5. My friend asks if I am able to make a parallel arrangement of resistors.

VII. Substitute the subordinate clauses for Participial Constructions.

1 The external force which is applied to a circuit to overcome the opposition to the flow of current is measured in volts. 2. The voltage is equal to the current which is miltiplied by the resistance. 3. The electrical current that is passing through a specified solution of nitrate of silver in water deposits silver. 4. The resistance is equal to the wattage that is divided by the current squared. 5. The current that is passing through the conductor equals 2 amperes.

VIII. Change Continuous Tenses into Perfect Tenses.

1. I am switching on the radio. 2. Tom is showing all figures to us. 3. The student is writing down a new rule. 4. We are considering the voltage as an energy per unit charge. 5. They are determining the resistance.

IX. a) Translate the following sentences. b) Pay attention to the words and word-combinations in bold type.

1. **In order to define the power** in watts we must know Ohm's law, that is the watt is the voltage times the current. 2. The solution of the formula is: the watt is equal to the current **squared times** the resistance. 3. **For defining** the power in watts according to the formula the voltage squared must be divided by the resistance. 4. **In order to overcome** the resistance of conductors and cause current to flow, **an external force** is necessary. This force is also reffered to as **electric pressure.** 5. This unit strength of an ampere is represented when an electrical current **passing through a special solution of nitrate of silver in water** deposits silver at the rate of.001118 gram per second.

X. Translate the sentences and explain the use of Perfect Tenses.

1. We have calculated the resistance in each case. 2. Yesterday we had calculated the resistance in each case before we began solving the problem. 3. We shall have calculated the resistance in each case before we begin to solve the problem.

XI. Memorize the reading of the following mathematical actions.

= is equal to; $2 + 3 = 5$ (Two plus three is equal to five.)
is (equals); $3 + 6 = 9$ (Three plus six is (equals) nine.)
+ plus плюс
— minus минус
× multiplied by умноженное на
: divided by (into) деленное на
× times / multiplied by $3 \times 3 = 9$. (Three multiplied by 3 equals nine.)
: divided by $10 : 2 = 5$. (Ten divided by two equals five.)
= equals (is equal to) is / makes
2^2 two squared / two to the second power
2^3 two to the third power
10^{-7} ten to the minus seventh power
0.3 ou point three (zero point three) point three
0.0004 — ou point three ouz four / point three ouz four
34.321 thirty four point three two one

$\frac{1}{2}$ a half (one second) a second
$\frac{2}{4}$ two fourth

Lesson 3. MAGNETISM

I. INDEPENDENT WORK

In the Laboratory

1. Skimming Reading

PRE-TEXT EXERCISES

I. a) Listen and repeat after the speaker. b) Practise the pronunciation of the following.

[s] so, sits; [z] rose, these; [ks] box, fox; [gz] example, examine.

same, takes, course, us, thus, bus, plus; poison, tables, times, rings, shells, house, washes; exercise, explain, excess, except, exception, experience; exaggerate, exact exhibit.

II. a) Make sure that you know these words. Say what Russian words help you to guess their meanings. b) Repeat these words after the speaker.

compass ['kʌmpəs], pole [ou], horisontal ['hori'zontl], horizon [hə'raizn], ˌfunda'mental [ʌ], 'vertical [ə:], component [kəm'pounənt], region ['ri:dʒən], react [ri:'ækt], cylinder ['silində], 'permanent [ə:], magnet [æ], hysterisis [hi'steriSis], instrument, mass [æ], perpendicular [ˌpə:pən'dikjulə], 'distance [i].

III. a) Listen, repeat and memorize the following words and word-combinations. b) Check if you know their meanings.

no matter неважно; exact точный, точно; approximately приблизительно; compass needle стрелка компаса; fine thread тонкая нить;

similar подобный; similarity подобие; experience испытывать; repulsion отталкивание; surround v. окружать; give rise вызывать, порождать; iron железо; exert v. создавать; carrying несущий; move v. двигаться; velocity скорость; motion движение; explain v. объяснять; base on v. основываться на; left-hand rule правило левой руки; south end южный конец; location расположение; locate v. располагать; point toward v. указывать на; force of attraction сила притяжения; modify v. изменять; strength сила, прочность; circular круглый; close замкнутый; conservation of energy principle принцип сохранения энергии.

IV. a) Give English equivalents to the Russian words and word-combinations in brackets and translate the sentences into Russian. b) Check yourself listening to the complete sentences after the speaker.

1. A compass (стрелка) suspended horizontally by (тонкая нить) will (реагировать) and (указывать) toward the north. 2. A current in a circular loop of the wire (порождать) to a magnetic (северный полюс) on one side of the loop and a south pole on the other side. 3. I shall (доказать) my viewpoint. 4. A magnet modifies the magnetic characteristics of the space (окружать) it. 5. All magnets, (неважно) how small, exhibit polarity. 6. The (точное расположение) of the two poles of a given magnet cannot be determined. 7. Each pole is located (приблизительно) near each end of the magnet.

Text A

MAGNETS

I. a) Listen to the text, mind the English intonation. b) Read the text to yourself and grasp the main idea of it.

All magnets, no matter how small, exhibit a north and south end.

The exact location of the two poles of a given magnet cannot be determined. Each pole is located approximately near each end of the magnet.

One end of a compass needle will point toward the north when the needle is suspended horizontally by a fine thread. That end of the compass is called its north pole.

When the north pole of one magnet is placed near the south pole of another magnet, each magnet will experience a force of attraction; when two similar poles are placed near each other, each magnet will experience a force of repulsion.

A magnet modifies the magnetic characteristics of the space surrounding it.

Charges in motion (electric current) give rise to a magnetic field.

A current in a circular loop of wire gives rise to a magnetic north pole on one side of the loop and a south pole on the other side.

2. Average Reading

Text B

MAGNETIC FIELD AND CURRENT

I. a) Listen to the text. b) Read it (time limit is 2 min.). c) Find the part of it dealing with the description of charged particles. Translate it.

A magnetic field exerts a force on a current carrying wire. The left-hand rule is used to determine the direction of the force. A magnetic field exerts a force on a moving charge. Charged particles move in circular orbits when the velocity of the particle is perpendicular to the magnetic induction B.

Relative motion between a magnet and a wire causes an induced e. m. f. in the wire. If the wire is a closed loop, the induced e. m. f. causes an induced current.

Lenz's law explains the conservation of energy principle when applied to induced voltages and currents.

The operation of a voltmeter, ammeter, and motor is based on forces produced by a current in a wire that is located between the poles of a magnet. These forces produce torques.

ASSIGNMENTS

I. a) Choose the key sentences from the Text A and compare them with the title of the text. b) Say what the text is about.

II. Skim through the Text B and find the part of it dealing with the relative motion between a magnet and a wire. b) Discuss the information with your fellow-students.

III. Find the part in the Text B containing information about the Lenz's law. Discuss it using your knowledge of the topic.

