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ІНОЗЕМНА МОВА (АНГЛІЙСЬКА) ЗА ПРОФЕСІЙНИМ СПРЯМУВАННЯМ

Методичні вказівки до виконання практичних робіт для
здобувачів освіти освітньо-професійного ступеня
фаховий молодший бакалавр
галузь знань 27 «Транспорт»
спеціальності 274 «Автомобільний транспорт»

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До друку

Голова методичної ради ВСП «Любешівський ТФК Луцького НТУ»
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Електронна копія друкованого видання передана для внесення в
репозитарій коледжу

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Методичні вказівки складені відповідно до діючої програми курсу. Ця
робота дає широкі можливості для творчої ініціативи здобувачів
освіти, а також виховує в них інтерес до мови, розвиває логічне
мислення, вміння концентрувати увагу.

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ВСТУП

Мета та завдання курсу: формувати у студентів систему знань з іноземної мови (англійської). Поновити і поглибити знання з іноземної мови, здобутих студентами у середніх навчальних закладах, дати лінгвістичну освіту, необхідну для вільного і правильного користування іноземною (англійською) мовою. Піднести рівень культури усного і писемного мовлення та збагатити знання студентів.

Практичний курс іноземної мови (англійської) покликаний формувати мовну особистість спеціаліста, здатну до розв'язання різноманітних комунікативних завдань у всіх актуальних сферах спілкування. Тому під час такого курсу студент повинен:

- володіти іноземною мовою (англійською);
- володіти лексичними, граматичними та стилістичними нормами іноземної мови (англійської);
- користуватись правилами мовного етикету, читанням літератури зі спеціальності з метою пошуку необхідної інформації.

Методичні рекомендації складаються з двох розділів (Units). Структура логічна, завдання лаконічні з моделями та прикладами. Кожен розділ містить тексти, об'єднані спільною тематикою, та граматичні вправи. Тематика і складність текстового та граматичного матеріалу визначається об'ємом технічних знань, якими володіють студенти на третьому та четвертому курсах. Тексти відібрані з урахуванням їх інформативності.

PART I
UNIT ONE
Automobile Production

New words

technician — технік

deal with manufacturing cars —
мати справу з виробництвом
автомобілів

**work out the technology of
manufacturing processes** —
розробляти технологію виробничих
процесів

put into mass production —
запустити масове виробництво

subject to tests — випробовувати

dependable brakes — надійні гальма

driving safety — безпека керування
автомобілем

long service life — довгий термін
використання

ease of maintenance — легкість
техобслуговування

**meet up-to-date demands
(requirements)** — відповідати
сучасним вимогам

be stable on the road — бути
стійким на дорозі

ignition system — система
запалювання

fuel consumption — витрати палива
car — легковий автомобіль

truck — вантажний автомобіль

1. Translate into Ukrainian

1. After graduating from the college I shall become a technician.
2. I shall deal with manufacturing cars.
3. The production of the automobile comprises five phases, such as: designing, working out the technology of manufacturing processes, laboratory tests, road tests, mass production.
4. The automobile of today must have high efficiency, long service life, driving safety, ease of maintenance and be stable on the road.
5. The automobile must meet up-to-date demands, that is, it must have rapid acceleration, smooth-acting clutch, silent gearbox, dependable braking and steering systems, dependable ignition system.
6. Before the car is put into mass-production it must be subjected to laboratory and road tests.
7. Technicians should know the technology of manufacturing processes.

2. Read the text

Automobile Production

I study at the college, at the automobile-construction department. When I graduate from the college I shall become a technician. All specialists in automobile industry dealing with manufacturing automobiles (cars or trucks) must know that the production of the automobile comprises the following phases:

-designing;

-working out the technology of manufacturing processes;

- laboratory tests;
- road tests;
- mass manufacturing (production).

Why is it necessary to know all these facts? It is important to know them, as before the automobile is put into mass production it should be properly designed and the car must meet up-to-date requirements. What are these requirements?

The automobile must have high efficiency, long service life, driving safety, ease of handling and maintenance, pleasant appearance. Also it must be comfortable and ecological. In order to obtain these qualities the specialists should develop up-to-date methods of designing cars using new types of resistant to corrosion light materials. Also it is important to know computer sciences because computers offer quick and optimal solutions of the problems. Besides they are used for optimal solutions of the problems. Besides they are used for better operation of mechanisms in cars.

Before the car is put into mass production the units of the car are subjected to tests in the Works laboratory and then the car undergoes a rigid quality control in road tests. Why are these tests required? What qualities are required of the automobile? They are needed because the modern automobile must be rapid in acceleration, have smooth acting clutch, silent gearbox, dependable braking and steering systems, dependable ignition system, low fuel consumption and be stable on the road.

3. Answer the questions:

1. What department do you study at?
2. What will you become after graduating from the college?
3. What should automobile specialists know?
4. What phases does the production of the automobile comprise?
5. What requirements must modern automobiles meet?
6. Why are automobile units and mechanisms subjected to laboratory and road tests?
7. What qualities are required of the automobile?
8. Why are computers used in cars?

4. Fill in the gaps with prepositions

1. After graduating ... the college I shall deal ... manufacturing cars.
2. The production ... the automobile comprises five phases.
3. Specialists ... automobile industry should develop up-to-date methods... designing cars.
4. In producing automobiles new types ... resistant... corrosion light materials should be used.
5. All cars undergo a rigid quality control... tests.
6. The car is put... mass production after laboratory and road tests.
7. Technicians must know the technology... manufacturing processes... cars.

5. Complete the sentences

1. An automobile specialist deals with
 - a. working out technological processes;
 - b. constructing and manufacturing cars;
 - c. producing new resistant to corrosion light materials.

2. The production of the automobile comprises
 - a. designing and mass production;
 - b. manufacturing and tests;
 - c. designing and working out technological processes, laboratory and road tests and mass production.

3. The cars are subjected to tests in order....
 - a. to work out new technological processes;
 - b. to meet up-to-date requirements;
 - c. to shorten the time between designing and manufacturing.

4. The qualities required of the automobile are
 - a. high efficiency, long service life, driving safety and pleasant appearance;
 - b. smooth acting clutch, silent gearbox, dependable braking and steering systems;
 - c. new types of resistant to corrosion materials.

5. The car must have the following units:....
 - a. high efficiency, long service life, driving safety and pleasant appearance;
 - b. smooth-acting clutch, silent gearbox, dependable braking and steering systems;
 - c. new types of resistant to corrosion materials.

6. Read dialogues

DIALOGUE A

Nick: Hullo, Boris!

Boris: Hullo, Nick. How are things?

N.: Perfectly well, thank you. I entered the automobile construction college.

B.: That's nice, what will you become after graduating from the college?

N.: I'll become a technician and deal with manufacturing new cars.

B.: Why did you choose this profession?

N.: I enjoy learning about a car. I enjoy working with metal. And most of all I enjoy being able to construct cars.

B.: Do you enjoy the course?

N.: Yes, of course.

B.: Tell me about your profession in detail, please?

N.: With great pleasure. As you know an automobile must be safe, have smooth acting clutch, silent gears, excellent brakes and steering system. And in order to achieve these qualities a lot of work must be done.

B.: Thank you very much for your information. I believe you like your profession very much.

N.: Oh, yes, very much, indeed

DIALOGUE B

Anton: Where do you study?

Boris: I study at the automobile construction college.

