениях цели, вводимых союзами: *so that* (*так чтобы*), *lest* (чтобы не):

Write down these data lest you *should forget* them.	Запишите эти данные, чтобы не забыть их.

3) в условных предложениях:

If we have fused two metal pieces we *would obtained* weld.	Если бы мы расплавили два куска металла, мы бы получили сварное соединение.

§ 12. Словообразование

Образование новых слов в английском языке происходит путем:

а) соединения двух или более слов в одно составное; составные слова при этом могут писаться слитно или через дефис:

bookshelf — книжная полка *world-famous* — всемирно известный;

б) прибавления префиксов (приставок) и суффиксов к основе слова:

Основные суффиксы существительных

-er	to work — работать	worker — рабочий
-hood	child — ребенок	childhood — детство
-or	to insulate — изолировать	insulator — изолятор
- ian	academy — академия	academician — академик
-ment	to develop — развивать	development — развитие
-ion	to express — выражать	expression — выражение
-ist	art — искусство	artist — художник
-ure	literate — грамотный	literature — литература
-ance	to assist — помогать	assistance — помощь
-ity	equal — равный	equality — равенство
-ness	happy — счастливый	happiness — счастье
-ence	to differ — отличаться	difference — отличие
-ency	to depend — зависеть	dependency — зависимость
-age	to break — ломать	breakage — поломка
-dom	king — король	kingdom — королевство
-ship	friend — друг	friendship — дружба

Основные суффиксы глаголов

-ate	active — активный	to activate — активизировать
-fy	electric — электрический	to electrify — электрифицировать
-ize	character — характер	to characterize — характеризовать
-en	deep — глубокий	to deepen — углублять

Основные суффиксы наречий

-ly	useful — полезный	usefully — полезно
-ward	south — юг	southward — южное направление

Основные суффиксы прилагательных

-able	comfort — удобство	comfortable — удобный
-ible	to convert превращать	convertible — изменяемый
-ic	history — история	historic(al) — исторический
-ical	ideology — идеология	ideological — идеологический
-al	form — форма	formal — формальный
-ant	importance — важность	important — важный
-ent	to differ — различать(ся)	different — различный
-ful	peace — мир	peaceful — мирный
-less	home — дом (очаг)	homeless — бездомный
-ish	red — красный	reddish — красноватый
-ive	effect — влияние, эффект	effective — эффективный
-ous	danger — опасность	dangerous — опасный
-y	wind — ветер	windy — ветреный

Основные префиксы (приставки)

а) с отрицательным значением

un-	limited — ограниченный	unlimited — неограниченный
in-	accuracy — точность	inaccuracy — неточность
im-	possible — возможный	impossible — невзможный
il-	legal — легальный	illegal — нелегальный
ir-	responsible — ответственный	irresponsible — безответственный
non-	conductor — проводник	nonconductor — изолятор
dis-	to close — закрыть	to disclose — раскрыть

б) с разными значениями

re-	write — писать	rewrite — переписать
sub-	system — система	subsystem — подсистема
over	load — нагрузить	overload — перегрузить
semi-	conductor — проводник	semiconductor — полупроводник
inter-	action — действие	interaction — взаимодействие
pre-	heat — нагреть	preheat — предварительно нагреть
post-	war — война	post-war — послевоенный
de-	increase — увеличить	decrease — снизить
mis-	understand — понимать	misunderstand — понять неверно
under-	take — взять	undertake — предпринять
co-	operate — действовать	cooperate — содействовать
counter	clockwise — по часовой стрелке	counterclockwise — против часовой стрелки

в) конверсии — переход слова из одной части речи без изменения его формы в другую часть речи:

oval — овал	—	an oval face — овальное лицо
a square — квадрат	—	a square window — квадратное окно
function — функция	—	to function — функционировать
Iron is not used in industry in pure form.	—	Железо в чистом виде в промышленности не используется.
We usually *iron* our clothes with hot iron.	—	Мы обычно гладим свою одежду горячим утюгом.
The *iron* device was very hard.	—	Железный прибор был очень тяжелый.