IV. Answer the following questions embracing the contents of the Text A and the Text B.

1. What do all magnets exhibit? 2. Where is each pole located? 3. Where does one end of a compass needle point to? 4. When will each magnet experience a force of attraction? 5. When will each magnet experience a force of repulsion? 6.What gives rise to a magnetic field? 7. What does a magnetic field exert? 8. What is used to determine the direction of the force? 9. Does a magnetic field exert a force on a moving charge? 10. When do charged particles move in circular orbits? 11. What causes relative motion between a magnet and a wire? 12. What does Lenz's law explain?

V. Discuss the information obtained from the Text A and the Text B.

VI. Be ready to discuss the information on the topic obtained at your lectures on speciality.

II. CLASSWORK

3. Close Reading

PRE-TEXT EXERCISES

I. Be sure that you know these words.

Essential существенный; neutralize [njutrə'laiz] v. нейтрализовать; corres'pond v. соответствовать; in most cases в большинстве случаев.

II. Memorize the words and word-combinations used in their specialized meanings.

Delta [deltə] дельта; winding ['waindiŋ] обмотка; primary coil ['praiməri] первичная обмотка; secondary coil вторичная обмотка; leakage ['li:kədʒ] утечка ; autotransformer ['o:tətræns'fo:mə] автотрансформатор; current flux данный (текущий) поток.

III. Find these word-combinations and terms in the Text C and translate the sentences containing them.

Laminated iron core пластинчатый железный сердечник; insulated coil изолированная катушка; magnetizing current намагничивающий ток; counter voltage противоЭДС; closed magnetic circuit замкнутая магнитная цепь; full-load current ток при полной нагрузке; magnetic leakage магнитная утечка; eddy-current losses потери от вихревых токов (Фуко); well-designed хорошо сконструированный; current effective in setting up ток, устанавливающий; the service is out of order работа (устройства) нарушилась.

Text C

TRANSFORMER

I. a) Read the text. b) Find the part of it describing the essential parts of a transformer. Translate it.

The transformer is a device that step-up and step-down alternating currents and voltages.

The essential parts of a transformer are shown in Fig. 1.6*a* and consist of a laminated iron core upon which are wound two separate insulated coils — the primary and the secondary. In most cases, the primary coil is connected to the supply or main side of the line where the alternating current sets up an alternating magnetic flux. This not only sets up a counter voltage equal and opposite in the primary coil, but also sets up a voltage in the secondary coil. The ratio of the voltage in the secondary coil as compared to that in the primary coil depends upon the amount of magnetic flux, the frequency of the alternating current, and mainly the number of turns in the coils.

The only current that flows in the primary coil or windings is the magnetizing current to set up the flux in a closed magnetic circuit and is usually a very small percentage of full load primary current of the transformer.

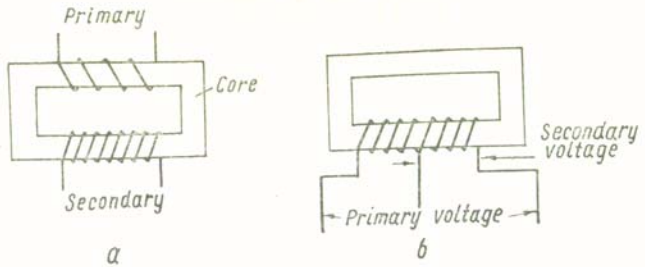

Fig. 1.6. The essential parts of:
a a transformer; *b* an autotransformer.

In a well-designed transformer, there is very little magnetic leakage. The effect of the leakage is to cause a decrease of secondary voltage when the transformer is loaded. When a current flows through the secondary in phase with the secondary voltage, a corresponding current flows through the primary in addition to the magnetizing current previously mentioned. The magnetizing effects of the two currents are equal and opposite.

In a perfect transformer — one having no eddy-current losses, no resistance in its winding, and no magnetic leakage — the magnetizing effects of the primary load current and the secondary neutralize each other, leaving only the constant primary magnetizing current effective in setting up the current flux. Such a transformer, if supplied with a constant primary pressure, would maintain constant secondary pressure at all loads.

In an autotransformer (Fig. 1.6*b*), there is only one coil, any portion of which may be used as primary and any portion as secondary. The ratio of transformation depends on the portions used; if the whole winding is used as primary and one-third of it a secondary, and the losses, which are small, are neglected, voltage of the primary equals 3 times the voltage of the secondary and the current of the secondary equals 3 times the current of the primary.

ASSIGNMENTS

I. Read the Text C attentively and answer the following questions embracing its contents.

1. What are the essential parts of a transformer? 2. What is the only current that flows in the primary coil or windings? 3. What is the effect of the leakage in a transformer? 4. When does the corresponding current flow through the primary in addition to the magnetizing current? 5. What are the characteristics of a perfect transformer?

II. Divide the Text C into logical parts. Choose the key sentences and translate them.

III. Read the text again and find the part of it describing the effect of the leakage.

IV. Read the final paragraph of the text and speak about the autotransformer.

V. Entitle each of the paragraphs of the text using the key sentences.

VI. Comment on the author's attitude to transformers.

VII. Make up a plan of the text using disjunctive questions.

VIII. Combine your answers into a short summary of the text.

IX. Speak on:

1. The essential parts of a transformer.
2. The characteristics of different kinds of transformers.

X. Prepare a dialogue on your own situation.

XI. Work in pairs. One student reads the Russian sentences for the other student to translate them and checks his translation with the key.

Sentences for translation	Key
1. Основные части трансформатора показаны на рис. 1.6*а*.	The essential parts of the transformer are shown in Fig. 1.6*a*.
2. Трансформатор состоит из пластинчатого железного сердечника, на который намотаны две отдельные изолированные обмотки — первичная и вторичная.	The transformer consists of a laminated iron core upon which are wound two separate insulated coils – the primary and the secondary.
3. Первичная обмотка соединена с питающей или основной стороной линии, где переменный ток создает переменный магнитный поток.	The primary coil is connected to the supply or main side of the line, where the alternating current sets up an alternating magnetic flux.

Now the first student will translate the sentences.

4. Единственный ток, протекающий по первичной обмотке — это намагничивающий ток.	The only current that flows in the primary coil is the magnetizing current.
5. В хорошо спроектированном трансформаторе магнитная утечка незначительна.	In a well-designed transformer, there is a very little magnetic leakage.
6. Намагничивающие эффекты двух токов равны и противоположны.	The magnetizing effects of the two currents are equal and opposite.

4. Searching Reading

PRE-TEXT EXERCISES

I. Match the following English words and word-combinations with the Russian ones.

primary leads	внешние зажимы (выводы)
primary main wire	основной первичный провод
be out of order	в каждый момент
outside terminals	выйти из строя, быть не в порядке
at every instant	выводы первичной обмотки

II. a) Give initial forms of the following words and check if you know the function of their suffixes. b) Translate these words into Russian.

Connecting, corresponding, voltage, secondary, transformer, generated, winding.