A: Whom does the college train?

B: It trains specialists for the automobile industry.

A: Why did you decide to become a technician?

B: I enjoy working with machines. I enjoy learning about a car. I understand every part of it.

A: What can you tell me about the car?

B: Well, the car of today must be rapid in acceleration, it must have dependable clutch, brakes, and steering system, be stable on the road and have pleasant appearance.

A: Do you enjoy the course?

B: Yes, very much. I have learned a lot of things. For example, I know that the production of the car comprises five phases.

A: What are they?

B: They are designing, working out the technology, laboratory tests, road tests, mass production.

A: And why are laboratory and road tests needed?

B: The cars are subjected to tests in order to meet up-to-date demands.

A: And what are these demands?

B: They are high efficiency, long service life, driving safety, ease of maintenance and so on.

A: I think you will become an expert in automobile engineering.

B: I'll try. The cooperative plan of an academic program with practice at a plant will help me to become a good specialist

7. Complete the sentence using words below

1. I study at
2. After graduating from the college I shall become
3. I shall deal with.....
4. All specialists must know that the production of the automobile comprises
5. It is necessary to know these facts because the automobile of today must meet ...
6. The modern automobile must have
7. In road tests the automobile undergoes

A technician, a specialist in automobile industry, the production of the automobile, designing, working out the technology of manufacturing processes, laboratory tests, road tests, mass production, high efficiency, long service life, driving safety, ease of maintenance, rigid quality control, rapid acceleration, smooth-acting clutch, silent gearbox, dependable brakes, dependable steering system, the technical college, up-to-date demands (requirements).

8. Answer the questions

1. What college do you study at?
2. What will you become after graduating from the college?
3. What will you deal with?
4. What phases does the production of the automobile comprise?
5. Why are the cars subjected to laboratory and road tests?
6. What qualities must the car have?
7. What units must the car have?

9. Make up questions to the sentences

1. I study at the automobile construction college.
2. After graduating from the college I'll become a specialist in automobile construction.
3. I'll deal with manufacturing automobiles.
4. The production of the automobiles comprises the following phases: designing, working out technological processes, laboratory and road tests and mass manufacturing.
5. The automobile must meet up-to-date requirements.
6. The car must have high efficiency, long service life, pleasant appearance and driving safety.
7. The car must have smooth-acting clutch, silent gearbox, dependable braking and steering systems, dependable ignition system.

Unit Two

Components of the Automobile

New words

engine (power plant) — двигун
chassis — шасі
power train — силова передача
running gear — ходова частина
steering system — кермо
brakes — гальма
clutch — зчеплення
gearbox — коробка передач
propeller shaft — карданий вал
final drive — головна передача
differential — диференціал
rear axle — задній міст
frame with axles — рама з осями

wheels and springs — колеса с рессорами
hood — капот
fenders — крила
windshield wiper — склоочисник
include — включати в себе
consist of — складатися
as well — також
in turn — в свою чергу
source of power — джерело енергії
fuel — паливо
cooling — охолодження
lubricating — мастило

1. Read the text

Components of the Automobile

The automobile is made up of three basic parts: the power plant, or the engine, the chassis and the body. The engine is the source of power that makes the

wheels rotate and the car move. It includes fuel, cooling, lubricating and electric systems. Most automobile engines have six or eight cylinders. The chassis includes a power train (power transmission), a running gear, steering and braking systems as well. The power train carries the power from the engine to the car wheels. The power transmission, in turn, contains the clutch, gearbox, propeller or cardan shaft, final drive, differential, rear axle and axle shafts. The running gear consists of a frame with axles, wheels and springs. The body has a hood, fenders and accessories: the heater, stereo tape recorder, windshield wipers, conditioner, speedometer and so on.

2. Answer the questions

1. What main parts is the automobile made up of?
2. What is the function of the engine?
3. What systems does the engine include?
4. What does the chassis consist of?
5. What units does the power transmission comprise?
6. What assemblies does the running gear consist of?
7. What has the body?

3. Make up sentences

- | | |
|---|---|
| 1. The automobile is made up of... | 1. fuel, cooling, electric and lubricating systems. |
| 2. The engine is ... | 2. the source of power. |
| 3. The engine includes ... | 3. a frame with axles, wheels and springs. |
| 4. The chassis consists of... | 4. the engine, the chassis and the body. |
| 5. The power transmission comprises ... | 5. a hood, fenders and accessories. |
| 6. The running gear consists of... | 6. the clutch, gearbox, propeller shaft, final drive, differential and axle shafts. |
| 7. The body has ... | 7. a power transmission, running gear, steering and braking system. |

4. Read the dialogue

DIALOGUE

A: Do you know what parts the automobile is made up of?

B.: Certainly. It is made up of the engine, the chassis and the body,

A: What is the source of power?

B:The source of power is the engine. It includes fuel, cooling, lubricating and electric systems.

A:And what does the chassis consist of?

B:It consists of a power transmission, running gear, steering and braking systems. By the way, the power transmission, in turn, comprises the clutch, gearbox, propeller shaft, final drive, differential, rear axle and axle shafts.

A:And what has the body?

B:The body has a hood, fenders and accessories, such as: the heater, stereo tape recorder, windshield wipers, conditioner and so on.

A:Thank you very much for your information.

B:Don't mention it. I am glad to help you.

5. Complete the dialogue using the words below

A: What parts does the automobile ... ?

B: It is made up of...

A: What is...?

B: The source of power is the ...

A: What systems does the engine ...?

B. : It includes ...

A: What does the chassis ... ?

B. : The chassis

A: What does the power train include?

B:The power train includes ...

A: What units does the body comprise?

B: It comprises ... and accessories such as ...

A: Thank you for your

Engine, chassis, body, power train, running gear, steering system, brakes, clutch, gearbox, propeller shaft, final drive, differential, rear axle, axle shafts, hood and fenders, heater, windshield wipers, information, conditioner, consist(s) of, the source of power, include, fuel, cooling, lubricating, electric systems.

6. Answer the questions

- 1.What main parts is the automobile made up of?
- 2.What is the function of the engine?
- 3.What systems does the engine include?
- 4.What does the chassis consist of?
- 5.What units does the power transmission comprise?
- 6.What assemblies does the running gear consist of?
- 7.What has the body?

7.Choose the correct answer

1. Mechanism which is used to stop the car.
a)clutch; b) brakes; c) gearbox; d) steering system.
2. Mechanism which is used to guide the car.
a) clutch; b) brakes; c) gearbox; d) steering system.
3. Mechanism which engages or disengages the engine and the car wheels.

- a) clutch; b) brakes; c) gearbox; d) steering system.
 4. Mechanism which is used to change the speed of the car.
 a) clutch; b) brakes; c) gearbox; d) accelerator.
 5. Mechanism which is used to guide the car in one or the other directions.
 a) clutch; b) brakes; c) gearbox; d) steering system.
 6. Device which is designed to measure the speed of the car.
 a) heater; b) windscreen; c) speedometer; d) tachometer

Unit Three Engine

New words

bottom dead center — нижня мертва точка	ignition — запалення
charge of fuel — заряд палива	internal combustion engine — двигун внутрішнього згорання
combustion — згорання	mixture — суміш
combustion chamber — камера згорання	operating cycle — робочий цикл
compression stroke — такт стискання	petrol engine — бензиновий двигун
crankshaft — колінчастий вал	piston — поршень
cylinder — циліндр	pressure — тиск
diesel engine — дизельний двигун	rotary movement — обертальний рух
engine — двигун	spark plug — свічка запалювання
exhaust stroke — такт випуску	stroke — хід (поршня);
four-stroke cycle — чотирьохтактний цикл	top dead center — верхня мертва точка
ignite — запалювати	valve — клапан

1. Translate into Ukrainian

1. During the inlet (intake) stroke the inlet valve opens and a charge of fuel (mixture) flows into the cylinder.
2. During the compression stroke the inlet valve is closed and the fuel is compressed by the rising piston.
3. During the power stroke both valves are closed, pressure rises in the combustion chamber, and the spark ignites the mixture.
4. During the exhaust stroke the exhaust valve is opened, pressure is released and the residual gases flow into the atmosphere through the exhaust valve.