г) чередования гласных и согласных:

to live — жизнь	—	life — жить
to sing — песня	—	song — петь
to advise — совет	—	advice — советовать

д) чередования ударения (форма слова для различных частей речи остается единой, но при этом у глаголов ударение падает на второй слог, а у существительных и прилагательных — на первый):

to con'duct — проведение	—	'conduct — проводить
to sub'ject — предмет	—	'subject — подвергать

§ 13. Общие указания по переводу английского текста

Приступая к переводу английского текста, следует исходить из того, что отношения между словами в английском предложении определяются не изменениями окончаний слов, а местом слов в предложении и служебными словами — предлогами и союзами. Поэтому в английском предложении обычно соблюдается твердый порядок слов: первое место занимает *подлежащее*, второе — *сказуемое*, третье — *дополнения*, четвертое — *обстоятельства*. Обстоятельство времени может также занимать место перед подлежащим. *Определение* обычно занимает место перед определяемым им существительным. Поэтому при переводе английского предложения необходимо исходить из этого твердого порядка слов и соответственно находить нужное значение и функцию слова в предложении. Это тем более важно, что в английском языке слово без изменения своей формы может иметь разные значения и относиться к разным частям речи:

like — подобный (*прилагательное*);
like — подобно (*наречие*);
like — нечто подобное (*существительное*);
like — нравиться (*глагол*).

Более того, каждое слово в составе одной и той же части речи, к которой оно относится, может иметь несколько значений. Так, на-

пример: слово *toe* как имя существительное, может иметь значение: *палец* (*ноги*), *нижний конец*, *вершина*, *пятка*, *подошва откоса*, *нижняя кромка*, *кромка наружной поверхности шва и т. д.*

Таким образом, при выборе значения слова (или группы слов), нужно исходить из его места в предложении, его функции и связи с другими словами в предложении. Определив функцию слова в предложении по его синтаксическим или морфологическим признакам, надо определить, к какой части речи оно относится, а затем отыскивать его значение в словаре.

Например: в предложении *My brother has a car like yours* может вызвать затруднение перевод слова *like*.

В данном случае *like*, занимая место перед местоимением *yours*, относится к этому местоимению и, следовательно, является его определением. Исходя из этого, отыскиваем в словаре значение слова *like* под рубрикой «прилагательное»: *похожий*, *подобный*, *одинаковый*, *одноименный*. Общее значение предложения подсказывает нам, что наиболее соответствующим значением в этом предложении будет *похожий*: *Машина моего брата похожа на твою.*

В предложении *The engine functions to some extent like a heart in a human body* слово *like* относится к другой части речи и имеет другое значение.

Здесь слово *like* относится к глаголу и несет функцию обстоятельства образа действия. Исходя из этого, отыскиваем в словаре его значение под рубрикой «наречие»: *так*, *подобно*: *Двигатель функционирует*, *до некоторой степени*, *подобно сердцу в человеческом теле.*

При переводе любого текста необходимо помнить, что, прежде чем приступить непосредственно к переводу, надо прочитать весь текст, или, в крайнем случае, один-два абзаца, для того, чтобы иметь общее представление, о чем идет речь. Это общее представление о содержании данного текста помогает выбрать в словаре правильное значение слова после того, как мы определили, к какой части речи относится.

При переводе английского текста ни в коем случае нельзя сначала выписывать из текста все незнакомые слова и отыскивать их значение в словаре, а затем приступать к переводу, как это нередко делают студенты. Такой метод работы приводит к выбору случайных значений слов вне зависимости от контекста и имеет результатом искажение смысла переводимого текста.

Нельзя также переводить текст без грамматического анализа предложений, руководствуясь только значением слов и общим знакомством с предметом, по которому написана статья. Такой способ работы приводит к тому, что студент придает предложению тот смысл, который ему подсказывают имеющиеся у него знания по данному предмету и подобранные соответственно этим знаниям значения слов, а не то содержание, которое передается автором.

Таким образом, при переводе иностранного текста следует сочетать грамматический анализ с выбором значений слов соответственно их функции в предложении, исходя из общего содержания текста.

При переводе следует также всегда помнить о необходимости изложения переводимого текста правильным литературным русским языком, т.е. соблюдая все нормы русского языка.

§ 14. Реферирование иностранного текста

Реферат служит для изложения основного содержания документа, статьи. Он не только раскрывает важные стороны содержания текста, но и показывает читателю, имеет ли для него смысл полностью или частично ознакомиться с данным источником информации в оригинале. Средний объем реферата не превышает 2000 печатных знаков.

