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ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
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ИНОСТРАННЫЙ ЯЗЫК.
АНГЛИЙСКИЙ ЯЗЫК
HARDWARE

Учебное пособие

*Утверждено редакционно-
издательским советом МГТУ ГА
в качестве учебного пособия*

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Unit 1

Input and Output Units (1/0 Units)

Грамматика:

Функция местоимения *it*.

Модальные глаголы и их эквиваленты.

Модальные глаголы: *will, would*.

Глаголы: *to make, to cause, to force*. Словообразование.

Ознакомьтесь с вокабуляром к тексту: “Input and Output Units”.

Постарайтесь запомнить значения слов и словосочетаний.

- | | |
|--|--------------------------------|
| 1) to take in }
to receive } information
to accept } | – принимать информацию |
| 2) to call | – называть |
| 3) to be interested in smith | – быть чем-то заинтересованным |
| 4) digit | – цифра |
| 5) to express
expression | – выражать
– выражение |
| 6) regularly | – обычно, регулярно |
| 7) presence | – присутствие |
| 8) absence | – отсутствие |
| 9) pulse (impulse) | – импульс, пульс |
| 10) vice – versa | – наоборот |
| 11) reader | – считывающее устройство |
| 12) to be acceptable | – быть приемлемым |
| 13) sequence | – последовательность |
| 14) to vary }
to alter }
to change } | – меняться |
| 15) according to | – в соответствии с |
| 16) per second | – в секунду |
| 17) to compare
comparison | – сравнивать
– сравнение |
| 18) tremendous | – огромный |
| 19) ratio | – соотношение |

1. Запомните следующие приставки и суффиксы.

Приставка *en-*:

able – to enable

rich – to enrich

sure – to ensure

large – to enlarge

Перед *p* и *b* *en* переходит в *em-*:

power – empower

body – embody

Суффикс *-en*:

- a) week – to weaken
light – to lighten
wide – to widen
black – to blacken
sharp – to sharpen
strength – to strengthen
- b) wool – woolen
silk – silken

Суффикс *-ern*:

- North – northern
- South – southern
- West – western
- East – eastern

Суффикс *-able (-ible)*:

- | | |
|-----------------------------|---------------|
| to move – movable | impossible |
| to eat – eaten | impartible |
| to translate – translatable | impermissible |
| to comfort – comfortable | |

2. Прочитайте и переведите *micro-* [maikrou].

- | | |
|----------------|------------------|
| microelement | microphone |
| microfilm | microphysics |
| microampere | microscope |
| microbiologist | microstructure |
| microcard | microprocessor |
| microclimate | microprogramming |
| microfarad | microsecond |
| microcopy | microvolt |
| microcosmic | microwave |
| micrometer | |

3. Дайте анонимы следующих слов, используя префиксы *in-*, *il-*, *ir-*, *im-*.

a) *in-*:

- | | | | | |
|----------|------|------------|---------|----------|
| adequate | firm | comparable | ability | complete |
|----------|------|------------|---------|----------|

b) *il-*, *im-*, *ir-*:

- | | | | | |
|----------|----------|----------|--------|-------|
| logical | resolute | probable | mobile | legal |
| possible | | | | |

4. Text.

Input and Output Units

The part of the computer that takes in information is called the input unit. The input unit or device provides the means of communications between the computer and the people who are interested in its operation.

To be accepted by the machine, information for digital computer has to be in the form of digits 0, 1, 2, 3, 4, 9 or characters A., B., C., D., These characters are regularly expressed for the computers proposes as six or seven 1`s and 0`s may be expressed for the computer: as punched holes (1) and blanks (0) in a card or a paper tape; as presence (1) and absence (0) of electrical pulse; or as polarized spots on a magnetic surface; for example, south – north is 1 and north – south is 0 or vice versa, etc.

So, the input unit makes possible communication from the other data – handling equipment and human being to the computer. It is the functional part of the computer that accepts the data to be operated on the programs for operating. It may consist of a key board operated tape reader, a paper tape reader, a card reader, and an electric typewriter.

The part of a computer that puts out information is called the output unit. The computer can easily put out information in a form acceptable to human beings. For example, the computer may give impulses to an electric type writer, so that the keys are energized in the proper sequence to type out a message in ordinary typed signs which human beings can read, etc.

The output of a computer is known to vary according to the capacity of the auxiliary equipment receiving the information. A computer can record on a magnetic tape at the rate of 1,000,000 characters per second. It can also control: a paper tape punch which will punch a paper tape at the rate of 100 characters per second; or a card punch which will punch per second about 300 standard punch cards of 80 columns; or a high-speed line-printer which will punch 20 lines per second, each of 80 to 120 characters. Input and output devices are usually called peripherals.

All this peripheral equipment is slow as compared with the computer. Consequently, for efficient use of the computer's tremendous calculating speed devices called buffers may be used. A buffer is known to be a storage device which is able to take in information at a very high speed from the computer and release the information at the proper speed for the peripheral equipment.

A human being is known to write by hand at the rate of about 30 words per minute, or to type at the rate of about 60 words per minute, or to talk at the rate of 200 or 250 words per minute. The ratio between a computer speed of about 40,000 words per second, and the top output speed of a human being of about 4 words per second, gives a factor of advantage to the computer of about 10,000 to 1 at the beginning of the 60's. Nowadays this ratio is much more.

Notes:

the means of communication	– средство связи
punched holes and blanks	– перфорированные отверстия и пробелы
a high-speed line printer	– высокоскоростное построчно-печатающее устройство
a factor of advantage	– коэффициент преимущества
ratio	– соотношение
data-handling equipment	– оборудование по управлению данными
keyboard operated tape punch	– ленточный перфоратор, работающий от клавишного пульта

5. Put questions to the text.

6. Translate the following sentences, paying attention to the words in the bold type.

- A.
- 1) What **kind** of a computer was it? – It was a digital computer.
 - 2) The computer can perform different **kinds** of operations.
 - 3) This **kind** of logical problem is very simple.
 - 4) Will you **kindly** explain to us the operation of this **kind** of machine?
 - 5) Be so **kind**, show us the new equipment.
- B.
- 1) **As** you already know logical relation in the computer are expressed by hardware.
 - 2) **As** the ordinary business adding machine has special equipment inside it, it can store information.
 - 3) An electronic computer can add, subtract, multiply, and divide **as well**.
 - 4) Natural sciences include mathematics, physics, chemistry, medicine, geology, biology, bionics **as well as** the engineering sciences and other fields of knowledge.
 - 5) **As** our professor was speaking of the history of computers, he mentioned Chebyshev and his great inventions.
 - 6) My friend works at a plant **as** an engineer.
- C.
- 1) Yesterday we heard an interesting lecture on modern electronics which was arranged **for** the students.
 - 2) He asked me **for** a book on microcomputers' organizations.
 - 3) The first computing machines were not reliable, **for** there were no good electrical units.
 - 4) The instructions are placed inside the computer, **for** the computer itself can select the numbers of instructions.