2. Read the text

Principle of Operation of the Four-Stroke Petrol Engine

The internal combustion engine is called so because fuel is burned directly inside the engine itself. Most automobile engines work on a 4-stroke cycle. A cycle is one complete sequence of 4 strokes of the piston in the cylinder. The operating cycle of the four-stroke petrol engine includes: inlet stroke (intake valve opens),

compression stroke (both valves closed), power stroke (both valves closed), exhaust stroke (exhaust valve is opened).

To describe the complete cycle, let's assume that the piston is at the top of the stroke (top dead center) and the inlet and the exhaust valves are closed. When the piston moves down the inlet valve opens to intake a charge of fuel into the cylinder. This is called the inlet (intake) stroke. On reaching the lowest position (bottom dead center) the piston begins to move upward into the closed upper part on the cylinder, (the inlet valve is closed and the mixture is compressed by the rising piston. This is called the compression stroke. As the piston again reaches the top dead center the spark plugs ignite the mixture, both valves being closed during its combustion. As a result of burning mixtures the both valves being closed during its combustion. As a result of burning mixtures the gases expand and great pressure makes the piston move back down the cylinder. This stroke is called the power stroke. When the piston reaches the bottom of its stroke, the exhaust valve is opened, pressure is released, and the piston again rises. It lets the burnt gas flow through the exhaust valve into the atmosphere. This is called the exhaust stroke which completes the cycle. So the piston moves in the cylinder down (intake stroke), up (compression stroke), down (power stroke), up (exhaust stroke).

The heat released by the fuel is transformed into work so that the reciprocating movement of the pistons is converted into rotary movement of a crankshaft by means of connecting rods.

3. Find the answers to the questions

1. Why is the engine called the internal combustion engine?
2. What stroke is called the inlet one?
3. What is a compression stroke?
4. What takes place in the cylinder on power stroke?
5. What takes place on the exhaust stroke?
6. By means of what is the reciprocating movement of the pistons converted into rotary movement of a crankshaft?
7. It is called so because the fuel (the mixture) is burned...
 - a) directly inside the engine;
 - b) outside the engine.
8. The inlet stroke is called so because during moving down the piston...
 - a) the inlet valve opens to intake a charge of fuel into the cylinder;
 - b) the inlet valve is closed and the mixture is compressed.
9. The compression stroke is a stroke.
 - a) when the inlet valve opens to intake a charge of fuel into the cylinder;
 - b) when the inlet valve is closed and the mixture is compressed.
10. On power stroke..
 - a) the spark plugs ignite the mixture, both valves are closed during its combustion;
 - b) the exhaust valve is opened and the residual gas flows through the exhaust valve into the atmosphere.
11. On the exhaust stroke....
 - a) the spark plugs ignite the mixture, both valves are closed during its

combustion;

b) the exhaust valve is opened and the residual gas flows through the exhaust valve into the atmosphere.

12. It is done....

a) by means of pistons;

b) by means of the connecting rods.

4. Complete the sentences

1. The internal combustion engine is called so because fuel is burned...

a) outside the engine; b) inside the engine.

2. On the inlet stroke.....

a) the intake valve opens; b) the intake valve is closed;

c) the intake and the exhaust valves are closed.

3. On the compression stroke

a) the intake valve opens; b) the intake valve is closed;

c) the intake and the exhaust valves are closed.

4. On the power stroke

a) the intake valve opens; b) the intake valve is closed;

c) the intake and the exhaust valves are closed.

5. On the exhaust stroke

a) the exhaust valve opens; b) the intake valve is closed;

c) the intake and the exhaust valves are closed.

5. Read the dialogue

DIALOGUE A

Tracing a Fault

Nick: Peter, I know you are a good driver. I would like you to have a look at my car.

Peter: What's wrong with your car?

N.: I don't know.

P.: Let me have a look. When did you have your plugs checked?

N.: Three days ago. I thought I had run out of fuel but the tank is half full.

P.: The 14ереднее14r is in order but the engine is misfiring. I guess the battery has run down. It needs recharging.

N.: Too bad.

P.: Don't get upset about it. It won't take you long to have your battery recharged.

N.: Do you really think so?

P.: I am sure of it. I advise you to have the engine greased.

N.: I'll follow your advice. Thank you, Peter.

P.: Don't mention it, Nick. I'm very sorry I couldn't help you.

N.: Well, you helped me to find the fault. Thanks a lot. Good-bye.

P.: See you later.

DIALOGUE B

At the Repairing Shop

Client: Good afternoon! Can you help me? There is something wrong with the engine.

Master: Hi! What is wrong with it?

C.: I don't know. It wouldn't start. Maybe the pistons and valves are in disorder.

M.: Let's have a look! Well, they are quite right.

C.: And what about the crankshaft, or electric spark plugs. I know absolutely nothing about the operating cycle of the engine.

Just a moment. Don't worry! We shall check up all units and how they work together.

Some time later

M.: My God! There is no petrol in the tank. How can you move drive?

C.: Really? Oh, I have forgotten to fill in the tank! I beg your pardon to trouble you!

M.: No trouble, at all. You are welcome!

Unit Four **Chassis**

New words

unit – блок, агрегат

gear — шестерня

power transmission – силова

gearbox – коробка передач

running gear — ходова частина

driving wheels — ведучі колеса

shaft — вал

car springs — рессори автомобіля

rear axle — задній міст

1. Translate into Ukrainian

1. The chassis includes the running gear, the power transmission and the steering mechanism.
2. The power transmission consists of the clutch, gearbox, cardan shaft, rear axle, final drive, differential and axle shafts.
3. The clutch connects the engine with the driving wheels.
4. The gearbox changes the speed of the car movement.
5. The steering mechanism changes the direction of the car.

2. Read the text

Chassis

The main units of the chassis are: the power transmission, the running gear and the steering mechanism. The power transmission includes the whole mechanism between the engine and the rear wheels. This entire mechanism consists of the clutch, gearbox, propeller (cardan) shaft, rear axle, final drive, differential and axle shafts.

At the front end of the car is the engine. On the back of it is the flywheel. Behind the flywheel is the clutch. The clutch is a friction device connecting the engine with the gears of the gearbox. The main function of the gearbox is to change the speed of the car.

The power is always transmitted by the cardan shaft to the live back axle. The

final drive reduces the high speed of the engine to the low speed of the driving wheels. The differential enables the driving wheels to turn at different speeds which is necessary when turning the car. The foundation of the automobile is the frame to which different chassis units are attached.

The rear axle is capable of moving up and down about the frame. The rear axle is an important part of the transmission. It carries the greater portion of the weight of the car.