Реферат состоит из следующих элементов:

1) заглавие реферата, имя автора;
2) выходные данные;
3) краткое содержание реферата.

Слова и словосочетания:

1) The title of the paper is ...
2) The paper is written by ...
3) As the title implies the article describes ...
   The subject matter of the text is ...
   The paper gives a valuable information on ...
   This paper discusses some problems relating to ...
   The paper considers the problems of ...
4) The paper begins with a short (discussion on ..., describing of ...)
   At the beginning the author (points out that ..., speaks in detail ...)
5) The author goes on saying that ...
   Than follows a discussion on ...
   Then the author goes on to the problem of ...
   The next part of the text (presents, discusses, describes) ...
6) The author concludes with the statement that ...
   Finally the author gives much attention to ...
   The final part is reported the information on ...
7) To my mind ...
   The article is of interest to ...
   The article is of great help to ...
   The paper gives a valuable information on ...

§ 15. Аннотирование иностранного текста

Аннотация — предельно сжатая характеристика статьи или книги, которая передает содержание оригинала в виде перечня основных вопросов и иногда дает критическую оценку. Аннотация только сооб-

щает о наличии материала на определенную тему и дает самое общее (предварительное) представление о содержании статьи или книги. Аннотация предназначена только для информации о существовании первичного источника определенного содержания и характера.

Существуют два типа аннотаций: справочные и рекомендательные.

Справочные аннотации наиболее распространены в информационной деятельности и особенно при аннотировании публикаций на иностранном языке. Они предназначены для быстрого просмотра, поэтому объем их не должен превышать 500 печатных знаков. Нередко справочные аннотации состоят всего из нескольких предложений.

Основным назначением **рекомендательных аннотаций** является оценка публикации, привлечение к ней внимания читателя, поэтому сжатость или краткость не имеет никакого значения.

Аннотация включает:

1) название работы (статьи, книги) на иностранном языке;
   фамилия и инициалы автора (если есть);
   перевод названия;
2) выходные данные журнала: название на иностранном языке;
   номер и год издания;
   место издания, том и количество страниц;
   количество рисунков, таблиц;
3) краткое изложение основных вопросов и проблем, затронутых в статье.

Слова и словосочетания:

This paper (article, book) has been written as ...
This book gives full information concerning the ...
The main problems discussed are ...
Special attention is paid to ...
The article is illustrated by ... examples.
The paper covers ... pp.

ТАБЛИЦА НЕСТАНДАРТНЫХ (НЕПРАВИЛЬНЫХ) ГЛАГОЛОВ

Infinitive	Past Simple	Past Participle	Translation
be	was/were	been	быть
become	became	become	становиться
begin	began	begun	начинать
break	broke	broken	ломать
bring	brought	brought	приносить
build	built	built	строить
buy	bought	bought	покупать
catch	caught	caught	ловить
choose	chose	chosen	выбирать
come	came	come	приходить
cost	cost	cost	стоить
cut	cut	cut	резать
do	did	done	делать
dream	dreamt	dreamt	мечтать
drink	drank	drunk	пить
drive	drove	driven	ехать
eat	ate	eaten	кушать
fall	fell	fallen	падать
feel	felt	felt	чувствовать
fight	fought	fought	сражаться
find	found	found	находить
fly	flew	flown	летать
forget	forgot	forgotten	забывать
forgive	forgave	forgiven	прощать
get	got	got	получать
give	gave	given	давать
go	went	gone	идти
grow	grew	grown	расти
hang	hung	hung	висеть
have	had	had	иметь
hear	heard	heard	слышать
hide	hid	hidden	прятаться
hold	held	held	держать

keep	kept	kept	хранить
know	knew	known	знать
lay	laid	laid	класть
lead	led	led	вести
learn	learnt	learnt	учить
leave	left	left	оставлять
lend	lent	lent	одолжить
let	let	let	позволять
lie	lay	lain	лежать
lose	lost	lost	терять
make	made	made	делать
meet	met	met	встречать
pay	paid	paid	платить
put	put	put	класть
read	read	read	читать
ring	rang	rung	звонить
rise	rose	risen	подниматься
run	ran	run	бежать
say	said	said	сказать
see	saw	seen	видеть
sell	sold	sold	продавать
send	sent	sent	посылать
set	set	set	садиться
shake	shook	shaken	трясти
shine	shone	shone	светить
show	showed	shown	показывать
shut	shut	shut	закрывать
sit	sat	sat	сидеть
sleep	slept	slept	спать
speak	spoke	spoken	говорить
spend	spent	spent	тратить
stand	stood	stood	стоять
take	took	taken	брать
teach	taught	taught	учить
tell	told	told	рассказывать
think	thought	thought	думать
throw	threw	thrown	бросать
wear	wore	warn	носить
win	won	won	выигрывать
write	wrote	written	писать