7. Functions of "it".

A. 1. The capacity of the functional assembly is 2 bytes. It can perform a number of logic operations. 2. A machine can perform reasonable operation. It can take information or data, perform a sequence of reasonable operations on the information it has received. 3. This is a hybrid computer. It combines some

properties of a digital and analog computers. 4. What is information? It is a set of marks or signs that have meanings.

B. 1. In winter it will snow. It will be very cold. It will be dark at 7 o'clock in the morning and it will be difficult to get up. 2. It was not easy to find the proper meaning of the new term; it was necessary to find it in a dictionary. 3. It is dark. It is late. It is half past eleven. 4. It is known that information is a set of marks or signs that have meaning. 5. It may be said that reasonable operations are mathematical and logic. 6. It often rains in autumn.

C. 1. What kind of a computer is it? It is a digital computer. 2. It is a dark room. 3. It is an uncomfortable chair. 4. It is a human being. 5. What is this man? It is a student of our group. 6. What is it? It is a handbook.

D. 1. It is pleasant to read books. 2. It is possible to take more than 2 books. 3. It is necessary to discuss the problem. 4. It is easy to learn some extracts.

E. 1. It is electrical engineering that deals with all kinds of electrical instruments and devices. 2. It was the invention of the computer that revolutionized the thinking process. 3. It was in 1944 when the first automatic computer appeared and began to operate. 4. It is an input unit that accepts the information from the outside the computer. 5. It was Pascal who invented the first mechanical computer. 6. It is in industrial technology and scientific development that electronic devices contributed greatly. 7. It was Norbert Wiener who was considered to be father of cybernetics.

8. Translate the following sentences, paying attention to the functions of the infinitive.

1. The assistant came to instruct students how to handle instructions. 2. The assistant came to be instructed by the professor. 3. The purpose of the computer is to solve complex problems. 4. To perform reasonable operations a computer must have a way of accepting data. 5. To add and subtract means to perform mathematical operations. 6. Chebyshev, a Russian scientist, was the first to construct arithmometer. 7. The input unit to be described here is a new device. 8. Punched holes in a card or a paper tape are used to represent 1's and 0's. 9. To carry out the instruction, the computer must accept the data in the form of punched holes and blanks. 10. In order to program, the programmer needs detailed data about the program and the way it is to be done.

9. Translate the following sentences, paying attention to modal verbs and their equivalents.

1. Information or data can be stored in the computer's memory or storage. 2. An analog computer is able to calculate by using physical values of numerical measurements. 3. The first automatic computer could operate at low speed. 4. Your paper may be published at our Institute. 5. My friend was happy when at last he might work at the computing centre. 6. Our students are allowed to visit the computing centre to see the operation of a new computer. 7. Every student must know that a digital computer performs reasonable operations. 8. Some operations

for this computer have to be changed and new instructions have to be added. 9. The instructions are recorded in the order they are to be carried out. 10. You should know the difference between the digital and analog computers. 11. We ought to help him to solve this problem by a personal computer. 12. According to the timetable you are to begin your classes at 8 o'clock. 13. Every student of our specialty has to know what a hybrid computer is. 14. We were permitted to attend the conference on cybernetics.

10. Modal verbs *will, would*:

A. 1. Don't stop me I will go there. 2. We can do much if we will. 3. I will call on you tomorrow. 4. I will tell him about it. 5. I will punish my son. 6. We will help him.

B. 1. Steam will not condense unless cooled. 2. When heated the metal will expand. 3. When subjected to high temperatures the metal will melt. 4. When used in this medium the transmitter will operate successfully.

C. 1. He was willing to become a scientist. 2. I am willing to pass all the exams in time. 3. They were willing in carry out the experiment successfully. 4. This student was willing to master the English language.

11. *Would, used to*:

A. 1. He would spend hours in the halls of the Hermitage. 2. He would repeat the text several times. 3. He used to come to see us every day. 4. When I was young I used to dance much. 5. I would sit for hours on the shore and would look at the sea. 6. He used to be very strong in his youth. 7. He used to live in the country.

B. 1. I asked him to do it, but he wouldn't. 2. The key wouldn't turn in the key hole until I oiled it. 3. I tried to persuade him but he wouldn't listen to me. 4. The criminal would not answer any questions. 5. I asked my friend to help me, but he would not. 6. He tried to start the engine but it would not. 7. Rontgen would carefully repeat his experiments to be sure of the results. 8. I asked him several times to give up smoking but he would not.

C. 1. The metal would rust in wet air. 2. Light would pass through glass but it would not pass through wood. 3. A magnet would attract pieces of iron. 4. Space travel would help us to know much more than we know now. 5. A radio-wave would travel in all directions.

D. 1. Would you tell me the way to the Hermitage? 2. I would like to buy a personal computer. 3. Would you help me? 4. I would like to answer your question.

12. Mind the meanings of the verbs *to make, to cause, to force*.

A. 1) They made me repeat the story. I was made to repeat the story. 2) I shall make him do it. He was made to do this. 3) I can make him believe anything I

choose. 4) It makes me think you are right. 5) The engineer made them repeat the test. They were made to repeat the test.

B. 1) If he won't act voluntary he must be forced. 2) The smile was forced. 3) I was forced to stay at home. 4) The war was forced upon them. 5) The uncertainly forced scientist to repeat the experiment.

C. 1) He caused me to go. 2) It caused my going. 3) What causes the plants to die? 4) The workers were caused to stop the machine due to the failure.