The steering mechanism is designed for changing the direction of the car.

The brakes are used for stopping the car, for decreasing its speed and for holding the car position.

3. Answer the questions

1. What main units does the chassis consist of?
2. Where is the engine located?
3. Where is the flywheel fixed?
4. Where is the clutch placed?
5. What is the gearbox designed for?
6. By what shaft is the power transmitted to the back axle?
7. What does the rear axle do?
8. What is the function of the differential?
9. What purpose is the steering system designed for?
10. What is the function of the brakes?

4. Translate into Ukrainian

1. Transmission, running gear and steering mechanism **are known** to be the main units of the chassis.
2. The clutch **is known** to connect the engine with the driving wheels of the car.
3. The gearbox is **known** to change the speed of the car.
4. The steering mechanism is **known** to change the direction of the car.
5. Brakes **are considered** to be one of the most important mechanisms of the car.

5. Match the words with their definitions

1.differential 2.steering wheel 3.clutch 4.rear axle 5.steering system 6.speedometer
7.brakes 8.gearbox 9.cardan shaft

- a).mechanism used to increase the speed of the car
- b).wheel used to turn the direction of the car
- c).mechanism used to transmit power to the back axle
- d).instrument used to measure the speed of the car
- e).mechanism that slows or stops the car
- f).mechanism used to guide the car
- g).mechanism used to engage or disengage the engine with gearbox

- h).mechanism used to carry the greater portion of the car weight
- e).mechanism used to turn the wheels at different speeds

6. Read the dialogue

Transmission Mechanism

Teacher: Let's speak about the transmission mechanism. What main units does the transmission include?

Student: The transmission is the entire mechanism between the engine and the rear wheels. It includes the clutch, gearbox, cardan shaft, rear axle, final drive and differential.

T.:What does the clutch connect?

S.:The clutch connects the engine with the gearbox.

T.:And what does the gearbox do?

S.:The gearbox changes the speed of the car.

T.:What does the differential enable?

S.:The differential enables the driving wheels to move at different speeds when turning the car.

T.: For what purpose is the steering system used?

S.: The steering system is used for changing the direction of the car movement.

T.: And what is the function of the brakes?

S.: Brakes are used to slow or stop the car.

T.: That's right. You know the subject very well.

7. Work out the text

Basic Troubles of Transmission Mechanism

The transmission of the engine torque to the driving wheels of the automobile must be smooth. There should be no vibration in the operation of transmission mechanism within the range of travelling speeds.

The indications of malfunctions in the transmission mechanism components are as follows:

1.incomplete disengagement of the clutch; 2.difficult engagement or self-demeshing of gears; 3.run out and vibration of the cardandrive shaft.

What to do in these cases:

1. Check the free travel of the clutch pedal and adjust it.
2. Check the oil level in the gearbox housing and wash breather channel.
3. Check to see that all the fastening bolts are securely tightened and that the trunnion crosses fit properly the bearings, and the bearings, in turn, the universal-joint forks.

Unit Five

Frame

New words

frame — рама

support — опора

suspension — підвіска

body — кузов

longitudinal members – лонжерони
weld — зварювати
reinforce — підслювати
insulate — ізолювати
rigid — жорсткий

rubber pad – резинова прокладка
mining – мйцний
unibody construction —
 конструкція
strengthen – змйцнювати

1. Read the text

Frame

The foundation of the automobile chassis is the frame which provides support for the engine, body and power-train members. Cross members reinforce the frame. The frame is rigid and strong so that it can withstand the shocks, vibrations, twists and other strains to which it is put on the road.

The frame provides a firm structure for the body, as well as a good point for the suspension system. There are two types of frames, namely: conventional frames and integral (unibody) frames (frameless constructions).

Conventional frames are usually made of heavy steel channel sections welded or riveted together. All other parts of the car are attached to the frame.

In order to prevent noise and vibrations from passing to the frame and from there to the passengers of the car, the frame is insulated from these parts by rubber pads.

It is also important to insulate the frame in order to prevent metal- to-metal contacts.

Frameless (unibody) constructions are called so because they are made integral with the body. The body parts are used to structurally strengthen the entire car. Some unibody frames have partial front and rear frames for attaching the engine and suspension members.

2. Answer the questions

1. What does the frame provide?
2. Why is the frame rigid and strong?
3. What types of frames are there?
4. What is the conventional frame made of?
5. By what is the frame insulated from the other car parts? For what purpose?
6. What do you know about unibody frames?

3. Match two parts of the sentence

1. The frame provides support for....	a. channel sections welded together.
2. Conventional frames are made of....	b. prevent noise and vibrations from passing to the passengers.
3. Frameless constructions are made....	c. cross members.

4. The frame is insulated from other parts in order to	d.. the engine, body and power train members.
5. The frame is reinforced by....	e. integral with the body.

4. Translate into Ukrainian

1. We know the frame to be the structural centre of any car.
2. Car specialists consider the conventional frame to be extremely rigid and strong.
3. We know the frame to be insulated from the other parts by rubber pads to prevent metal-to-metal contacts.
4. Many specialists consider the body parts to be used to structurally strengthen the entire car.
5. The frame is a structural centre of any car as it provides support to the engine, body, wheels and power-train members.
6. Cross members reinforce the frame and provide support for the engine and wheels. The frame is extremely rigid and strong. The engine is attached to the frame in three or four points and insulated in these points by some rubber pads to prevent vibration and noise from passing to the frame and thus to the passengers. There are two types of frames: conventional construction and unibody one.

5. Read the dialogue

Stas: Hi! Seen you for ages! How are you?

Vlad: Hi! I'm perfectly well! I am working at a repairing shop. Very interesting I can tell you.

S.: What are you doing there?

V.: Now, we are testing the frame. You see, the driver has got into trouble. Something is wrong with his car. He thinks it is the frame.

S.: Has the car a conventional frame or a unibody frame?

V.: Unibody frame.

S.: I think you have to do a lot of work as body parts strengthen the entire car.

V.: Sure. We are testing all parts in order to find out the damage.

S.: I think you will cope with the problem.

Unit Six **Clutch**

New words

friction device — фрикційний прилад

hard-wearing material — зносостійкий матеріал

connect — сполучати

gearbox — коробка передач

frictional force – сила тертя

start the car – завести автомобіль

clutch pedal — педаль зчеплення

release the engine — від'єднати

1. Read the text

Clutch

The clutch is a friction device. It connects the engine to the gears in the gearbox. It is used for disconnecting the engine from the gearbox, for starting the car and for releasing the engine from the car wheels.

The clutch is fixed between the flywheel of the engine and the gearbox and consists of two plates (discs): the friction disc and the pressure disc. The friction disc is situated between the flywheel and the pressure plate and has a hard-wearing material on each side.

The basic principal operation of the clutch is a frictional force acting between two discs. The clutch is controlled by the clutch pedal. When the pedal is at rest the clutch is engaged and the running engine is connected to the gearbox. When the pedal is pressed down the clutch is disengaged and the engine runs idly.

2. Answer the questions

1. What device is the clutch?
2. What units does it connect?
3. What is the clutch used for?
4. Where is the clutch placed?
5. What plates does the clutch consist of?
6. What is the basic principal operation of the clutch?
7. What is the clutch controlled by?
8. What takes place when the clutch pedal is at rest?
9. When does the engine run idly?