Text D

TRANSFORMER CONNECTIONS

I. a) Read the following text and say what it is about. b) Review the text.

When connecting two or more single-phase transformer in parallel, corresponding primary leads of each transformer must be connected to the same primary main wire, and the secondary leads must be so connected that the secondary voltage of the transformers shall at every instant oppose each other. If this is done, no current can flow through the secondary coils or windings until the secondary load is applied — even if the secondary coils are connected in series. On the other hand, if the leads are improperly connected, the secondaries will be short-circuited on each other.

When three single-phase transformers are connected to a three-phase Y system, two coils are in series across each phase, and the voltage on each coil is the voltage per phase divided by 1.73. When the primaries are connected in either Y or delta, the secondaries are usually connected in the same way.

It is possible to use only two single-phase transformers on a Y or delta three phase system, but if one of the transformers fails, the service is out of order.

Single phase primary systems may be transformed to three-phase by either the open delta or Scott systems. The Scott system uses two special transformers, as shown in Fig. 1.7, which have primaries connected to the single-phase circuit. The secondary of the transformer «A» contains sufficient turns in its windings to give, between its outside terminals, the voltage desired between lines on the three-phase circuit. The secondary of the transformer «B» contains sufficient turns to give .87

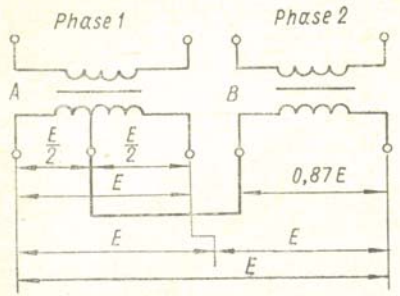

Fig. 1.7. The Scott or T-connected transformer.

times the voltage; one end feeds directly into one side of the three-phase circuit, and the other to the middle point of the secondary transformer «A». One of the three phases, then, has the voltage generated by the secondary of transformer „A", and each of the other two has a voltage equal to the square root of $(.5E)^2 + (.87E)^2$.

ASSIGNMENTS

I. Answer the following questions embracing the contents of the Text D.

1. When connecting two or more single-phase transformers in parallel what must corresponding primary leads of each transformer be connected to? 2. How must the secondary leads be connected? 3. When will the secondaries be short-circuited on each other? 4. How are two coils connected when three single-phase transformers are connected to a three-phase Y system?

II. a) Look at Fig. 1.7. and describe it. b) Discuss it with your fellow-student.

III. Speak on:

1. Connecting two or more single-phase transformers.
2. The Scott system of transformers.

IV. Make up a plan of the text.

V. Prepare a dialogue on your own situation.

VI. Give some additional informations about transformers.

VII. Discuss the problem of fabrication and utilization of transformers nowadays.

VIII. Look through the latest magazines, find some articles on transormers and discuss the topic with your fellow-students.

III. GRAMMAR EXERCISES

I. a) Pay attention to the following prefixes and their meanings. b) Check if you know them well.

mis- (something wrong): mislead вводить в заблуждение; **ill-** (something wrong or bad): ill-use плохо обращаться; **post-** (after): post-war послевоенный; **pre-** (before): pre-war довоенный; **out-** (пере-, пре-): outgo превосходить; **over-** (пере-, пре-): overcome преодолеть.

II. a) Analyse the following sentences. b) Find the verbs in the Subjunctive Mood. c) Translate the sentences.

1. It is important that they should achieve satisfactory results. 2. We insist that the results of these researches be published. 3. You must write this rule lest you should forget it. 4. I wish you would be more attentive. 5. I wish I had been present at that discussion yesterday. 6. She spoke as if she were an expert in this field of production. 7. Even though it were raining I should come to see you.

III. Change the following sentences according to the model adding the phrases "I wish" with Past Indefinite (мне бы хотелось), "I wish" with Past Perfect (как жаль, что не):

Model. I was present at the meeting.
I wish I were present at the meeting.
Мне бы хотелось присутствовать на собрании.
I wish I had been present at the meeting.
Как жаль, что я не присутствовал на собрании.

1. He received good results during his experiments. 2. The report is successful. 3. They were present at the discussion. 4. You helped me in my research work. 5. You understand me better.

IV. Change the following sentences using the phrase "should + S + + V". Translate them.

Model. If I got permission to work in this laboratory we should begin at once.
Should we get permission to work in this laboratory we should begin at once.

1. If we came, they would tell him about this accident. 2. If comrade Ivanov returned from his mission, we should repeat our experiment. 3. If they read this book, they would know much about South Africa. 4. If she calculated these data correctly, she would solve these problems. 5. If it were possible, we should begin our work immediately.

V. Translate the following sentences into Russian paying attention to the function of the Infinitive in the sentence.

Model 1. The student **to be sent abroad** is very capable.
Студент, *которого отправят за границу*, очень способный.

1. The work to be done is very useful. 2. The example to be given must illustrate the rule. 3. The research to be carried on is very important for our industry.

Model 2. I know **him to be a good student.**
Я знаю, *что он хороший студент.*

1. We know him to carry out research in cybernetics. 2. I suppose his article to be published. 3. They considered him to be a very experienced researcher. 4. I heard him speak at the meeting. 5. We often see him talk with the students.

VI. a) Define the tense-forms of the verb in the following sentences. b) Translate these sentences into Russian.

1. The primary coil is connected to the supply or main side of the line. 2. A corresponding current flows through the primary in addition to the magnetizing current previously mentioned. 3. If such a transformer were supplied with a constant primary pressure, it would maintain constant secondary pressure at all loads.

VII. Give three forms of the following verbs:

Exert, use, move, be, cause, explain, apply, produce, exhibit, locate, point, call, experience, place, give, show, wind, connect, flow, load, mention.

VIII. a) Define the forms and functions of the Participles. b) State the verbs they are formed of. c) Translate them into Russian.

1. Given, determined, located, suspended, called, placed, surrounding, used, moving, charged, induced, applied, based, shown, wound, insulated, connected, alternating, compared, magnetizing.

II. Given magnet; magnet cannot be determined; each pole is located near each end; the needle is suspended; one end of the compass is called the north pole; one magnet is placed near the south pole; a magnet modifies the magnetic characteristics of the space surrounding it; it is used to determine; a force on a moving charge; charged particles move in circular orbit; the induced e. m. f. causes an induced current; Lenz's law explains the conservation of energy principle when applied to induced voltages and currents; motor is based on forces; a transformer is shown in Fig. 1.6*a*; it consists of an iron core upon which are wound two insulated coils; the primary coil is connected to the supply or main side of the line.

Lesson 4. ELECTRIC LIGHTING

I. INDEPENDENT WORK

In the Laboratory

1. Skimming Reading

PRE-TEXT EXERCISES

I. a) Listen and repeat after the speaker. b) Practise the pronunciation of the following.

Con'ceivable [i:] возможный; envelope колба; quartz-iodine ['kwɔ:ts'aɪədi:n] иодисто-кварцевый; luminance ['lju:mɪnəns] освещение; interference [ˌɪntə'fɪərəns] помеха; vapor ['veipə] пар; merchandise ['mə:tʃəndaɪz] товары; seal [si:l] паять; delux [dɪ'lju:ks] дневной свет; ambient ['æmbiənt] окружающий; ultra-violet ['ʌltrə'vaɪəlɪt] ультрафиолетовый; diameter [daɪ'æmɪtə] диаметр.