Unit 2

Memory or Storage Unit

Грамматика:

Функции причастия.
 Независимый причастный оборот.
 Объектный падеж. Participle II.
 Объектный падеж с инфинитивом.
 Именительный падеж с инфинитивом.
 Словообразование.

Ознакомьтесь с вокабуляром к тексту «Memory or Storage Unit».
 Постарайтесь запомнить значение слов и словосочетаний.

- | | |
|--|--|
| 1. number | – число |
| a number of smth | – ряд чего-либо |
| 2. intermediate result | – промежуточный результат |
| 3. to generate electric current, results | – вырабатывать электрический ток, результаты |
| 4. an access time | – время доступа |
| 5. to transmit to transfer | – передавать (информацию) |
| 6. fast computer | – быстродействующий компьютер |
| 7. to memorize (memorizing memorizable) | – запоминать |
| memorable material | – запоминающий материал |
| 8. cell | – ячейка (в памяти), батарейка |
| 9. drum | – барабан |
| 10. core | – стержень |
| 11. track | – дорожка |
| 12. inside the computer | – внутри компьютера |
| outside the computer | – снаружи компьютера |
| 13. register, general proposal register | – регистр, регистр общего назначения |
| 14. temporarily | – временно |
| 15. floating point register | – регистр с плавающей точкой |
| 16. create | – создавать |
| creation | – создание |
| 17. on the one hand | – с одной стороны |
| on the other hand | – с другой стороны |
| 18. layer | – слой |
| 19. nowadays | – в настоящее время |
| 20. permanently | – постоянно |

1. Запомните следующие приставки:

re- – со значением ‘снова, заново, вновь’

(во многих случаях соответствует приставке ‘пере-’):

to appear – to reappear

to consider – to reconsider

to construct – to reconstruct
 to elect – to re-elect
 to export – to re-export
 to open – to re-open
 to read – to re-read
 to sell – to resell
 to write – to re-write

anti- – ‘ПРОТИВО-’:

aircraft – anti-aircraft
 cyclone – anticyclone
 fascist – anti-fascist
 imperialist – anti-imperialist

non-:

conductor – non-conductor
 essential – non-essential
 ferrous – non-ferrous

counter- – ‘КОНТР-’:

to act – to counteract
 action – counteraction
 attack – counter-attack

sub- – ‘ПОД-’:

committee – subcommittee
 conscious – subconscious
 division – subdivision
 marine – submarine

2. Translate these synonyms and memorize them:

1. include, involve, contain, comprise
2. convert, change, transform
3. basic, fundamental
4. begin, start, commence
5. type, kind
6. numerous, many
7. reduce, decrease
8. important, significant
9. allow, permit, let
10. almost, nearly

3. Назовите антонимы следующих слов. Используйте префикс *un-*.

comfortable	known	expected	official	important
equal	limited	happy	pleasant	

4. Text.

Memory or Storage Unit

The part of digital computer which stores information is called storage or memory. The computer's memory stores the numbers to be operated on; it stores intermediate results that are generated during the course of computation and it stores the final results. The instructions themselves are also stored in the computer's memory.

There are two important factors about the memory unit: an access time and a capacity. The time required to transmit one computer word out of the memory to where it will be used is called the memory access time; it usually amounts to a few millionths of a second or less in modern fast computer. The speed of modern computers is the speed of access to their memories. The capacity of a computer is the quantity of data that its memory unit can hold.

There are many ways of memorizing information in memory cells of a digital computer. External memory or storage units may use magnetic tapes, magnetic drums, magnetic disks and floppy disks. The magnetic drum and magnetic disks we called a Direct Access, or Random Access Storage Device (DASD).

The magnetic disk is very similar to the magnetic drum but is based upon the use of a flat disk and with a series of concentric circles of magnetizable material, one read/write head being for each concentric circle, i. e., for each track. Memory units on magnetic disks may store more than 100.000 000 bytes.

Internal or main memory units were constructed of magnetic cores about 8 hundredths of an inch in diameter, each core storing one "yes" or "no", that is each core representing one bit of information.

Information that is stored inside the computer is stored in registers. electronic units of hardware in which the positioning of physical objects stores information. Each register holds one machine word consisting usually of 32 bits or 4 bytes. Registers hold information temporarily during processing. The slower models of registers use magnetic cores; the faster models use special electronic circuits or film memory devices.

Usually registers are of three types:

General Purpose Registers are sixteen registers; each bring able to contain one word. These registers are used for storing the integer operands taking part in binary arithmetic operations.

Floating Point Registers are four registers, each being able to contain a double word. These registers hold the operands taking part in arithmetic operations on floating point numbers.

Control registers form a group of registers differing from one model to another.

The development of semiconductor integration technology has led to creation of memories on LSI circuits. For constructing memory units on LSI circuits either bipolar or MOS memory are used. The access time of bipolar memory is about 100 nanoseconds. The access time of MOS memory is 500 nanoseconds. But on the other hand the density of memorizing elements allocation in the latter very high and amounts to 4 thousand memorizing elements for one chip. The latest achievements of modern electronics is creation of memories on electronic circuits made by spraying layers of different memorizing materials.

Nowadays the main memory RAM which is regularly used in microcomputers can accept new instructions or information from a peripheral device. Terms synonymous with the computer's working memory RAM are core, core storage, main memory, main storage, primary storage, read write memory. Other memories, such as ROM, of PROM, which are used in microcomputers as well, store instructions or information permanently. ROM, PROM, EPROM and EEPROM are all together called firm/ware which is "hard" software.

Notes:

during the course of computation – во время вычисления
 a read/write head – считывающая-записывающая головка
 internal (main) memory – оперативная память
 a film memory device – запоминающее устройство тонких пленок
 general purpose registers – регистры общего назначения

Mind the following abbreviations:

LSI – large scale Integration – интеграция высокого уровня
 MOS – metal oxide semiconductor – метал-оксид-полупроводник
 RAM – random access memory – память с произвольной выборкой
 ROM – read only memory – постоянная память
 PROM – programmable ROM – программируемая постоянная память
 EPROM – erasable programmable ROM – стираемая программируемая постоянная память
 EEPROM – electrically erasable PROM – электрически стираемая программируемая постоянная память
 firmware – программно-аппаратное обеспечение, встроенное в компьютер фирмой

5. Put questions to the text.

6. Translate the following sentences paying attention to the form and function of the participle.

1. The input consists of some devices using different means. 2. Performing addition the computer must have two members to be added. 3. When pressing the keys the operator makes the adding machine operate. 4. The operator pressing the keys makes the adding machine operate. 5. A device invented by the German mathematician Leibnitz could control automatically the amount of adding to be performed by a given digit. 6. Logical operations performed by a computer are comparing, selecting, sorting, and determining. 7. Discussing the advantages of the new memory unit the professor gave the students all the necessary explanations. 8. Having punched holes in a card the operator put it into the computer. 9. When passed through the reading equipment the characters are read in a way similar to a way used for a magnetic tape. 10. The density of memorizing elements in MOS memory is very high.