3. Complete the sentence

1. The clutch is a device connecting
 - a). the rear axle and axle shafts.
 - b). the gearbox and differential.
 - c). the engine and the gearbox.
2. The clutch is situated between
 - a). the gearbox and cardan shaft.
 - b). the flywheel and the gearbox.
 - c). the gearbox and rear axle.
3. The clutch is controlled by
 - a). the brake pedal
 - b). the clutch pedal.
 - c). the gearbox and rear axle.
4. The clutch is engaged
 - a). when the clutch pedal is pressed down.
 - b). when the clutch pedal is at rest.
5. The clutch is disengaged
 - a). when the clutch pedal is at rest.
 - b). when the clutch pedal is pressed down.

4. Read the dialogue

A.: What is the function of the clutch?

B.: You see, it serves three functions. It is used for freeing the engine from the gearbox, for starting the car and for freeing the engine from car wheels.

A.: Is it a friction device?

B.: Yes, of course. It is fixed between the flywheel of the engine and the gearbox and usually consists of two discs.

A.: What discs?

B.: The friction disc (driven disc) and the pressure disc.

A.: I suppose the principle of operation of clutches is a frictional force between discs. Am I right?

B.: Yes, you are. When the clutch is fully engaged the frictional force makes discs rotate at the same speed.

A.: And by what is the clutch controlled?

B.: By the clutch pedal. When it is at rest the clutch is engaged and when it is pressed down the clutch is disengaged and the engine is disconnected from the car wheels.

A.: Thank you. And what types of clutches do you know?

B.: Positive clutches and gradual engagement clutches.

A.: Thank you very much for your information.

B.: Not at all. Glad to help you.

5. Complete sentences with given words below

A.: What three functions does the clutch ... ?

B.: It is used for

A.: Where is it ... ?

B.: It is ... between the flywheel of the engine and the

A.: By what is the clutch ?

B.: It is ... by the

A.: What takes place when the pedal is ?

B.: The clutch is

A.: And when the driver pushes down on the pedal?

B.: The clutch is

freeing the engine from the gearbox, serve, fixed, gearbox, controlled, starting the car, freeing the engine from the car wheels, pedal, at rest, engaged, disengaged, do, located.

Unit Seven **Gearbox**

New words

gear — передача

gearing — зубчасте зєднання

road conditions — дорожні умови
forward speed — 22ереднее
швдкість
reverse drive – задній хід
low gear – перша передача
top gear — четверта передача
characteristic feature — характерна
особливість
fixed axes – зафіксовані осі

rotate 22ередн — обертатись
корпусом
axis – ось
axle — вал
secure — забезпечити
shifting – перемикання
in direct line-важливо

1. Read the text

Gearbox

The gearbox is placed between the clutch and the propeller shaft. The principal function of the gearbox is to vary the speed of the car movement to meet the road conditions. The gearbox provides four forward speeds and one reverse, as follows:

1. First or low gear;
2. Second gear;
3. Third gear;
4. Fourth or top gear;
5. Reverse gear.

There are many constructional arrangements of gearboxes, which can be classified as follows:

1. Sliding-mesh type;
2. Constant-mesh type;
3. Epicyclic (planetary) type.

The sliding-mesh type is the simplest one and is the oldest historically. The constant-mesh type is the most widely used type. They are termed “ordinary” gearing, the characteristic feature of which is that the axes of the various gears are fixed axes. The gears simply rotate about their own axes.

The characteristic feature of epicyclic (planetary) gearing is that one gear rotates about its own axis and also rotates bodily about some other axis.

To secure the several speeds of the car the clutch shaft is mounted in direct line with the gearbox shaft. The gearbox shaft carries on it the sliding gears which are used for shifting to secure the forward speeds and the reverse drive.

2. Answer the questions

1. Where is the gearbox situated?
2. What is the function of the gearbox?
3. What speeds does the gearbox provide?
4. What types of gearboxes do you know?
5. Why is the clutch shaft mounted in direct line with the gearbox shaft?

3. Match two parts of the sentence

1. The principal function of the gearbox is....
 2. The gearbox provides
 3. Gearbox can be
 4. The sliding-mesh gearbox is ...
 5. The constant-mesh gearbox is....
- a). sliding-mesh type, constant mesh type and planetary type
 - b). the simplest one and historically the oldest
 - c). to vary the speed of the car

d). four forward speeds and one

e). the most widely used

4. Read and translate

Gearboxes are assembled and disassembled on special stands using special mechanisms. In case of trouble in change-speed gearbox it can be repaired only in the workshop. But in order not to get into trouble you should do the followings steps:

- a).check the oil level in the gearbox casing; b).wash the breather channel;
- c).change the oil in accordance with the lubrication schedule; d).wash the gearbox with a thin mineral oil;
- e).drain the used oil through the drain hole.

5. Read the dialogue

Mike: Peter, do you remember what our teacher told us last time? What do you know about gearboxes?

Peter: I know that the gearbox is used to change the speed of the car.

M.: And how many speeds does the gearbox provide?

P.: It can provide four forward speeds and one reverse.

M.: Into what types are the gearboxes divided according to their arrangements?

P.: They are divided into sliding-mesh type, constant-mesh type and epicyclic type.

M.: What type is the simplest?

P.: The sliding-mesh one.

M.: Thank you very much for you help.

P.: You are welcome. Glad to help you.

Unit Eight

Brakes

New words

brakes — гальма

force the fluid — подавати рідину

under pressure – під тиском

safety — безпека

brakes are applied — гальма
спрацьовують

slow – сповільнювати

divide – розділяти

push down on the brake pedal –
натиснути на педаль гальма

drum brakes — барабанні гальма

disk brakes – дискові гальма

hydraulic assisted brakes — гальма
з гідравлічним приводом

brake shoes — колодки гальм

brake fluid — гальмівна рідина

brake pedal – гальмівна педаль

master cylinder – головний
циліндр

2. Read the text

Brakes

Brakes are used to slow or stop the car where it is necessary. It is one of the most important mechanisms of the car as upon its proper performance the safety of passengers depends. Car brakes can be divided into two types, namely: drum brakes and disc brakes. The drum type may be either a band brake or a shoe brake.

Depending on their functions, the automobile has foot brakes and hand brakes (parking brakes). According to their mode of operation, the brakes are classified as: mechanical brakes, hydraulic brakes, airbrakes, electric brakes. Brakes are controlled by the brake pedal.

Most braking systems in use today are hydraulic. This system consists of a master cylinder mounted on the car frame and wheel cylinders. When the driver pushes down on the brake pedal, it forces the piston to move in the master cylinder and brake fluid is delivered from it to the wheel cylinders. The piston movement causes brake shoes to move and the brakes are applied (the brake shoes are pressed against the brake drums). The air brake uses compressed air to apply the braking force to the brake shoes.

Electric brakes use electromagnets to provide the braking effort against the brake shoes.

Formerly brakes were applied only to the two rear wheels, but now all cars are equipped with all-wheels brakes. Today many improvements are being made in brakes.

3. Answer the questions

1. What is the function of the brakes?
2. What types are brakes divided into?
3. What brakes do you know according to their mode of operation?
4. What braking systems are used today?
5. By what are brakes controlled?
6. When are brakes applied?

4. Read the dialogue

Alex: Why are brakes used?

Boris: They are used to stop or to slow the car.

A.: Well, it is one of the most important mechanisms of the car, isn't it?

B.: Of course, the safety of the passengers depends upon their proper performance.