II. a) Listen and repeat after the speaker. b) Notice the word-building elements and define the function of the suffix -ing.

to light освещать	lighting освещение
to design проектировать	designing проектирование
to interfere мешать	interfering помехи
to cool охлаждать	cooling охлаждение

III. a) Listen, repeat and memorize the following word-combinations and terms from the text. b) Check if you know their meanings.

Lighting layout план (проект) освещения; highest visual comfort and performance наилучший визуальный комфорт и качество; conceivable lighting application возможное применение освещения; incandescent filament lamp лампа накаливания; basic incandescent lamp типовая лампа накаливания; white light (incandescence) белый свет (накаливание); quartz-iodine tungsten-filament lamp йодистокварцевая лампа с вольфрамовой нитью накала; surface luminance поверхностное освещение; critical light control регулировка критического света; iodine vapor йодистые пары; cool white lamp холодная лампа дневного света; delux warm white lamp теплая лампа дневного света; flattering colour приятный свет.

Text A

ELECTRIC LAMPS

I. a) Listen to the text, mind the English intonation. b) Read the text to yourself and grasp the main idea of it.

Electric lamps are made in thousands of different types and colours, from a fraction of a watt to over 10 кW each, and for practically any conceivable lighting application.

Incandescent filament lamps, for example, consist of a sealed glass envelope containing a filament that produces light when heated to incandescence (white light) by its resistance to a flow of electric current. This type of light source is relatively inexpensive to install, is not greatly effected by ambient temperatures, is easily controlled as to direction and brightness, and gives a high colour quality.

The quartz-iodine tungsten-filament lamp is similar to the basic incandescent lamp except that the glass envelope contains an iodine vapor, which prevents the evaporation of the tungsten filament. This increases the normal life to about twice that of a normal incandescent lamp.

2. Average Reading

Text B

FLUORESCENT LIGHTING

I. a) Listen to the text. b) Read it (time limit is 3 min.). c) Find the part of it dealing with the types of lamps.

consist of gaseous discharge arc tubes which, in the versions designed for lighting, operate at pressures and current densities sufficient to generate desired quantities of radiation within their arcs alone.

Mercury vapor lamps contain arc tubes which are formed of fused quartz. This has resulted in great improvements in lamp life and maintenance of output through life. These arcs radiate ultraviolet energy as well as light, but the glass used in outer bulbs is generally of a heat-resisting type that absorbs most of the ultraviolet.

The outer bulbs of high intensity discharge lamps are designed to provide, as nearly as possible, optimum internal environments for arc-tube performance. For example, the rounded shapes labelled E and BT in the sketches in Fig. 1.8 were designed to maintain uniform temperatures of the bulb walls for better performance of phosphor coatings.

In some cases, special consideration dictates the bulb shape. The R and PAR contours have been selected to achieve desired directional distribution of light.

Most of the general contours of high intensity discharge lamps are shown in Fig.1.8 with verbal descriptions of the code used for the shapes. The complete description of a bulb also includes a number that represents the maximum diameter of the bulb in eighths of an inch. The E-37 bulb, therefore, is elliptical in shape and 37/8 inches in diameter at its widest point; the R-80 is a reflector bulb with 10-inch maximum diameter.

ASSIGNMENTS

I. a) Divide the Text C into logical parts. b) Choose the key sentences and translate them.

II. Look through the Text C and find the part of it dealing with the outer bulbs of high intensity discharge lamps.

III. Read the Text C attentively and answer the following questions.

1. What does the term «high intensity discharge lamps» describe? 2. What is their common characteristic? 3.What do mercury vapor lamps contain? 4. What absorbs most of the ultraviolet?

IV. Make up a plan of the text.

V. Retell the text according to your own plan.

VI. Speak on:

1. Measuring vapor lamps.
2. The bulb shapes of an electric lamps.

VII. Prepare a dialogue on your own situation.

VIII. Review the text in written form.

IX. Translate the Text C to be sure you understand it well.

4. Searching Reading

PRE-TEXT EXERCISES

I. Match the following English words and word-combinations with the Russian ones.

mercury	капли дождя
thermal shock	окисление
borosilicate glass	боро-кремниевое стекло
raindrops	ртутный
strike	пусковой газ
nitrogen	баласт (буфер) для цепи переменного тока
oxidation	удар
starting gas	тепловой удар
a. c. circuit ballast	азот

II. Give initial forms of the following words and translate them.

Resistant, striking, outer, electrical, insulation, oxidation, distribution, inductive, capacitive, burning, maitenance, operation, popularity, lighting.

Text D

MERCURY LAMPS

I. a) Read the following text and say what it is about. b) Review the text.

A typical mercury lamp consists of the several parts enclosed in an outer bulb made of borosilicate glass, which can withstand high temperatures, and which is resistant to thermal shocks such as those imposed by cold raindrops striking a hot bulb. The outer bulb contains a small quantity of nitrogen, an inert gas; this atmosphere maintains internal electrical stability, provides thermal insulation for the arc tube, and protects the metal parts from oxidation. The quartz arc tube contains a small quantity of high-purity mercury, and a starting gas, argon.

Most mercury lamps operate on a. c. circuit ballast usually consists of a transformer to convert the distribution voltage for the lamp, and inductive or capacitive reactance components to control lamp current and — in some ballasts — to improve power factor.

Most mercury lamps start and operate equally well in any burning position. However light output and maintenance of output through life are generally slightly higher with vertical than with horisontal operation.

The operating life of mercury lamps is very long, which accounts for much of their popularity in recent years. Most general lighting lamps of 100 to 1,000 watts have rated lives in excess of 24,000 hours, while the 50-, 75-, and 100-watt lamps with medium screw bases are rated at 10,000 hours.

ASSIGNMENTS

I. Skim through the Text C and divide it into logical parts. Choose the key sentences and translate them.

II. Find the part of the text describing the operating life of mercury lamps.

III. Ask your friend about mercury lamps.

IV. Make up a plan of the text.

V. Discuss the problem of mercury lamps.

VI. Make a short summary of the text.

VII. Look through the latest magazines and find additional information about mercury lamps.

III. GRAMMAR EXERCISES

I. Find the words in the Text C with suffixes -ment, -ing, -ic, -ate, -ance, -tion, -al, define their initial forms and translate them into Russian.

II. Give the main forms of these verbs.

Consist, enclose, impose, contain, maintain, operate, account.

III. Find the following words and word-combinations in the Text D and translate the sentences with them.

Withstand high temperature; resistant to thermal shocks; a small quantity of nitrogen; internal electrical stability; thermal insulation; a. c. circuit ballast; in any burning position.

IV. Translate the following sentences using the models.

Model 1. Задача, *которую нужно решить*, проста.
The problem **to be solved** is simple.

Model 2. *Использованная* формула известна.
The formula **used** is well known.

Model 3. *Когда меня спросили*, я не мог ответить.
When asked I could not answer.