7. Translate the following sentences paying attention to the Absolute Participle Construction.

1. The first automatic computers of the 1940's not being very reliable, scientists went on improving them. 2. Specialists use computers widely, the latter helping in performing computations at great speeds. 3. Personal computers being used for many purposes, scientists go on improving their characteristics. 4. The computer SM-100 is used in industrial processes and scientific researches, its main function being to carry reasonable operations with numbers and to calculate complex problems. 5. With the current being on, the computer automatically begins operating. 6. A printer's line is usually between 60 and 150 characters long, with 120 characters being a common length. 7. The computer centre having a complicated organization, it takes time to understand how it works. 8. These considerations being incompatible with our decision, we had to appoint another discussion. 9. With the computer centre put into operation, we may start running our stimulation program. 10. The program having been tasted, we could recommend it for further application. 11. The computer being maintained properly, we completed our work in time.

8. Translate the sentences paying attention to the Objective Infinitive construction.

A. 1) We expect the experiment to be finished in time. We expect the experiment to have been finished 2) We believe this computer to find wide application. We believe this computer to have found wide application in solving such tasks. 3) We suppose them to carry out the experiment under hard operating conditions. We suppose them to have carried out the experiment. 4) I know him to be working in his study. I know him to have worked at our Institute.

B. 1) The teacher watched the students make the experiment. 2) We noticed the airplane approach 3) We heard the students discuss this problem. 4) We saw the water boil. 5) We observe a star fall down.

C. 1) I wish you to help us. 2) She wants us to come in time. 3) She wanted the experiment to be repeated. 4) The teacher wanted the text to be translated.

9. Translate these sentences paying attention to the Subjective Infinitive construction.

A. 1) The input and output units are known to be the parts of a computer. 2) This type of the output unit is said to use a punched paper tape. 3) Devices for accepting information are said to have been described in some magazines. 4) Automated Management Systems are known to have appeared quite recently. 5) Our programmers are known to be studying the theory of programming. 6) In ancient times the sun was thought to be revolving round the Earth. 7) Gagarin is known to be the first cosmonaut who made an orbital flight around the Earth. 8) The French mathematician Pascal is known to construct the first Mathematical computer. 9) Two remarkable features of electrons – radiation flows and undulation processes are known to have been previously used separately in independent classes of electric equipment.

B. 1) Human beings seem to be able to find facts or even logical consequences of facts in their memory according to association. 2) Historically, linear programming proved to be especially effective in analyzing industrial processes. 3) It turned out to be that electrons obtained and controlled in the new device have demonstrated a volumetric character. 4) This computer proved to be reliable. 5) This substance proved to be a good conductor. 6) These experiments appeared to be carried out in our laboratory. 7) The operator happened to have done such kind of job. 8) The new Computing Centre seems to be built in our city. 9) This man turned out to be our chief. 10) The engineer happens to carry out experiments in our lab. 11) He did not prove to be a good specialist.

C. 1) Nuclear energy is certain to be the prime source of heat energy. 2) He is sure to analyze the results of the test. 3) The dimensions of the body are likely to change under different temperature conditions. 4) Our laboratory is certain to be equipped with new computers. 5) Any information is certain to be represented by the binary system including two digits: one and zero. 6) We are unlikely to solve the task without a computer. 7) Reasonable operations are certain to be mathematical and logical. 8) This computer is certain to find wide application. 9) This computer is sure to be intended for solution of a wide range of scientific, economic, information and logical problems. 10) The experiment is very likely to be carried out next month.

Unit 3

The Floppy Disks. The hard disks. Chips.

Грамматика:

Независимый причастный оборот.
 Атрибутивные группы.
 Сослагательное наклонение.
 Условные предложения.
 Инфинитивные конструкции.

Ознакомьтесь с вокабуляром к текстам “The Floppy Disks”, “The Hard Disks”, “Chips”:

1. floppy (flexible) disk	– гибкий диск
2. medium	– среда
media, <i>pl.</i>	– средства
mass media	– средства массовой информации (СМИ)
3. over and over again	– снова и снова
4. inch	– дюйм
5. to house	– вмещать, помещать
6. envelope	– конверт
7. rigid	– жесткий
8. shell	– оболочка
9. to be used extensively	– широко использоваться
10. word processing	– обработка слова
11. a disk drive	– дисковод
12. to spin	– вращаться
13. spot	– пятно
14. search	– искать
syn. look for	
in search of smth	– в поисках чего-либо
15. somewhat	– некоторым образом
16. unlike	– в отличие от чего-либо
17. to be like	– быть подобным, похожим
18. platter	– пластина
19. as the power is on	– пока поступает энергия
20. to damage (the disk)	– разрушить (диск)
21. integrated circuits	– интегральные цепи
22. entire	– целый, полный
23. contents	– содержание

1. Запомните значения следующих приставок и суффиксов.

- а) **co-** – общность действия, сотрудничество:
- author – co-author
 - education – co-education
 - existence – co- existence
 - operation – co-operation

- b) **ex-** – БЫВШИЙ:
 ex-champion
 ex-minister
 ex-president
- c) **-ist**:
 scientist
 communist
 materialist
 physicist
- d) **-ism**:
 communism
 materialism
 capitalism

2. Translate these synonyms and memorize them.

1. place, put
2. control, govern, regulate
3. connect, join, couple
4. operate, work
5. ability, capability
6. amount, quality
7. usually, generally, commonly, ordinarily
8. completely, entirely
9. proper, suitable
10. with respect to, with regard to

3. Образуйте слова от глаголов, используя префикс **mis-** и переведите их.