A.: What types of brakes are used today?

B.: Drum brakes, disk brakes and others.

A.: And in what way are they applied?

B.: They are applied by the brake pedal. When the driver pushes down on the pedal they are applied.

A.: Thank you. It was very nice of you to tell me this information.

B.: Don't mention it. I was glad to serve you.

5. Read and translate into Ukrainian

Two stories — in one

Brakes are the most important mechanism of the car. They are used to slow or stop the car where it is necessary.

The clutch is a friction device. It connects the engine to the wheels in the gearbox. It is used for freeing the engine from the gearbox, for starting the car and for releasing the engine from the car wheels.

It is fixed between the flywheel of the engine and the gearbox.
They are divided into 2 types, namely: drum brakes and disc brakes.
Most cars of today use hydraulic or power assisted brakes.
They may be of 2 plates: friction disc and pressure disc. The friction disc is situated between the flywheel and the pressure disc.

Troubles in Braking System

The basic troubles of the braking system are as follows:

poor braking action;

- sticking brake shoes which would not return to the initial position after a brake pedal is released;
- non-uniform braking of the left and the right wheels on a common axle;
- leakage of brake fluid and air leakage in the hydraulic brake;

poor air tightness of the pneumatic brake control.

What to do:

Check the action of the foot and hand brakes and leak proofness of the brake hoses connections, components of the hydraulic and pneumatic controls of the brakes, as well as of the vacuum- power system.

Unit Nine **Steering System**

New words

guide the car — керувати автомобілем

front wheels – 2 переднее колесо

steering wheel — кермо

for this purpose — для цієї цілі

swing (swang, swung) – повертати

in turn — в свою чергу

injury – пошкодження

1. Read the text

Steering System

To guide the car, it is necessary to have some means of turning the front wheels so that the car can be pointed in the direction the driver wants to go. The steering wheel in front of the driver is linked by gears and levers to the front wheels for this purpose. The front wheels are on pivots so they can be swung to the left or right. They are attached by steering knuckle arms to the rods. The tie-rods are, in turn, attached to the pitman arm.

When the steering wheel is turned, gearing in the steering gear assembly causes the pitman arm to turn to the left or right. This movement is carried by the tie-rods to the steering knuckle arms, and wheels, causing them to turn to the left or right.

The steering system incorporates: the steering wheel and column, steering gear, pitman arm, steering knuckle arm, front axle, steering knuckle pivot, tie-rods.

There are several different manual steering gears in current use, such as the

rack and pinion type and the recirculating ball type. The rack and pinion steering gear is widely used. Another manual steering gear which is popular in imported cars is the worm and sector type.

The steering wheel and column are the source of injury to the driver, air bags and other devices being developed now to save the life of a driver.

Energy-absorbing columns must stop the steering wheel and column from being pushed to the rear as the front of the car is crushed in an impact.

Energy-absorbing columns must also provide the driver with a tolerable impact as he moves forward and strikes the wheel with his chest.

2. Answer the questions

1. What mechanism is necessary to guide the car?
2. How is the steering wheel connected to the front wheels?
3. Why can the front wheels be swung to the left or to the right?
4. What does the manual steering system incorporate?
5. What types of manual steering gears in use do you know?

3. Translate into Ukrainian

1. To guide the car it is necessary to have some means of turning the front wheels.
2. The steering wheel in front of the driver is linked by gears and levers to the front wheels for turning the car in the direction the driver wants to go.
3. Without using the steering system the car moves only in the direct position.
4. Manufacturers can use rack and pinion type steering gear without choosing another type because "rack and pinion" type steering is very dependable.
5. Energy-absorbing columns must stop the steering wheel from being pushed to the rear when the front of the car is damaged in an impact.

4. Read and work out texts

To turn the car you must have some means of turning the front wheels. For this purpose the steering wheel and steering column are linked to the front wheels. The front wheels are on pivots and can be swung to the left or to the right.

When the driver turns the steering wheel and column the front wheels (being on pivots) attached by the steering knuckle arms to the tie rods are also turned.

Troubles of Steering Gear Components

Steering gear and linkage may have the following basic troubles: excessive steering-wheel free play, bending of steering rod, oil leakage from the steering-gear case, disadjustment of steering gear.

What to do

1. Check the steering-wheel free play and steering gear performance while the car is running.
2. Check the steering-gear case for oil leakage by visual inspection.
3. Adjust the steering gear. Steering gear of the worm and roller type is adjusted by end play in the steering worm shaft bearings.

5. Match two parts of the sentence

1. The front wheels are on pivots so...
2. When the steering wheel is turned...
3. The steering wheel is linked...
4. Most manufacturers use...
5. Steering gear may be...
6. Steering knuckle arms and wheels are turned...
 - a. by the tie-rods.
 - b. rack and pinion type, recirculating ball type, worm and sector type
 - c. gearing in the steering system causes the pitman arm to turn.
 - d. rack and pinion type.
 - e. they can be swung to the left or right.
 - f. by gears and levers to the front wheels.

6. Read the dialogue

Stas: Look here. I have some troubles with the steering system.

Vlad: What troubles?

S.: The first is excessive free play of the steering wheel.

V.: You should check free play of the steering wheel and steering gear performance.

S.: The second problem is oil leakage from the steering gear case.

V.: Check the steering gear case for oil leakage visually. Anything else?

S.: Sure. It is disadjustment of the steering gear. And I don't know what to do.

V.: You see, in this case it is better for you to go to a repairing shop. Good specialists should do this job.

S.: Thank you very much.

V.: Not at all.

PART II

Texts for additional reading

Section 1

QUESTIONS

1. What Russian experts in mechanics must be remembered in the history of automobile engineering?
2. Who was the first Russian inventor of the automobile?
3. What did Mamin designed?
4. What did Blinov constructed?

TEXT

From the History of Automobile Engineering

The automobile industry in our country has been developed since 1916. Before that time Russia had no automobile industry at all, technical schools had no departments to train specialists in automobile engineering. But in the history of the automobile such names as Shamshurenkov, Blinov, Mamin and other Russian experts in mechanics must be remembered.

The first automobile built by Shamshurenkov, a Russian inventor, was put into motion by the pedalling of the driver himself.

Blinov designed and constructed tractor driven by steam engine. Mamin was one of the pioneers in Russian internal combustion engines.

Today Russian automobiles are engineered and built in such a manner that they are able to withstand heavy loads for long periods of operation.

The modern automobile is much more than a means of riding from one place to another. The passenger's safety and comfort must be considered as much as the car's reliable performance and ability to travel on the highways.

The modern automobile must have a steel body and a steel roof and this roof must be insulated against the summer's heat and winter's (old. Ventilation is also of great importance. The comfort and convenience of the driver must be taken into consideration too. The automobile must have a heater with special defrosting devices which insure clear vision to the driver.

The automobile must have great power for riding, have dependable clutch and brakes, have good riding qualities, good lights, dependable starting and ignition systems, low fuel consumption, as well as long service life.

Section 2

TEXT

Benz, Karl (1844 — 1929) was a German inventor of the automobile, who devoted his life to making a horseless vehicle. When Benz's three-wheeled engine-driven machine (the first "car") appeared on the streets in 1885, people couldn't believe that it moved without the aid of horses. It was a great triumph to him because Benz built a new engine that was lighter and more powerful than any other. He put it onto a chassis and got power from the engine to the wheels.