1. Текст, который нужно изучить, посвящен электрическому освещению. 2. Рисунок, который нужно показать, демонстрирует различные виды ламп. 3. Пройденный урок был посвящен электрическому освещению. 4. Лампы, представленные на рисунке, являются флюоресцентными лампами. 5. Когда лампа включена, она ярко светит. 6. Если дан рисунок, текст легко запомнить. 7. Нить накала светится, если она нагрета до накала. 8. Если флюоресцирующий материал активизирован, он излучает видимую энергию.

V. Translate the sentences using the models. Pay attention to the forms and functions of Gerund.

Model 1. **Lighting** the streets is very important. *(A subject)*
Освещение улиц очень важно.

Model 2. Deciding is **acting**. *(A part of the predicate)*
Решить значит *действовать*.

Model 3. I like **reading**. *(An object)*
Я люблю *читать*.

Model 4. The problem **for solving** is difficult one. *(An attribute)*
Задача *для решения* очень трудная.
In reading the text we paid attention to the description of different types of motors.
Читая текст, мы обращали внимание на описание различных видов моторов. *(Adverbial Modifier)*

1. The scientist went on working at his reseach. 2. Demonstrating his experiments was not an easy task. 3. They knew of his having spent much time investigating this phenomenon. 4. The motion of a body is changed as a result of its being acted upon by a force. 5. We know of his having been provided with new equipment. 6. By repeating experiments one gets more data. 7. On being set on a proper orbit the Earth's sputnik keeps on moving.

VI. In the following sentences find the Infinitive, Gerund and Participle II, state their functions and translate the sentences.

1. Lighting layout for building construction should be designed to provide the highest visual comfort and performance that is consistent with the type of area to be lighted and the budget provided. 2. The lamp to be selected for office, factories and commercial areas is the cool white lamp. 3. Fluorescent material when activated by the ultraviolet rays emits visible energy.

VII. Ask questions about the word-combinations in bold type.

1. Electric lamps **are made** in thousands of different types and colour. 2. **Fluorescent lighting** has a high efficiency as compared to incandescent lighting. 3. The cool white lamps is often selected for **offices, factories, and commercial areas.** 4. The term «high intensity discharge lamps» describes **a wide variety of lighting sources.** 5. **Mercury vapor lamps** contain arc tubes which are formed of fused quartz.

Lesson 5. POWER SOURCES

I. INDEPENDENT WORK

Laboratory Work

1. Skimming Reading

PRE-TEXT EXERCISES

I. a) Listen and repeat after the speaker. b) Practise the pronunciation of the following words. Memorize their Russian equivalents.

Rectification [ˌrektɪfɪkeɪʃn] выпрямление; advantage [əd'vɑ:ntɪdʒ] преимущество; ˌporta'bility портативность; 'absence отсутствие; exhaust [ɪg'zɔ:st] v. истощать; acci'dentally случайно; avoid [ə'vɔɪd] избегать; replacement [rɪ'pleɪsmənt] замена, замещение; hermetically герметически; facility возможность; nickel-cadmium cell никель-кадмиевый элемент; quote [kvout] v. цитировать; capacity емкость; мощность; производительность; pound фунт; worth [wə:θ] стоящий; reduce [rɪ'dju:s] v. сокращать; incorporate соединять, объединять.

II. a) Listen and repeat after the speaker. b) Notice the word-building elements and define their functions.

electron электрон — electronic электронный
rectify выпрямлять — rectification выпрямление
replace заменять — replacement замещение
probable вероятный — probability вероятность
portable портативный — portability портативность
capable способный — capability способность
accidental случайный — accidentally случайно
hermetic герметичный — hermetically герметически
usual обычный — usually обычно
complete полный — completely полностью
occasional случайный — occasionally случайно

III. Read abbriviations and memorize them.

d. c. — direct current	постоянный ток
a. c. — alternating current	переменный ток
e. m. f. — electromotive force	электродвижущая сила (ЭДС)
V — volt	вольт
A — ampere	ампер
r. m. s. — root-mean-square	среднеквадратичный
AH — ampere-hour	ампер-час
mA — milliampere	миллиампер

IV. a) Listen, repeat and memorize the following words and word-combinations. b) Check if you know their meanings.

Draw v. получать, тянуть, рисовать; a. c. mains напряжение основной цепи переменного тока; endanger подвергать опасности; rechargeable перезаряжаемый; tiny «button» cells крошечные «кнопочные» элементы; electric traction городской электротранспорт; seal герметизировать, закрывать; topping up нагромождение; low (high) load current низкий (высокий) ток нагрузки; quote along with назначать в зависимости от; step down ступенчато (дискретно) понижать; half-wave rectifier circuit схема однополупериодного выпрямителя; half-wave (HW) однополупериодный; full-wave (FW) двухполупериодный; diamond-shaped diode configuration ромбовидная диодная конфигурация; bridge rectifier мостиковый выпрямитель; centre tap средний вывод; conveniently удобно; bi-phase двухфазный; cheaply дешево.

V. Translate the question-answer units into English. Work in pairs.

1. Какие преимущества имеют батареи? (Батареи имеют преимущества в портативности и полном отсутствии переменной составляющей на выходе.) 2. Когда появляется опасность утечки? (Опасность утечки появляется в том случае, если истощенные батареи случайно будут оставаться слишком долго в аппаратуре.) 3. Насколько падает ЭДС никель-кадмиевой батареи? (ЭДС никель-кадмиевой батареи падает от 1,3 В до 1,1 В за время полезного разряда.) 4. В чем выражается емкость батареи? (Емкость батареи обычно выражается в ампер-часах.)

Text A

BATTERIES

I. a) Listen to the text, mind the English intonation. b) Read the text to yourself and grasp the main idea of it.

The necessary d. c. supplies for electronic circuits may be drawn from batteries or obtained by rectification of the a. c. mains. Batteries composed from separate cells have the advantage of portability and complete absence of a. c. components in their output. There is, however, a danger of leakage if exhausted batteries are accidentally allowed to stay too long in equipment; this may endanger many hundreds of pounds worth of circuitry through corrosion damage.

Rechargeable nickel-cadmium cells are available in an enormous variety of sizes, ranging from tiny «button» cells to the large batteries used for electric traction. The smaller sizes are usually hermetically sealed so that there is no risk of leakage and no need for topping up. They make an ideal power sources for portable electronics, since the need for battery replacement is avoided.

The e. m. f. of a nickel-cadmium cell falls from 1.3 to 1.1 V over the useful discharge range.

The capacity of a battery is usually expressed in ampere-hours (AH), which is the product of the discharge current and the time for which the battery will give that current. Because the capacity of most batteries is greater at low load currents than high load currents, the normal rate of discharge is usually quoted along with the capacity. The discharge rate is often stated in terms of time required to discharge the battery completely.

The capacity of the sort of dry cells used to power small electronic circuits is often in the region of 3 AH at the 100-hour rate, indicating that a current of 30 mA is available for 100 hours.