ABBREVIATIONS LIST

AAR — Automatic Air Recirculation — автоматическое отключение рециркуляции воздуха при обнаружении вредных примесей

ABC — Active Body Control — активный контроль в автомобилях, регулирующий жесткость амортизаторов и дорожный просвет

ABS — Anti-Lock Braking System — устройство, препятствующее блокировке колес при торможении

ACD — Active Center Differential — межосевой дифференциал с тремя режимами настройки: «асфальт», «гравий», «снег»

ADB-X — Automatic Differential Brake — электронное устройство, подтормаживающее буксирующие колеса; входит в DSC

ASC+T — Automatic Stability Control + Traction — система курсовой устойчивости, пресекающая проскальзывание ведущих колес

ASR — Anti Slip Regulation — устройство, препятствующее пробуксовке ведущих колес при разгоне; на многих автомобилях — составляющая ESP

ATV — All-terrain vehicle: автомобиль, предназначенный для перемещения по пересеченной местности (внедорожник)

AWC — All Wheel Control — комплексное устройство для полноприводных автомобилей, контролирующее крутящий момент, торможение, жесткость подвески и усилие на руле

AYC — Active Yaw Control — дифференциал «Мицубиси», перераспределяющий крутящий момент между правым и левым колесами и компенсирующий тем самым недостаточную или избыточную поворачиваемость

BA — Brake Assist — устройство, поднимающее давление в тормозной системе при экстренной остановке, помогая водителю, «додавливает» педаль; на автомобилях «Мерседес-Бенц» называется BAS

CBC — Cornering Brake Control — система перераспределения тормозного усилия при прохождении поворотов

CBS — Condition Based Service — устройство, диагностирующее неисправности автомобилей «БМВ» и записывает данные на встроенный в ключ микрочип

CI — Compression Ignition — воспламенение от сжатия

DAC — Downhill Assist Control — устройство, удерживающее заданную скорость на спуске с горы (при движении вперед — не более 5—7 км/ч, назад — 3—5 км/ч)

DBC — Dynamic Brake Control — аналог BA, ассистирует водителю при экстренном торможении

DIRAVI — сокращение от французского 'Direction à rappel asservi', что буквально означает 'steering with controlled return', управление с контролируемым обратным ходом

DRC — Dynamic Ride Control — механическое устройство «Ауди», изменяющее характеристику амортизаторов в зависимости от дорожных условий

DSC — Dynamic Stability Control — более известна как ESP, при возникновении опасной ситуации «душит» двигатель и подтормаживает одно или пару колес, чтобы вернуть автомобиль на нужную траекторию

DSG — Direct Shift Gearbox — роботизированная коробка передач «Ауди» с двумя сцеплениями, позволяющая переключать передачи без разрыва потока мощности

DSP — Dynamic Shift Program — устройство, благодаря которому автоматическая коробка передач адаптируется к стилю водителя и внешним условиям

DSTC — Dynamic Stability and Traction Control — система динамической стабилизации и контроля тяги

DTC — Dynamic Traction Control — устройство, контролирующее крутящий момент на ведущих колесах, исключая пробуксовку на старте и при переключении передач

EBD — Electronic Brake-force Distribution — устройство, распределяющее тормозное усилие между передней и задней осями в зависимости от положения кузова

ECU — Engine Control Unit — устройство, контролирующее работу двигателя

EDC — Electronic Damper Control — устройство управления демпфированием: по команде компьютера электромагнитные клапаны регулируют жесткость амортизаторов в зависимости от ситуации и дорожного покрытия

EDL — Electronic Differential Lock — устройство, имитирующее блокировку дифференциала, притормаживая одно из ведущих колес

EPB — Electronic Parking Brake — автоматический ручной тормоз, отключающийся, когда водитель нажимает на педаль газа