- to hear
- to inform
- to interpret
- to lead
- to quote
- to understand

4. Поставьте вопросы к текстам.

The Floppy Discs

Floppy disks are a magnetic storage medium which can be recorded, erased and used over and over again. Floppy disks are flexible plastic disks which have several standard sizes. Full size floppy disks are 8 inches in diameter; minifloppy disks are 5 inches in diameter. Both full size floppy disks and minifloppy disks are

housed in a paper – like plastic envelope, usually black and remain in the envelope at all times.

Microfloppy disks are in sizes from 3 to 4 inches. They are housed in a rigid plastic shell of different design. The number of bytes that can be recorded in a floppy disk are about 80.000 to 1.000.000 and more. Floppy disks are used extensively in personal computers, small business computers, word processing, etc.

Floppy disks are used for direct-access storage, which means that data can be read at any point on the disk without passing through other, unneeded data. The user puts a floppy disk into a disk drive that spins it past a read/write head, which is actually an electromagnet. The drive spins the disk only when the information it contains is being accessed. When the head is reading, it detects the magnetized spots, changes them into electrical pulses, and sends them to the CPU. When writing, the head magnetizes spots on the disk. The head finds the right track and sector to read or write the data. This way, the drive finds the data without searching through the whole disk.

The Hard Disks

Most new computers today, even notebooks, come with hard disk drives installed. The units work somewhat like floppy disk drives; read/write heads read and write data to and from the disk. Unlike a floppy disk, however, a hard disk consists of two or more rigid, metallic, circular platters. In addition, the hard disk spins as long as the power is on. As rigid disk can be spun faster without wobbling, hard disk drives are much faster than floppy disk drives. Speeds of hard drives are measured in milliseconds (ms); lower numbers mean higher speeds. A speed of 85 milliseconds, for example, is slow for a hard disk drive: 40 ms is better, and 13 to 20 ms is fast and desirable.

Each platter in a disk has two read/write heads, one for each side of the platter. The read/write heads cannot move independently of each other, however, because they are all attached to a single access arm. Each platter has the same number of tracks. All of the number-1 tracks on all the disk surfaces form a cylinder, the number-2 tracks on all surfaces form another cylinder, and so on.

The number of cylinders per hard disk equals the number of tracks per surface. When the read/write heads are reading, they detect the magnetized spots and change them into electrical pulses that are sent to the CPU. When writing the heads magnetize spots on the disk. Most drives have self-parking heads so that the heads can't move and damage the disk when the computer or drive is moved.

Chips

Chips are miniaturized electronic circuits. A chip contains several hundred thousand electronic components (transistors, resistors, etc.). The terms synonymous to chip are intergraded circuits and microelectronics. There are some types of chips. Logic chip is a single chip which can perform some or all the functions of a processor. A microprocessor is an entire processor on a single chip.

One or more microprocessors are used in a portable or desk computer. Larger computer may use several types of microprocessors. Memory chips contain from several hundred to hundreds of thousands of bits (storage cells). Ram chips are the computer's primary internal working storage and require constant power to keep their bits. Chips, such as ROMs, PROMs, EPROMs are permanent memory chips and hold their contents without power.

Notes:

rigid shell – жесткая оболочка
 unlike a floppy disk – в отличие от гибкого диска
 in addition – в дополнение
 to spin – вращаться
 to wobble – качаться, колебаться

5. Translate these sentences, pay attention to the Subjunctive Mood.

A. 1. It was necessary that programmer should examine the computer. 2. It is desirable that he should perform the work. 3. It is natural that this student pass all the exams in time. 4. It is important that the plan should be discussed in detail. 5. It is unusual that this student should fail the exam. 6. It is requested that the article should be translated. 7. It is right, that you come in time. 8. It is recommended that the experiment should be repeated. 9. It is of vital importance that peace should be preserved. 10. It is essential that the computer should be always in operating conditions.

B. 1. The student suggests that the meeting should be postponed. 2. The programmer ordered that the computer should be examined. 3. Our chief suggests that we should study artificial languages. 4. The engineer demanded that the tool should be properly adjusted. 5. The professor insists that she conduct the test herself. 6. They proposed that his report should be illustrated with diagrams.

C. 1. The students should be attentive lest they should make mistakes. 2. Repeat this word so that you might remember it. 3. They covered the goods with canvas lest they be damaged by rain. 4. She opened the window lest it should be stuffy in the room. 5. The students were shown the devices so that they should get an idea of its design. 6. The students must work hard lest they should fail the exams. 7. Put down the rule lest you should forget it. 8. You should be careful with device so that it should operate without failure.

D. 1. I wish I were at the concert now. 2. I wish I had been at the concert yesterday. 3. I wish I could help you. 4. I wish I had been able to help you. 5. I wish it were not so cold. I wish the last summer had not been so cold. 6. I wish I knew the way to the station. I wish I had asked the way to the station. 7. I wish I had something to read. I wish I had taken some books to read. 8. I wish I were in London. I wish I had been to London last month. 9. I wish I had watched TV yesterday. 10. I wish somebody had taught me to play chess. 11. I wish I had switched on the radio earlier. 12. The teacher wishes the students were not so lazy. 13. I wish I had a sister. 14. I wish my family were large.

E. 1. If he works hard, he will learn English well. If he worked hard he would learn English well. Worked he hard, he would learn English well. If he had work hard last year he would have learnt English well. 2. If i have the book I shall give it to you. If I had the book I should give it to you. Had I book I should give it to you. If I had this book yesterday I should have given it to you. 3. If the film were interesting I should see it. If I were not busy I should help you. Had I time I should read this book. If it were not raining we should go for a walk. If I were a doctor I should help you.

F. 1. It is important that the program be introduced be carefully examined. 2. The English mathematical Charles Babbage suggested that a machine for mathematical computation should be built. 3. Machine processing information demands that the information contained in the problem should correspond to the information stored in the machine words and in the structure of sentences. 4. It is desirable that cooperation among various research centres be stimulated. 5. The temperature should be increased in order that the process should reach its normal state. 6. While it is not necessary for all engineers to become expert computer programmers, it is desirable that they should have at least the basic knowledge of programming.