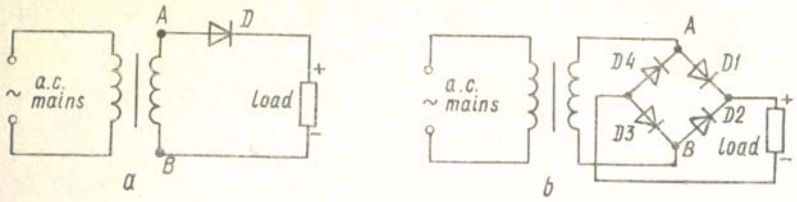

Fig. 1.9. The rectifier circuits:
a a simple half-wave (HW) rectifier circuit; *b* a full-wave (FW) rectifier circuit.

2. Average Reading

Text B

RECTIFICATION OF A. C.

I. a) Listen to the text. b) Read it (time limit is 3 min.). Find the part of it dealing with the resultant waveform. Translate it.

In the majority of power supply units, a transformer is used to step down the a. c. mains to the required voltage. A simple half-wave rectifier circuit is shown in Fig. 1.9*a*.

The diode only allows current to flow when terminal *A* is positive, cutting off when *A* is negative. The waveform of the resulting d. c. voltage across the load is shown in Fig. 1.10*b* where it may be compared with the original sinusoidal a. c. waveform in Fig. 1.10*a*. Since only the positive half-cycles are available, the d. c. consists of a series of indirectional pulses. This is known as half-wave (HW) rectification.

Fig. 1.9*b* shows an improved rectifier circuit which makes use of the whole a. c. waveform and is therefore known as a full-wave (FW) rectifier. Because of the similarity of the diamond-shaped diode configuration to the Wheatstone bridge, this particular circuit is called a bridge rectifier. We can easily sort out its operation by considering what happens on successive half-cycles of the transformer output. When *A* is positive, D_1 conducts to make the top end of the load positive, at the same time *B* is negative and D_3 conducts to the bottom end of the load. On the next half-cycle, *A* is negative and *B* is positive so that D_2 conducts from *B* to the top end of the load and D_4 conducts from *A* to the bottom end of the load. The resultant waveform is shown in Fig. 1.10*c* where it is clear that the FW d. c. waveform is of a more continuous nature than in the HW case. Notice that the frequency of the FW rectified waveform is double that of the original a. c., the negative half-cycle inverted and located between adjacent positive half-cycles.

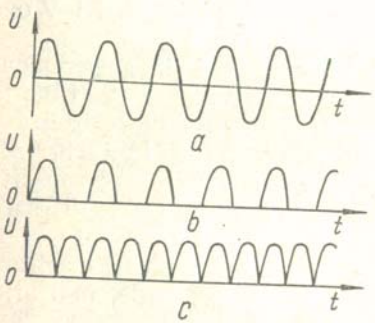

Fig. 1.10. The waveforms in rectifier circuits:
a the original sinusoidal a. c. waveform; *b* the waveform of the resulting d. c. voltage across the load in HW rectifiers.

ASSIGNMENTS

I. a) Choose the key sentences from the Text A and compare them with the title of the text. b) Say what the text is about.

II. Skim through the Text B and find the part of it dealing with half-wave rectification.

III. Find the part in the Text B containing information about an improved rectifier circuit which makes use of the whole a. c. waveform.

IV. Answer the following questions embracing the contents of the Text A and the Text B.

1. What advantages have batteries? 2. When is there a danger of leakage? 3. How does the e. m. f. of a nickel-cadmium cell fall? 4. How is the capacity of a battery expressed? 5. What is shown in Fig. 1.9*a*? 6. When does the diode allow current to flow? 7. What is shown in Fig. 1.9*b*?

V. Make up a plan of the text.

VI. Retell the text according to your plan.

VII. Speak on:

1. Waveforms in HW rectifier circuit.
2. FW bridge rectifier.

VIII. Prepare a dialogue on your own situation.

II. CLASSWORK

3. Close Reading

PRE-TEXT EXERCISES

I. Read the following words and memorize their Russian equivalents.

Fluctuation колебание; faithful верный, точный; overcome преодолевать; regulation регулирование; compare сравнивать; to take into account принимать во внимание; breakdown поломка, пробивание, пробой; sophisticated сложный, запутанный; Zener [zi:nə] diode диод Зенера.

II. Memorize the following terms.

Mains input voltage входное напряжение основной цепи переменного тока; step-down transformer понижающий трансформатор; p. d. (potential difference) разность потенциалов; IC circuit regulators регуляторы (стабилизаторы) на интегральных схемах; line regulation линейное регулирование.

Text C

VOLTAGE STABILIZERS

I. a) Read the text. b) Find the part of it dealing with typical characteristics of a Zener diode.

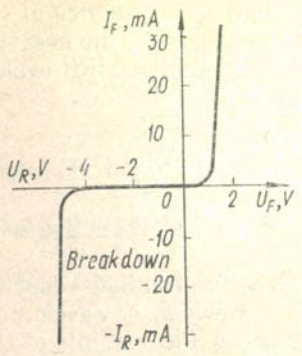

Fig. 1.11. Typical Zener diode characteristics.

The variable voltage circuits have one disadvantage in common. Any fluctuation in mains input voltage will be faithfully transmitted to the output so that, even if the load is constant, there will be variations in input voltage. These limitations are overcome in that class of circuits known as voltage stabilizers.

Zener or avalanche diodes make use of high doping levels to obtain artificially low reverse breakdown voltages. Typical characteristics of a Zener diode are shown in Fig. 1.11 where a 5 V breakdown is illustrated.

The p. d. across the diode in the breakdown condition is almost constant over a wide range of currents; this property is exploited in the simple voltage stabilizer circuit of Fig. 1.12*a*. Here the output voltage is equal to the diode p. d. and is therefore constant over a wide range of input voltages.

The degree of stabilization produced by a particular circuit can be specified as its stabilization ratio, which is obtained by measuring the percentage change in output voltage produced by a given percentage change in input voltage. Then stabilization ratio = $= \frac{\text{change in input voltage}}{\text{change in output voltage}}$. A basic Zener diode stabilizer like Fig. 1.12*a* usually gives stabilization ratios between 5 and 20, whilst some of the more sophisticated IC regulators give values over 1000.

ASSIGNMENTS

I. a) Divide the Text C into logical parts. b) Choose the key sentences and translate them.

II. Find the part in the Text C describing the degree of stabilization produced by a particular circuit.

III. Read the Text C attentively and answer the questions.

1. What is known as voltage stabilizers? 2. What is the output voltage in Fig. 1.12*a*? 3. How can the degree of stabilization produced by a particular circuit be specified? 4. How is the stabilization ratio obtained?

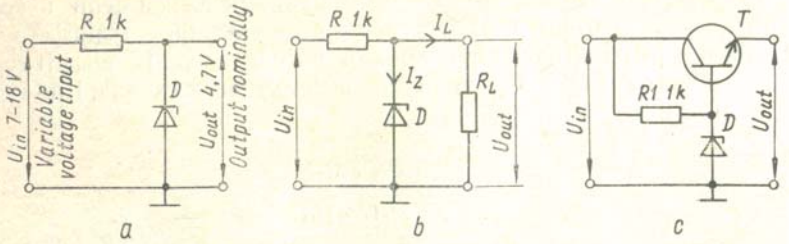

Fig. 1.12. Voltage stabilizer circuits:
a basic Zener diode; *b* Zener stabilizer with load; *c* Zener stabilizer with emitter follower.