ESP — Electronic Stability Program — система стабилизации в опасных ситуациях: берет на себя управление тягой и тормозами, чтобы побороть занос или снос

FPS — Fire Prevention System — противопожарная система, перекрывающая при аварии подачу топлива

4WS — four-wheel steering technology

HAC — Hill-start Assist Control — технология управления рулевым колесом, аналог MSR: при старте в гору подтормаживает ведущие колеса, исключая пробуксовку

HCCI — homogeneous charge compression ignition — однородный заряд воспламенения от сжатия

HDC — Hill Descent Control — аналог DAC, только для полноприводных автомобилей «БМВ» и «Ленд-Ровера»: автоматически поддерживает заданную скорость на крутых спусках

HFI — hydrogen fuel injection — впрыск водородного топлива

HH — Hill Holder — помогает при трогании в подъем, удерживая машину тормозами в течение 1,5 с, после того как водитель отпустил педаль

ICE — internal combustion engine — двигатель внутреннего сгорания

LCD — liquid crystal display — жидко-кристаллический дисплей

LPG — liquefied petroleum gas — сжиженное газовое топливо

ME — mechanical efficiency — механический КПД

MSR — Modulate System Regulation — устройство, регулирующее крутящий момент на крутых подъемах, не давая колесам срываться в пробуксовку

PDC — Park Distance Control — устройство, более известное как парктроник: при парковке ультразвуковые датчики измеряют расстояние до ближайшего препятствия, оповещая водителя световым и звуковым сигналами

PFI — port fuel injection — загрузочное отверстие для топлива

psi — pounds per square inch — фунтов на квадратный дюйм

RFID — radio-frequency identificator — радио-частотный определитель

RPM — revolution per minutes — оборотов в минуту

SI — spark ignition — свеча зажигания

SRS airbag — system reliability service — система безапосности

TE — thermal efficiency — термический КПД

TC — Traction Control — аналог ASR, при начале движения не допускает пробуксовки колес

TDI — Tire Damage Indicator — устройство, отслеживающее давление воздуха в шинах, предупреждая о возможной утечке

VDC — Vehicle Dynamic Control — устройство, изменяющее крутящий момент для стабилизации траектории

VE — volumetric efficiency — объемный КПД

VSC — Vehicle Stability Control — восстанавливающее устройство, при заносе сцепление шин с дорогой, подтормаживая излишне быстрые колеса

WIL — Whiplash Injury Lessening — система защиты водителя и пассажиров при ударе сзади

GLOSSARY

Air handler, or **air handling unit** (AHU): central unit consisting of a blower, heating and cooling elements, filter racks or chamber, dampers, humidifier, and other central equipment in direct contact with the airflow. This does not include the ductwork through the building.

Chiller: a device that removes heat from a liquid via a vapor-compression or absorption refrigeration cycle. This cooled liquid flows through pipes in a building and passes through coils in air handlers, fan-coil units, or other systems, cooling and usually dehumidifying the air in the building. Chillers are of two types; air-cooled or water-cooled. Air-cooled chillers are usually outside and consist of condenser coils cooled by fan-driven air. Water-cooled chillers are usually inside a building, and heat from these chillers is carried by recirculating water to outdoor cooling towers.

Controller: a device that controls the operation of part or all of a system. It may simply turn a device on and off, or it may more subtly modulate burners, compressors, pumps, valves, fans, dampers, and the like. Most controllers are automatic but have user input such as temperature set points, e.g. a thermostat. Controls may be analog, or digital, or pneumatic, or a combination of these.

Condenser: a component in the basic refrigeration cycle that ejects or removes heat from the system. The condenser is the hot side of an air conditioner or heat pump. Condensers are heat exchangers, and can transfer heat to air or to an intermediate fluid (such as water or an aqueous solution of ethylene glycol) to carry heat to a distant sink, such as ground (earth sink), a body of water, or air (as with cooling towers).

Constant air volume (CAV): actually means 'constant air flow rate' or 'constant air volume per time', not 'constant air volume'. This is applied to all-air or air-water HVAC systems that have variable supply-air temperature but constant flow rate of air. Most residential forced-air systems are small CAV systems with on/off control.

Evaporator: a component in the basic refrigeration cycle that absorbs or adds heat to the system. Evaporators can be used to absorb heat from air (by reducing temperature and by removing water) or from a liquid. The evaporator is the cold side of an air conditioner or heat pump.