G. 1. If there were no computers we would not be able to solve many complicated problems. 2. The great speed of electronic computers has made possible a large number of technological advances which otherwise would not have taken place. 3. Not long ago the very idea of using computers for industrial purposes would have seemed fantastic. 4. He speaks about computers as if he were an expert on them. 5. Were it possible to discover some common logic in all "natural" languages such as English, French, German, etc., then it would perhaps be possible to translate from one languages to another simply by giving a machine a set of formal rules and a dictionary of words and phrases in both languages.

6. Define the infinitive constructions and translate the sentences.

1. We know B. Pascal to be the first inventor of the mechanical computer. 2. B. Pascal is known to be the first inventor the mechanical computer. 3. In the middle of the 17th century it was possible for B. Pascal to invent only the mechanical computer. 4. The possibility for the problem to be solved is illustrated by the given formula. 5. Human beings seem to be able to find facts or even logical consequence of facts in their memory according to association. 6. The magnetic recording is done on a disk which permits information to be stored or read at one or several points on it. 7. The students were explained the high-speed memory unit to use the LSI circuits. 8. For results to be obtained an instruction has first been put into computer.

Unit 4

A Central Processing Unit

Грамматика:

Модальные глаголы. Повторение.
 Модальные глаголы с перфектным инфинитивом.
 Словообразование.
 Герундий.

Ознакомьтесь с вокабуляром к тексту “A Central Processing Unit”.

- | | |
|---------------------|---|
| 1. a nerve | – нерв |
| nervous | – нервный |
| 2. since | – с тех пор, с, поскольку (не путать с существительным “a science” – наука) |
| 3. to apply | – применять к чему-л. |
| 4. to execute | – выполнять |
| syn. to perform | |
| to fulfill | |
| to carry out | |
| 5. within | – в пределах чего-л. |
| 6. convenient | – удобный |
| syn. comfortable | |
| 7. previous | – предыдущий |
| 8. the latter | – последний из двух |
| the former | – первый из двух |
| 9. at a time | – за один раз |
| 10. accumulator | – наполнитель |
| 11. in order (that) | – для того, чтобы |
| 12. to facilitate | – содействовать, облегчать |

1. Запомните значение следующих суффиксов:

-age:

to leak – leakage
 to marry – marriage
 to pass – passage

-ance, -ence:

important – importance
 different – difference
 insistent – insistence
 resistant – resistance

-dom:

free – freedom
 wise – wisdom
 king – kingdom

-hood:

brother – brotherhood
 child – childhood
 man – manhood
 mother – motherhood
 neighbor – neighborhood

2. Translate these synonyms and memorize them.

1. image, representation
2. period, time, cycle
3. steady, fixed, stable
4. device, gadget, instrument
5. supply, furnish, provide
6. show, indicate, illustrate, demonstrate
7. investigate, research, explore
8. accurately, exactly
9. hence, so, then, therefore, consequently
10. appear, become, visible

3. Образуйте слова с префиксом **under-** и переведите их.

to value
 to pay
 to charge
 production

4. Прочитайте текст.

A Central Processing Unit

The central processing unit (CPU) or central processor is the nerve of any Computer system, since it coordinates, controls the activities of all the other units and performs all the arithmetic and logic processes to be applied to data. All program instructions to be executed must be held within the CPU, and all the data to be processed must be loaded first into this unit. It is convenient to consider the central processor to have three separate hardware sections: an internal or main memory, an arithmetic and logic unit, and a control unit. The role of the internal

memory was discussed more detailed in the previous lesson. Now let us discuss the latter two sections.

The CPU has two functions: it must (1) obtain instructions from the memory and interpret them, as well as (2) perform the actual operations. The first function is executed by the control unit. This unit in its turn must perform 2 functions: it must (1) interpret the instruction; then, on the basis of this interpretation (2) tell the arithmetic and logic units what to do next. The latter function is accomplished through the use of electronic signals. According to these two functions we can separate the part of the control unit that interprets or decodes the instruction called the instruction decoder from the part that generates the control signals called the control generator.

An instruction having been transmitted to the instruction decoder, where it is interpreted the control generator senses this interpretation and then produces signals that tell the arithmetic unit which operation to perform. It also generates signals that choose the proper numbers from the memory and sends them to the arithmetic and logic unit at the proper time; and when operation has been performed, other control signals take the results from the arithmetic and logic unit back to the internal memory. After an instruction has been executed, the control generator produces signals that cause the next instruction to go from the memory to the instruction decoder. In this way the instructions are performed sequentially.

The second function of the CPU is performed by the arithmetic and logic unit which does the actual operation. This unit is capable of performing automatically addition, subtraction, multiplication, division, comparing, selecting and other mathematical and logical operations. Consider now what happens in the arithmetic and logic unit while an instruction is being executed. In most computers only one word at a time can be transferred between the arithmetic/logic unit and the memory. Hence, to perform an operation involving two arguments, the first argument must be transferred from the memory to the arithmetic/logic unit and stored there temporarily while the second argument is being transferred. The special memory cell in the arithmetic/logic unit for this purpose is called the accumulator. The operation being performed, the result is formed in the accumulator before it is transmitted back to memory.

Next consider the instruction decoder that interprets instruction. In order that the instruction decoder performs its function, it must constantly refer to the instruction being interpreted during the time control signals are being set up. To facilitate this, while an instruction is being executed it is stored in a special memory cell called the instruction register, located in the instruction decoder.

There is another memory cell located in the instruction decoder called the current address register. The contents of this register is always the memory address from which the instruction being executed came. The reason for this related to the fact that the address of the present instruction was given as part of the previous instruction.

For the computer designer to understand the work of CPU is quite necessary.

Notes:

to execute – выполнять, осуществлять
 to obtain instruction – получать инструкцию
 to accomplish – выполнять, совершать
 a control generator – генератор управления
 an instruction decoder – дешифратор команд
 to sense – считывать, воспринимать
 at the proper time – в надлежащее время
 in this way – таким образом
 sequentially – последовательно
 hence – следовательно
 accumulator – накапливающий сумматор
 during the time control signals – во время формирования сигналов
 управления

5. Put questions to the text.

6. Translate this text paying attention to the modal verbs.

– These computers are very sensitive. They may be affected by the weather. You should pack them very carefully. The boxes must not be kept in the open air under any circumstances. You will have to load them into the wagon as soon as possible. We were permitted to have a special car. Hurry up, we are to arrive at the railway station at 3 o'clock.