IV. Speak on:

1. Voltage stabilizers.
2. Stabilization ratio.

V. Prepare a dialogue on your own situation.

VI. Translate the Text C to be sure you understand it well.

VII. Translate the question-answer units into English. Work in pairs.

1. Что собой представляют стабилизаторы напряжения? (Стабилизаторы напряжения — это такие схемы, которые обеспечивают почти постоянное выходное напряжение в широком диапазоне изменений входного напряжения.) 2. Какое выходное напряжение на рис. 1.12*a*? (Выходное напряжение на рис. 1.12*a* равно разности потенциалов на диоде и поэтому постоянно в широком диапазоне изменений входных напряжений.) 3. Как может быть названа степень стабилизации, создаваемая конкретной схемой? (Она может быть названа ее коэффициентом стабилизации.) 4. Как получают коэффициент стабилизации? (Коэффициент стабилизации получают путем измерения процентного изменения выходного напряжения, возникающего при заданном процентном изменении входного напряжения.)

VIII. Make up a plan of the text.

IX. Retell the text according to your plan.

X. Review the text in written form.

4. Searching Reading

PRE-TEXT EXERCISES

I. Match the following English words and word-combinations with the Russian ones.

permissible load current	эмиттерный повторитель
load robbing the diode current	избежать излишнего рассеивания
care must be taken	питать, подавать
involve considerable waste of power	допустимый ток нагрузки
avoid excess dissipation	необходимо обратить внимание
feed	нагрузка снижает диодный ток
emitter follower	включать значительный расход мощности

II. a) Give the initial forms of the following words. b) Find the sentences in the Text D with them and translate them.

Stabilizer, robbing, achieving, considerable, expensive, fortunately, dissipation, regulation, incorporating, adjusting, provision, reference, improvement, temperature, feeding.

Text D

IMPROVED STABILIZATION

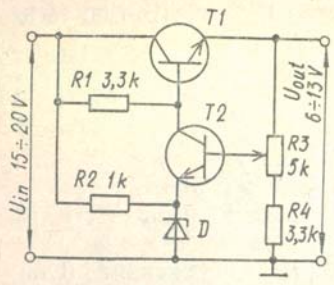

Fig. 1.13. The voltage stabilizer incorporating an error amplifier.

I. Read the following text and say what it is about.

The maximum permissible load current for the Zener stabilizer of Fig. 1.12*b* was about 8 mA, any greater load robbing the diode of current so that it could not give its normal Zener voltage. In most cases, load current is much greater than this must be supplied. One way of achieving this is simply to reduce the value of the series resistor R so that a greater current I flows to the diode and load; care must be taken, though, that the maximum rated power of the diode is not exceeded. This line of action can involve considerable waste of power and require an expensive high-power Zener diode. Fortunately, there is a more elegant solution to the problem of high current supplies.

If an emitter follower is added to the simple Zener stabilizer, the available output current is increased by the current gain of the transistor. In Fig. 1.12*c* such a circuit is shown. The maximum available output current is chiefly limited by the power dissipation of the transistor T; for a voltage drop of approximately 10 V, the output current should be limited to 80 mA to avoid excess dissipation. Lower voltage drops will allow greater currents to be drawn.

Regulation can be improved further by incorporating an amplifier in the circuit to compare the reference voltage from the Zener diode with a given fraction of the output voltage. Such a circuit, which also has provision for adjusting the output voltage, is shown in Fig. 1.13. Here, the voltage amplifier T_2 has R_1 as its collector load and feeds emitter follower T_1. The emitter T_2 is held at a constant voltage by Zener diode D. Potentiometer R_3 and resistor R_4 feed a given fraction of the output voltage to the base of transistor T_2. Since the emitter of T_2 is held at the Zener voltage, the circuit output voltage adjusts itself until the base of T_2 is 0.6 V (base-emitter drop) above the Zener voltage. By adjusting potentiometer R_3 and thus feeding back a different fraction, the output voltage may be varied.

Further improvement can be made by replacing T_2 with a differential amplifier (e. g. a 741 integrated circuit) and using a Darlington pair in the emitter follower instead of single transistor T_1. The differential amplifier virtually eliminates voltage drift with temperature, whilst the Darlington pair further lower the output impedance.

ASSIGNMENTS

I. Give the main idea of the Text D.

II. Answer the following questions embracing the contents of the text.

1. What was the maximum permissible load current for the Zener stabilizer of Fig. 1.12*b*? 2. When is the available output current increased? 3. What is the maximum permissible load current for the Zener stabilizer? 4. What is shown in Fig. 1.13? 5. At what voltage is the emitter T_2 held?

III. Make up the plan of the text.

IV. Retell the text according to your plan.

V. Speak on:

1. Stabilizer circuit used in the calculation.
2. Stabilizer incorporating an error amplifier.

VI. Prepare a dialogue on your own situation.

VII. Look through the latest magazines and find additional material about improved stabilisation. Discuss it.

III. GRAMMAR EXERCISES

I. Find Subjunctive Mood in the following sentences and translate them.

1. Although the same battery in the principle might be expected to give 40 A for 1 hour, in practice its capability would be very much reduced at this 1-hour rate. 2. The necessary d. c. supplies for electronic circuit might be drawn from batteries.

II. State the forms and functions of the Participles and translate the sentences with them.

1. Electrons, passing through the wire, create the current flow. 2. The discharge rate is often stated in terms of time, required to discharge the battery completely. 3. Experiments, being conducted in the field of electricity are based on Ohm's Law. 4. Studing the capacity of a battery we learned that it is expressed in ampere-hour (AH). 5. Having defined that a car battery may have a capacity of 40 AH at the 10 hour rate, we state that it can be deliver a current of 4 A for 10 hours. 6. If emitted by a strong source of light the rays will cast bright light. 7. I saw my neighbour examining his car. 8. I saw the car being examined by my neighbour. 9. Having been calculated the data is used in the experiment.

III. Pay attention to the Participial Absolute Construction in the following sentences and translate them.

1. Electrical energy being released, a force called electromotive force is developed. 2. An e. m. f. is present, whenever free electrons are moved from atoms, any of the above-named methods being used to produce such electron motion. 3. This charge being always negative, the e. m. f. is indirectional. 4. This field can be detected by the electroscope, the strength being measured by an electrometer. 5. If this is not provided for, electrons will accumulate at the end of the wire, their repulsion back along the wire stopping the current flow. 6. There two general methods by which a continuous supply of electrical charge is obtained; one being by means of a battery, and the other being by means of an electric generator.