Fan-coil unit (FCU): a small terminal unit that is often composed of only a blower and a heating and/or cooling coil (heat exchanger), as is often used in hotels, condominiums, or apartments.

Furnace: a component of an HVAC system that adds heat to air or an intermediate fluid by burning fuel (natural gas, oil, propane, butane, or other flammable substances) in a heat exchanger.

Fresh air intake (FAI): a vent from outside a building. Outside air can be used to replace air in the building that has been exhausted by the system, or to provide fresh air for combustion of fuel.

HVAC: heating, ventilating and air-conditioning systems.

Heat load, heat loss, or **heat gain**: terms for the amount of heating (heat loss) or cooling (heat gain) needed to maintain desired temperatures and humidities in controlled air. Regardless of how well-insulated and sealed a building is, buildings gain heat from warm air or sunlight or lose heat to cold air and by radiation. Engineers use a heat load calculation to determine the HVAC needs of the space being cooled or heated.

Makeup air unit (MAU): an air handler that conditions 100 % outside air. MAUs are typically used in industrial or commercial settings, or in once-through (blower sections that only blow air one-way into the building), low flow (air handling systems that blow air at a low flow rate), or primary-secondary (air handling sytems that have an air handler or rooftop unit connected to an add-on makeup unit or hood) commercial HVAC systems.

Roof-top unit (RTU): an air-handling unit, defined as either 'recirculating' or 'once-through' design, made specifically for outdoor installation. They most often include, internally, their own heating and cooling devices. RTUs are very common in some regions, particularly in single-story commercial buildings.

Thermal zone: a single or group of neighboring indoor spaces that the HVAC designer expects will have similar thermal loads. Building codes may require zoning to save energy in commercial buildings. Zones are defined in the building to reduce the number of HVAC subsystems, and thus initial cost. For example, for perimeter offices, rather than one zone for each office, all offices facing west can be combined into one zone. Small residences typically have only one conditioned thermal zone, plus unconditioned spaces such as unconditioned garages, attics, and crawlspaces, and unconditioned basements.

Variable air volume (VAV) system: an all-air or air-water HVAC system that has a stable supply-air temperature, but the flow rate of air varies to meet the thermal load. Compared to CAV systems, these systems waste less energy through unnecessarily-high fan speeds. Most new commercial buildings have VAV systems.

KEYS

Part I

Unit 1, ex. 14

1) vehicle 2) include 3) is derived 4) terms 5) driver 6) transportation

Unit 2, ex. 19

1) automobiles 2) recovery 3) production 4) world 5) barriers 6) supply 7) top 8) exports 9) penetration 10) market 11) imports

Unit 3, ex. 16

1) rival 2) production 3) quite 4) higher 5) figure 6) rivalry 7) comparable 8) competition 9) expensive 10) marketplace 11) compete 12) firms

Part II

Unit 4, ex. 14

1) electricity 2) meant 3) power 4) combustion 5) generate 6) outside

Unit 5, ex. 15

1) useless 2) air-fuel 3) octane 4) correct 5) distributor 6) calibrated 7) sacrifice 8) system 9) coolant 10) closed

Unit 6, ex. 14

1) mechanical 2) conventional 3) reduction 4) utilization 5) road 6) survival 7) characteristics

Part III

Unit 7, ex. 12

1) for 2) at least 3) instead of 4) under 5) behind 6) without 7) with 8) up

Unit 8, ex. 11

1) by 2) to 3)because of 4) from 5) without 6) since 7) in 8) although 9) if

Unit 8, ex. 17

1) g 2) e 3) f 4) b 5) h 6) a 7) c 8) d 9) I

Unit 8, ex. 23

1) h 2) g 3) c 4) d 5) j 6) f 7) b 8) e 9) i 10) a

Part IV

Unit 9, ex. 26

1) transportation 2) traveler 3) shock resistant frame 4) automobile 5) greenhouse 6) van 7) collision 8) entertainment 9) courting

Unit 10, ex. 37

1) locomotion 2) 19th century 3) moment of glory 4) vintage cars 5) hybridized technologies 6) gasoline engine 7) carbon monoxide 8) hybrid motors

Unit 11, ex. 38

1) 1 2) 4 3) 3 4) 2

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