– You need not worry. *I shall be able* to do everything in time.

– You ought to do it in time. You are allowed to leave the office earlier.

7. Translate these sentences, pay attention to the modal verbs with perfect infinitive.

CAN What are we to do? We could play chess.
 We could have played chess if he had not been in a hurry.
 Why did not you buy this book? My son could read it in the original.
 It is unusual that he should know the contents of the book. He cannot have read it in the original.

MAY Tell me who can type? This clerk may type. But I don' know.
 The clerk may be typing your letter. I shall inquire.
 The clerk may have typed your letter. I shall see.

MUST I cannot get him on the phone. He must go to bed early.
 He has taken off his clothes. He must be going to bed.
 I could not get him on the phone yesterday. He must have gone to bed early.

OUGHT TO	One ought to return books. Lizzi ought to have returned me the book. I need it badly.
SHOULD	If you are not going to miss lessons you should have got up earlier.
NEED	You need not reread this English novel. I shall give you a new one. You need not have reread this English novel. I should have given you a new one.
WOULD	He would prefer not to tell them what has happened. If he had not been forced to tell, he would have preferred not to tell them anything.

8. Translate these sentences paying attention to the modal verbs with Perfect Infinitive.

1. The modern development of interplanetary research could not have been achieved without computers 2. Something must have happened to the control unit, it does not work 3. The computer may have been repaired. The computer should not have been installed in this room. 4. The programmer ought to have been more careful to avoid errors. 5. If it had not been for the computer we could not have processed the data. 6. You need not have processed this information. It is of no importance. 7. This unit may have been broken accidentally. 8. You could have asked him about it. 9. Can you have believed them?

9. Translate the following sentences paying attention to the *ing*-forms.

1. According to the principles of their work computers are subdivided into three parts: analog, digital and hybrid. 2. When applying mathematical methods to the solving of technical problems engineers are most interested in obtaining a finite numerical result. 3. Proper relation between theory and practice must be observed in training young specialists. 4. Mathematical tables are necessary aids for perforating computational work. 5. The students get the practical training when they are working at various plants. 6. In modem computers LSI circuits and RAM/ROM memories are used for executing sophisticated operations. 7. A memory unit is used for storing information. 8. Electronics being used not only in industry but in many other fields of human activity as well, one should have idea of what it is. 9. The processing of messages can be performed sequentially, i.e. a new task is not given until the currant one is completed. 10. Having conducted many experiments scientists proved that electricity had an atomic character. 11. The fast electronic machines, such as microcomputers are effective for carrying out complicated computations.

10. Translate these sentences. Pay attention to the use of gerund.

1. Listen to me instead of interrupting. 2. On hearing the news he was greatly surprised. 3. She listened to us attentively without saying a word. 4. He reached the station by taking a taxi. 5. In writing a dictation she made a lot of mistakes. 6. In reading the poem I missed a line. 7. After writing a letter I went to the post-office. 8. On reading the text I learned all the new words. 9. They reached the river by crossing the bridge. 10. He translated the story without using a dictionary. 11. Before ringing him up I spoke to his mother. 12. Upon reading the book I gave it back to my friend. 13. Correct your mistakes instead of reading your composition. 14. Excuse me, for being late. 15. He gave me a book for reading.

11. Translate the sentences.

1. The higher the temperature, the lower is the conductivity of a metallic conductor. 2. The lower the temperature the better is the conductivity of a metallic conductor. 3. The slower the electrons move, the easier it is to stop them and return them to the space charge. 4. The more heavily the material is doped, the lower its electrical resistance will be. 5. The hotter the cathode becomes; the more electrons it emits per unit of time. 6. The greater the load resistance of a tube amplifier the greater is the voltage amplification.

12. Translate the following sentences paying attention to the comparison degrees.

1. A computer does arithmetic problems million times faster than any person. 2. Any device is simpler than a human being. 3. Another advantage in this case is that less power is required to run a computer. 4. The smaller the computer, the faster it can work. 5. The better we know the Universe, the better we know our Earth. 6. The symbols representing intermediate results appear later in the flow chart of the right-hand side of the equation. 7. In this case the instruction puts the number U into the largest number cell.

Unit 5

Microcomputer and microprocessor design

Грамматика:

One, ones

Бессоюзные придаточные предложения.

Инфинитивные конструкции.

Сослагательное наклонение.

Герундий.

Суффиксы прилагательных.

Ознакомьтесь с вокабуляром к тексту «Microcomputer and microprocessor design»:

1. no single electronic innovation	– ни одна электронная инновация
2. impact	– влияние, воздействие
3. tiny	– маленький, крошечный
4. to power by smth	– оснащать чем-л.
5. Literally	– буквально
6. to occur	– происходить
7. large scale	– крупномасштабный
8. sophisticated	– усложненный
9. assembly line	– линия сборки
10. significantly	– значительно, существенно
11. to support	– обеспечивать
12. a power supply	– электропитание
13. complete	– полный
14. mainframe	– центральный блок обработки данных
15. ability	– способность
16. to fetch	– вызывать (данные из памяти)
17. to increment	– увеличиваться
18. to reside	– размещаться (в памяти)
19. to retain	– удерживать, сохранять
20. to stock	– запасать
21. micro – microcomputer	– запоминающее устройство с переходом
Josephson junction memory	Джозефсона
22. just as ... so	– точно также как... так и

1. Запомните значения следующих суффиксов и окончаний:

-ous:

courage – courageous

danger – dangerous

fame – famous

glory – glorious

-y:

cloud – cloudly
 dirt – dirty
 fog – foggy
 rain – rainy
 sun – sunny
 thirst – thirsty
 wind – windy

– суффиксы глаголов:

false – to falsify
 simple – to simplify
 pure – to purify

-ize:

character – to characterize
 crystal – to crystalize
 sympathy – to sympathize

2. Translate these words.

	a	b	c	d
1	equation	equal	equally	equalize
2	useful	user	uselessness	usage
3	valued	valuation	valuable	valueless
4	variety	various	variously	variation
5	operate	operator	operative	operation
6	electric	electricity	electrician	electricity
7	dependable	dependence	dependency	dependent
8	import	importance	important	importer

3. Match these synonyms.

- | | |
|-----------------|-------------------|
| 1. with respect | a. zero |
| 2. control | b. retain |
| 3. connect | c. indicate |
| 4. naught | d. usually |
| 5. keep | e. govern |
| 6. denote | f. name |
| 7. generally | g. entirely |
| 8. call | h. give rise to |
| 9. cause | i. with regard to |
| 10. completely | j. join |

4. Define the meanings of the suffixes and prefixes in the following words and translate the words.

actor, action, interaction, active, activity, dependent, independent, dependable, dependence, independence, dependency, formation, formative, former, formless, formular, formulation, relative, relatively, relation.