Chapter II. ELECTRONIC DEVICES AND ELECTRONIC TECHNIQUE

Lesson 1. THERMIONIC VALVES

I. INDEPENDENT WORK

In the Laboratory

1. Skimming Reading

PRE-TEXT EXERCISES

I. a) Listen and repeat after the speaker. b) Practise the pronunciation of the following.

[i:] reach, field, meaning, increase, decrease, receive, heat, leader, lead, screen; [ai] might, sign, high, slightly; [ɔ:] bought, daughter; [ə:] term, third, circuit, certain, first.

II. a) Make sure that you know these words. Say what Russian words help you to guess their meanings. b) Repeat these words after the speaker.

Diode, electrode, cylindrical, positive, cathode, negative, electron, emission, voltage, thermionic, active, element, electronics, signal, diagram, symbol, proportion, anode, volt.

III. a) Listen, repeat and memorize the following words and word-combinations. b) Check if you know their meanings.

Thermionic diode вакуумный диод; thermionic valve электронная лампа; handle v. управлять; definite определенный; incandescent filament раскаленная нить накала (катод); velocity скорость; assisting field ускоряющее поле; negative space charge отрицательный пространственный заряд; repellent effect отталкивающий эффект; inhibiting effect сдерживающий, тормозящий эффект (влияние); for most small-scale amplification при усилении самого малого сигнала; high-power high-frequency signals мощные сигналы высокой частоты; it is usually held positive он обычно поддерживается положительным; with respect to the filament по отношению к нити накала (катоду); a small forward current flows протекает небольшой прямой ток.

IV. Analyse the constituents the following words consist of.

Cylindrical, emission, thermionic, electronics, amplifications, similarly, assisting.

Text A

THE TWO-ELECTRODE VALVE

I. a) Listen to the text, mind the English intonation. b) Read the text to yourself and grasp the main idea of it.

The thermionic diode is a two-electrode valve. It consists of a plate and filament. The filament is surrounded by a cylindrical plate, normally termed the anode. It is usually held positive with respect to the filament (cathode). If the anode is negative with respect to the cathode no current flows. As the anode is made positive, the current increases. The increase of the current stops when the full electron emission of the cathode is reached. When there is zero voltage at the anode a small forward current flows.

2. Average Reading

Text B

THE THERMIONIC DIODE

I. a) Listen to the text. b) Read it (time limit is 3 min.). c) Find the part of it dealing with the current-voltage characteristic of a thermionic diode.

The thermionic valve was the first active element in electronics. Although obsolete for most small-scale amplification, the valve still finds a place where high voltages must be handled or high-power high-frequency signals are involved (e. g. in radio transmitters). Fig. 2.1*a* shows a diagram of the diode (two-electrode valve). The incandescent filament is surrounded by a cylindrical plate, normally termed the anode because it is usually held positive with respect to the filament. Similarly, the filament is usually called the cathode. The circuit symbol for the diode is shown in Fig. 2.1*b*.

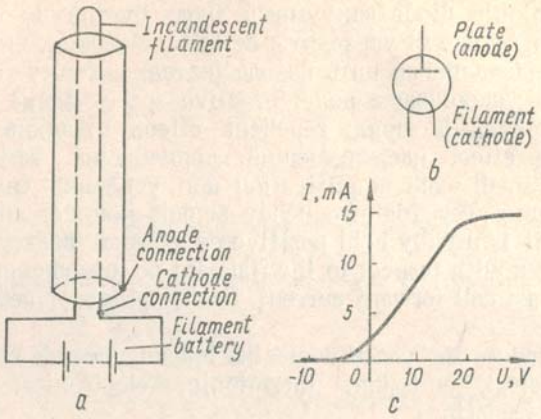

Fig. 2.1. The thermionic diode:
a the diagram; *b* the circuit symbol; *c* the typical current-voltage characteristic.

The current-voltage characteristic of a thermionic diode is shown in Fig. 2.1*c*. In the thermionic diode a small forward current flows when there is zero voltage across the device. This is because the electrons are emitted from the filament with a definite velocity. A small proportion of these electrons reaches the anode even when there is no assisting field.

As the anode is made slightly positive, more electrons are drawn towards it. If the anode is made negative with respect to the filament, the emitted electrons are repelled back to the cathode, and no current flows at all when the anode is several volt negative.

ASSIGNMENTS

I. a) Skim through the Text A and find the part of it dealing with the stop of the increasing of the current. b) Be ready to discuss the information about it.

II. Discuss the information about the two-electrode valve.

III. a) Find the part in the Text B containing information about the incandescent filament. b) Discuss it.

IV. Answer the questions embracing the contents of the Text A and the Text B.

1. What is the simplest thermionic valve? 2. What is a diode? 3. Why are electrons drawn toward anode? 4. What does the thermionic diode consist of? 5. What is the filament surrounded by? 6. How is it usually held with respect to the filament (cathode)? 7. When doesn't any current flow at all? 8. When does the current increase? 9. When does the increase of the current stop? 10. When does a small forward current flow? 11. Was the thermionic valve the first active element in electronics? 12. Why are the emitted electrons repelled back to the cathode?

V. a) Examine Figs. 2.1 *a*, *b*, *c* and describe them. b) Answer the questions.

1. What does Fig. 2.1*a* show? 2. What is the incandescent filament surrounded by? 3. Why is a cylindrical plate termed the anode? 4. How is the filament usually called? 5. What is shown in Fig. 2.1*b*? 6. Are the filament and plate clearly represented in Fig. 2.1*b*? 7. What is shown in Fig. 2.1*c*? 8. What current flows in the thermionic diode when there is zero voltage across the device? 9. Why does it happen?

VI. Make up a dialogue on one of the following situations.

1. A student wants to know about extensive usage of thermionic valves. A qualified specialist answers his questions on the topic.
2. Two students discuss the figures showing the diode.

VII. Speak on:

1. The usage of thermionic valves in electronic equipment.
2. The structure of the thermionic diode.

VIII. Translate the question-answer units into English. Work in pairs.

1. Что представляет собой диод? (Диод — это откачанная стеклянная колба с двумя электродами: катодом и анодом.)
2. Какая электронная лампа самая простая? (Самая простая электронная лампа — это диод.)
3. Когда электроны устремляются к аноду? (Электроны устремляются к аноду тогда, когда анод положительный.)
4. Когда эмиттированные электроны отталкиваются обратно к катоду? (Если анод отрицательный по отношению к катоду, то эмиттированные электроны отталкиваются обратно к катоду.)
5. Когда ток совсем не проходит? (Ток совсем не проходит в том случае, если анод имеет отрицательное напряжение в несколько вольт.)

X. Make a short summary of the Text B.

II. CLASSWORK

3. Close Reading

PRE-TEXT EXERCISES

I. Be sure that you know these words.

Add добавлять; piece кусочек; ratio отношение; contain v. содержать; look like быть похожим; permit v. разрешать; allow v. позволять; thus таким образом; window screen оконная сетка.

II. Memorize these words and word-combinations used in their specialized meanings.

Control управлять; amplifier усилитель; ratio отношение; radio-receiver радиоприемник; frequency частота; capacity емкость; attract притягивать; rectifier выпрямитель; grid сетка.

III. Find these word-combinations and terms in the Text C and translate the sentences containing them.