Benz's first car was a great achievement for him. Everything — the engine, fuel transmission, controls — had been developed and designed by him. The wheels were driven by means of a chain, and there were two speeds.

In his early days the speed limits were 12 kilometers an hour outside the city, six — inside. Benz realized that he would never be able to improve his cars if this rule were not changed. He thought up a plan. He invited the Minister to ride in his car and agreed with a milkman that the latter would wait with his horse for them on a certain place. When Benz, with the Minister in his car, passed the milkman, the latter started off, passed the car at a good speed and laughed at them. The plan worked perfectly. The Minister ordered to go faster. But Benz referred to speed limit. "Never mind", said the Minister. Thus Benz won the day.

Section 3

TEXT 1

Internal Combustion Engines

The first internal combustion engine light enough in weight was the gasoline engine, invented by a German named Otto.

At the same time Dr. Rudolph Diesel was working on the diesel engine. The Diesel engine is similar to the gasoline engine in many ways. There are many variations in engine arrangements, but the basic parts of most 4-stroke cycle engines are similar.

In the in-line arrangement the cylinders are lined up in a single row. The V-type engine is called so as the cylinders form 2 rows or "banks", set at an angle to each other to form the letter V.

The diesel engine gets its power from the expansion of burning gases. The diesel engine depends on the heat of compression for ignition of the fuel.

Liquid fuel that contains more heat energy than gasoline is diesel oil.

Diesel oil is slower burning, but it produces more power. Diesel engines also must be heavier than gasoline engines, but they are more efficient when working under heavy loads at low speeds.

The advantages of the diesel over the gasoline engine are as follows:

- a).more economic operation;
- b).higher compression ratio;
- c).reduced maintenance costs;
- d).good pulling power.

TEXT 2

Engines

The two most common types of engines for cars are the petrol engine and diesel engine.

Petrol engines are usually lighter and smaller than diesel engines. This makes them cheaper, and this is why most cars use petrol engines. Petrol engines are also less noisy than diesel engines. They usually go faster. On the other hand, diesel engines use less fuel than petrol engines, and this is why trucks use them. They are

also safer than petrol engines, because there is less danger of fire.

There are two main types of petrol engine - 4-stroke and 2-stroke. All cars use 4-stroke engines. But most motorbikes use 2-stroke engines. They are lighter and smaller than 4-stroke engines, and are therefore cheaper.

Section 4

TEXT **The "UAS" Model**

This model designed as "go anywhere" vehicle is built by the Ulyanovsk Plant. It gives high performance under all conditions. All the four wheels of this model are driving ones. Roadless is easily overcome at medium speeds. Stable suspension gives great riding comfort even under off-road conditions.

To protect passengers and the driver from sun rays, winds and rains the UAS is equipped with a weather proof hood. In cold weather an effective heater system may be switched on.

This model possesses excellent road stability and is easy in control. Well-balanced, synchromesh gearbox, effective brakes provide additional conveniences for the driver. Maintenance of the car is extremely simple, as all points, which are frequently lubricated and adjusted are easily accessible. The body is an all-metal, two-door, eight - seater construction. The clutch is of a single dry plate type.

The transmission has three forward and one reverse speeds. The lower gear can be put in only when the front axle is engaged.

Answer the questions:

1. At what plant is the model built?
2. Does it give high performance under all conditions?
3. At what speeds is roadless overcome?
4. What is done to protect passengers from wind and rain?
5. What may be switched on in cold weather?
6. Why is maintenance of the car extremely simple?
7. How many speeds has the transmission?

Section 5

TEXT

The new vehicle was designed and built by the General Engineering Division. A conventional chassis, rigid axles and leaf spring suspension are used in this car. However, the frame has been modified to improve the angle of turning. The rear suspension incorporates rubber spring washers. There are telescopic shock absorbers all around. This car has four-wheel drive, it is fitted with larger tires. The wheels are driven through a four-speed gearbox, third and the top gears being synchromesh. The car is also fitted with a transfer gearbox with a 1.148:1 high ratio and a 2.4:1 low ratio. This gives the car eight forward

and two reverse speeds. Both front and rear axles incorporate spiral bevel differentials. Brakes are of drum type with servo assistance and the steering system is modified. The car is powered by a six-cylinder engine, which resulted in a maximum average speed of 55 miles per hour. It should be noted that ventilation is provided by means of a standard air system.

Section 6

TEXT

What Motor-Car Buyers Want

In answer to a questionnaire sent out by the General Motors Corporation relating to the general characteristics considered most important in cars, 211000 replies were received. According to the Automobile Daily News, car users specified the following characteristics, listed in order of their importance:

1.reliability; 2.operating economy; 3.safety; 4.appearance; 5.comfort; 6. ease of control; 7. smoothness; 8. low first cost; 9. pick-up; 10. speed.

It is very significant that pick-up and speed, frequently stressed in automobile advertising, are, according to the answers of this questionnaire, considered of least importance by the car buyers.

Section 7

TEXT

Automobile Synchromesh Transmissions

This automated transmission provides effective two-pedal motoring, with the standard four-speed all synchromesh gearbox, a hydraulically operated diaphragm spring clutch and a low ratio torque converter. A microswitch in the gear lever knob initiates clutch disengagement when the knob is touched, thus making normal gear changes despite the absence of the clutch pedal. Although the torque converter can start in any gear, it is desirable that the converter should start in the first or second gear from the point of view of acceleration requirements. Any gear ratio may be kept in engagement to suit the driver's wishes and road and traffic conditions. This transmission makes driving in the city traffic easier and has good characteristics even when the car is moving on snow and ice. The only drawback of this synchromesh transmission is its cost.

Section 8

TEXT

Super Stoppers

Disk and drum brakes are conventional ones. Improved hydraulic systems and anti-lock devices are designed to make brakes more effective. But they don't improve the brakes themselves.

Recently a clutch-type brake of extreming simplicity was created. Most brakes are cooled by air, like an air-cooled engine. But like a car engine they could be liquid-cooled, a water tank cools the brakes with its water when the brakes reach a certain temperature. That method should be used only for sport

cars, but not for conventional passenger-cars.

The inventor became interested in liquid cooling of brakes and developed several systems.

In passenger cars the engine's water and radiator were used to cool (he brakes. The idea is that both the engine and the brakes will not be generating peak heat at the same time.

Radar-controlled brakes are being studied now. In such cars radar is used for measuring the distance to the next car, printing that information into a simple computer, which points the accelerator, and brakes what to do.

Section 9

TEXT

Electric Gear Change Control System

This electric gear change control system is for large vehicles. It consists of three basic elements: a controller located near the driver, an electric cable to the transmission, and a solenoid actuated valve on the transmission that receives the signal from the driver to change gear selection.

The system is used in large trucks where the transmission is mounted far from the engine. The control system provides the driver a high degree of operation flexibility. The system also incorporates an inhibitor which prevents accidental down changing at high vehicle speed.

Section 10

TEXT

Lotus Elan Car

Lotus Elan is a car, capable of carrying four person and their luggage at great speed and in comfort. It is the finest sport car.

In construction, it is very similar to the two-seater Elan car, with a steel chassis, at the front of which the 16-litre engine is installed and at the rear the differential is located. The body is a glass-fiber unit, carrying no chassis stresses. The whole car is just 2 ft longer and 10 inch wider than the previous version.

With such a light and aerodynamic car the driver can reach maximum 6500 rpm easily. Despite its high power output and two carburettors the engine always started easily. An engine is a smooth unit with a high torque.