5. Прочитайте текст и обсудите его.

Microcomputer and microprocessor design

Since the transistor was invented, no single electronic innovation has had such an impact as microcomputer. Powered by tiny semiconductor chips containing computing elements with the same power and functions previously found only in large scale computers, these microcomputers systems are now being applied to literally thousands of application. Microcomputers are automating assembly lines providing the heart of sophisticated electronic games, making “intelligent” computer peripherals even faster. This revolution is occurring because microcomputers are very inexpensive, easy to implement into a system, and significantly reduce the time cost of product development.

The microcomputers were the first computers to use a single microprocessor chip as the processor. Personal computers and small business computers are microcomputers. 8 bit microcomputers usually support only one user terminal and have a maximum of 64 Kb of memory. 16-bit microcomputers may support several user terminals and have a maximum of 1 million bytes of memory. As the power of microcomputers increases, they can be used in two ways. They can be used either as the central computer (providing processing for several user terminals), or as a more powerful single computer for an individual user.

A microprocessor is the tiny processor used, as mentioned above, in microcomputers. The microprocessor requires a power supply and memory to be a complete computer. Microprocessors are also used in microcomputers, mainframes and peripheral devices, as well as in all industrial and consumer products which use a computer. As usual processors of all microprocessors have the ability to fetch (obtain from memory) and execute a limited set of instructions to perform addition and subtraction on a binary word, and to input (take in) and output (put out) binary data. After fetching an operational code from the program in memory, while this operation is being executed, the program counter is automatically incremented by one unit. At the completion of the instruction, it is then ready with the address for the following program instruction. In many situations the microprocessors have many more capabilities that application requires.

In conclusion some words more about single – chip microcomputers. They, where control functions and memory circuits reside on one chip, are beginning to appear in consumer appliances. One of their attractions is the fact that programmable read – only memories (PROMs) that can be included on these chips require no electrical power to retain data. In addition to providing permanent

storage, PROMs also allow one type of micro to be stocked as a standard component that can be programmed individually to provide a variety of control functions.

Just as computer circuit have grown smaller, so too have memory circuits. Moreover, new technologies such as the bubble memory and Josephson – junction memory show the ability for providing more compact memories that retain data with little or no applied power. These new memories allows micros to be used where power is not always available and conventional read – only memories do not have enough capability.

6. Put questions to the text.

7. Translate these sentences, pay attention to the words *one, ones*.

A. 1. There are many ways of classifying materials. The one we shall speak about is based on the ability of material to conduct electricity. 2. There are many types of robots; the ones, we are going to discuss today, are the robots of the third generation. 3. The new computer is more powerful than the one put into service last year 4. That semiconductor device is more efficient than the one under consideration.

B. 1. One must not cross the street under the red light 2. One should remember this law. 3. One must not increase the voltage any more. 4. One cannot live without air. 5. One ought to respect the old. 6. To measure the value of power one is to use a wattmeter. 7. One should attend lectures. 8. One ought to reconsider the matter. 9. One must know the facts before discussing the problem. 10. One need not buy the book. One can borrow it from the library. 11 One was to test the equipment before working with it. 12. One can rest a little. 13. One need not speak in whisper. Nobody is sleeping. 14. One may give the answer tomorrow. 15. One may smoke here.

8. Translate these sentences, paying attention to the infinitive constructions.

1. To do this work is may task.
2. My task is to do this work.
3. The work is to be done in time
4. To be done in time the work must be done properly.
5. He is the first to have done the work.
6. I came here to do this work.
7. The work to be done must be done in time.
8. I believe the work to be done.
9. I want you to do this work.
10. I waited for you to do this work.
11. The work seems to have been done.
12. He seems to be doing this work.
13. The work is likely to be done.

9. Read and translate the following sentences, paying attention to the objective infinitive constructions and for phrases with the infinitive.

1. Our engineers want the complex problem to be solved by computers. 2. It is quite necessary for the programmer to understand the work of all units of a computer. 3. We watched the floppy disk begin to operate. 4. The speed of the computer may be found by measuring the time which is required for it to transmit one word out of the memory to where it will be used. 5. We asked the lab assistant to show us the new computer operation. 6. There is a good reason for us to use this kind of the bubble memory in a personal computer. 7. Information has to be in the form of digits or characters for a digital computer to perform reasonable operations.

10. Translate these sentences, pay attention to the Subjunctive Mood.

1. It is desirable that all complex industrial processes should be automatically controlled. 2. The inventors suggested that special electronic robots (should) be used to research the radioactive materials. 3. Measuring instrument have to be carefully maintained lest they (should) give incorrect readings. 4. It is essential that industrial application of electronics should include control of temperature, weight, heating, speed regulation, etc. 5. The specialist suggested that special electronic devices should be used in the field of theatrical and industrial lighting. 6. It is quite possible that semiconductors should be used in electronic devices lest they be bulky and expensive. 7. Pyotr Capiza suggested that low temperature physics (should) be taking rapid progress in our country. 8. It was decided that minicomputer should be reintroduced so that they facilitate the implementation of very large systems. 9. Be careful with this device lest it be broken again.

11. Translate into Russian sentences with Gerund.

1. There are a lot of things to consider before making a final decision. 2. Century after century passed without such discoveries being made. 3. This line of thinking has proved to be very useful in designing such structures. 4. X-raying is the basic principle in revealing the structure of these atoms. 5. Protecting the personnel against radioactive radiation holds an important place in working out the scheme. 6. The problem could not be solved without necessary experiments being carried out. He spared no effort in preparing his work for the press. 8. He began by explaining the situation in the North. I am so grateful for helping me.

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