Section 11

TEXT 1

Autotest of Volvo

Since previous tests of the car the engine capacity has been increased from 1.778 to 1.986 c.c.

Earlier Volvos had some real difference in appearance but the current series have international look, but with considerably more space for passengers and baggage than the earlier models. Technically, they are conventional, with the 2-litre 4-cylinder engine mounted in front, and rear-wheels drive through a 4-speed gearbox and coil-spring live axle.

Brakes are servo-assisted discs, the rear brakes incorporating small drums

for the parking brake. Twin hydraulic circuits unite both front brakes to one rear brake, so that when one circuit fails only one brake is lost.

The synchromesh gearbox is satisfactory. In average conditions the car rides well.

TEXT 2

Finding a Fault in the Car

If your car doesn't start in the morning, you should check three things first: the battery, the fuel level and the spark plugs. It is easy to repair these faults. If the battery is flat, you should recharge it. If this doesn't work, you should replace it. If the petrol tank is empty, fill it up. If the spark plugs are dirty, clean them, and if the gap in a spark plug is too narrow or too wide, adjust it to the correct width.

Section 12

TEXT

Let's look closer at the engine components that operate together to generate power. The basic unit of the engine is the piston which moves up and down inside a cylinder. As air is compressed in the cylinder, fuel is injected on top of the piston. Under high pressure the fuel mixes with the hot air and self-ignites causing combustion. The force of the combustion pushes the piston and connecting rod down turning the crankshaft and flywheel which drive other components.

During engine operation the piston goes through four strokes: intake, compression, power and exhaust. During the four strokes, the piston moves down and up to complete cycles.

Intake: During the intake stroke the piston moves down in the cylinder pulling air past an open intake valve into the combustion chamber.

Compression: During the compression stroke all valves are closed, and piston moves up in the cylinder compressing the air. As the air molecules are compressed the air temperature increases dramatically to about 1000° F (537° C). As the piston nears the top of its stroke, fuel is injected into the combustion chamber on top of the piston. The fuel mixes with the hot compressed air and causes combustion.

Power: During the power stroke the valves are closed as the forces from combustion push the piston and connecting rod down, thereby turning the crankshaft. The heat energy has now been converted into mechanical power.

Exhaust: During the exhaust stroke the inertial force of the turning flywheel helps continue the rotation of the crankshaft to push the piston up again in the cylinder forcing the burned gases out the open exhaust valve. This completes the four strokes of the piston. These four strokes are repeated over and over as the engine operates.

Diesel engine offers the following advantages over automotive-type gasoline engines:

- Fuel economy

- Diesel engines have higher compression ratios and therefore burn fuel more

completely and efficiently.

Reliability

Diesel engines have no electrical ignition system to fail or be maintained. They are built with heavy-duty parts to withstand the higher compression ratios and to operate for long periods with minimum breakdown. In on-highway trucks for instance, diesel engines have a projected service life of many hundreds of thousands of miles.

Power

It depends on engine size, but diesel engines generally produce more torque and power output than gasoline engines.

QUESTIONS

1. What takes place in the combustion chamber during the intake stroke?
2. What takes place in the cylinder during the compression stroke?
3. What takes place in the combustion chamber during the power stroke?
4. What takes place in the combustion chamber during the exhaust stroke?
5. What advantages do diesel engines offer?

Section 13

TEXT

The Car and the Environment

Most of us know that cars cause air pollution. Scientists tell us that if we don't do something soon, we will be unable to repair the damage that we are causing to our planet. What are some of the things we can do to help?

1. Buy a fuel-efficient car and keep it that way

Good gas is a way to stop pollution. Choose a car that is friendly to the environment when you buy one.

2. Keep your car tuned up

A car that badly tuned releases more pollutants into the air. If you keep track of your gas mileage, you'll know when something is wrong. A badly tuned car uses almost 10% more gas than a well-tuned car. Other ways to waste gas are: *Idling your car unnecessarily.* If you are stopped for longer than a minute, it is more fuel efficient to turn off your engine.

Using dirty fuel filters. Dirty fuel filters waste gas.

Air Conditioner Maintenance. Of course, this causes a big problem for both us and our mechanics. Our mechanics will have to make sure that there are no leaks, and fix them if there are, before they can add any R-12 (freon) to our air conditioning systems. Naturally, this cost will be passed along to us.

Section 14

TEXT

Gas Ecology

There are many ways that we can reduce pollution by observing good gas ecology — that is using our cars in fuel efficient ways.

Don't move the car unless you are going somewhere. Plan ahead. Starting the car up just to move it a short distance produces more pollutants than hours of driving on the freeway.

Don't use your heater until the car is warmed up. The engine will start more quickly, because it won't be losing heat to warm you.

Try to drive within 35-45 miles per hour when possible. Driving at slower speeds reduces engine efficiency and causes more pollutants.

Don't make fast starts or stops. Fast starts can burn more than 50% gas than regular acceleration (as well as cause 50% more emissions). When a big burst of gas enters the engine, much of catalytic converter's job is bypassed and the unburned gas comes out the tailpipe or is sent into the converter. Rapid acceleration is only called for in emergency or passing situations. Stopping rapidly also leaves the engine with a lot of unburned gas to deal with. This results in damage to the converter and pollution.

Try not to idle. At bank lines and fast food places with over thirty second waits, turn the engine off, and restart it. It is more fuel efficient, and causes less pollution. The only time that idling is a good thing is after a long, fast run. Idling the engine for a minute or so after one of these helps get rid of any hot spots and fuel vapors.

Keep to steady speeds on the highway. Changing speeds produces more pollution and uses more gas. Don't use the air conditioner unless you have to. It makes your engine work harder, uses more gas, and causes more pollution. Most evaporative emissions get into the atmosphere when we put gas in our cars. Make sure your gas cap is the right one, and in good working order. Gas caps don't cost that much, but are very important in anti-pollution.

Since gasoline expands, never overfill your tank. It will wind up leaking out.

Use known brands of gas. Poor quality gas will not save you money. Instead, it will foul your engine and cause it to function badly. Try several different brands and octane ratings to find out which makes your car the happiest, and stay with it.

Section 15 **TEXT** **Road Safety**

Every year several thousand people are lloled on the roads. Every year hundred thousand people are injured. These people are killed and injured in road accidents.

Accidents are often caused by carelessness of the people. There are rules that help to make the roads safe, but people do not follow the rules.

In our country as in most other countries traffic keeps to the right, but in Great Britain traffic keeps to the left. While driving the car you can get into trouble. The data indicate that in road accidents the passengers who use different kinds of safety belts suffer from the impacts less than the passengers who don't use ones. It was shown that safety belts had reduced the risk of serious injuries.

Accidents can be divided into three types as follows:

1. Head-on impacts between cars;
2. Side impacts caused by accidents at intersections;
3. Rear impacts in which the car (often stationary) is struck from the rear by another car.

Head-on accidents are the most numerous in which the driver and the front seat passenger suffer head injuries. That is why the most important function of safety belts is to protect the driver and passenger from head injury.

In up-to-date cars various types of safety cushions are used to protect the lives of those sitting in the car. But the gold rule is to be careful on the road while driving the car.

As far as the pedestrians are concerned they should obey the following rules: before crossing the road, stop and look both ways. Look right, look left, and then look right again. If the road is clear, it is safe to cross it.

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