МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ЖИТОМИРСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ ІМЕНІ ІВАНА ФРАНКА

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Computer Hardware
Апаратне забезпечення

Практикум з англійської мови для студентів фізико-математичного факультету спеціальностей: «Інформатика», «Математика та інформатика», «Фізика та інформатика»

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Апаратне забезпечення: практикум з англійської мови для студентів фізико-математичного факультету спеціальностей: «Інформатика», «Математика та інформатика», «Фізика та інформатика». – Житомир: Вид-во ЖДУ ім. І. Франка, 2012. – 124 с.

Практикум складається з 8 розділів, текстів для самостійного опрацювання, додаткового читання та додатків. Тексти підібрані з оригінальної науково-технічної літератури та містять необхідну термінологію зі спеціальності. До складу розділів входять лексико-граматичні та комунікативні вправи, що спонукають студентів до монологічного, діалогічного та полілогічного мовлення, тести для перевірки набутих знань, та завдання для розвитку творчої діяльності студентів. Вправи та тести побудовано на мовному матеріалі, який використовується в текстах розділів. Лексичний мінімум подається у вправах кожного розділу. Додається підсумковий тест для перевірки знань всього курсу. Глосарій містить необхідний мінімум спеціальної лексики.

Для студентів неспеціальних факультетів денної, заочної та дистанційної форми навчання, які вивчають інформатику. Пізнавальний характер текстів зацікавить не лише зазначене коло студентів, але й усіх тих, хто поглиблено вивчає англійську мову.

Introduction

Вступ

Інформаційне суспільство висуває нові вимоги до професійної підготовки сучасного фахівця, що передбачає досконале знання комп'ютерної техніки. Автори посібника намагались надати підібраному матеріалу не тільки інформативну, але й професійну спрямованість. Посібник-практикум складений відповідно до вимог Програми з англійської мови для університетів (5-річний курс навчання): Проект. (Київ, 2001 р.) та рекомендацій Ради Європи щодо вивчення іноземних мов.

Основна мета посібника надати необхідну професійно-спрямовану інформацію з вивчення апаратного забезпечення комп'ютерної техніки, формувати та закріплювати вміння використовувати дану лексику під час перекладу текстів за фахом на українську мову та виробити у студентів навички невимушеного спілкування англійською мовою в обсязі тематики.

Практикум складається з 8 розділів, текстів для самостійного опрацювання, додаткового читання та додатків. Тексти підібрані з оригінальної науково-технічної літератури та містять необхідну термінологію зі спеціальності. До складу розділів входять лексико-граматичні та комунікативні вправи, що спонукають студентів до монологічного, діалогічного та полілогічного мовлення, тести для перевірки набутих знань, та завдання для розвитку творчої діяльності студентів. Вправи та тести побудовано на мовному матеріалі, який використовується в текстах розділів. Лексичний мінімум подається у правах кожного розділу. Додається підсумковий тест для перевірки знань всього курсу. Глосарій містить необхідний мінімум спеціальної лексики.

Практикум призначений для студентів неспеціальних факультетів денної, заочної та дистанційної форми навчання, які вивчають інформатику. Пізнавальний характер текстів зацікавить не лише зазначене коло студентів, але й усіх тих хто поглиблено вивчає англійську мову.

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Unit 1

Task 1. Read the following international words and give their Ukrainian equivalents:

informatics [ˌɪnfə'mætɪks] *n*
symbol ['sɪmbəl] *n*
computer [kəm'pju:tə] *n*
personal ['pə:snl] *adj*
portable ['pɔ:təbl] *adj*
universal [ˌju:nɪ'və:səl] *adj*
element ['elɪmənt] *n*
false [fɔ:ls] *adj*
discussion [dɪ'skʌʃn] *n*
performance [pə'fɔ:məns] *n*
virtual ['və:tjuəl] *adj*
opposite ['ɔpəsɪt] *adj*
binary ['baɪnərɪ] *adj*
process ['prəusəs] *n*
code [kəud] *n*
system ['sɪstɪm] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:

['hɑ:dweə] [dɪs'pleɪ] ['ki:bɔ:d] [ɪlek'trɔnɪk] [dɪ'vaɪs] ['spredʃi:t] ['pə:snl] ['fʌŋkʃən] [kəm'pəunənt] [tʃɪp] [pə'fɔ:məns] [kəm'pju:tə keɪs] ['pauə sə'plaɪ] ['mʌðəbɔ:d] ['və:tjuəl] [ɪm'bedɪd] ['eksɪkju:t] ['tɪpɪkl] ['bʌtn] ['ɪləstreɪt] ['sə:kɪt] ['prəusesə] [ə'dæptə] ['dɪdʒɪt] [θru:] [kəud] [pə'rɪfərəl] [kɑ:d] ['ju:zə] [tʃɑ:dʒ] [keɪdʒ] ['ækses] [ˌju:nɪ'və:səl] [ˌmaɪkrəu'prəusesə]

Task 3. Practise saying the following words and word-combinations. Pay attention to the pronunciation:

display, keyboard, electronic, device, spreadsheet, personal, function, graphic dialog, component, performance, user, computer case, power supply, motherboard, virtual reality, cage, embedded systems, execute, typical, button, illustrate, circuit, processor, adapter, digit, through, computer code, peripherals, expansion card, computer hardware, chip, access, charge, data, microprocessor, binary system.

Task 4. Look at the following notes and decide which can be done by computers. Then, listen to some students expressing their opinions and tick (√) the boxes. How correct were your guesses?

a) teach a grammatical structure ☐
b) print out information or compositions ☐
c) help students to revise for tests or exams ☐
d) help students with their personal problems ☐
e) enable students to contact other people around the world ☐
f) encourage students to work together ☐
g) have information available when you need it ☐
h) stop an argument in the classroom ☐
i) help students with pronunciation ☐
j) teach new vocabulary ☐

Task 5. Read the text and make an outline of it.

Physical parts of a computer

A computer is the universal technical system, well-off expressly to execute the certain sequence of operations of the certain program. One man can use the personal computer unassisted auxiliary personnel. Cooperating with an user takes a place through many environments, from an alphanumerical or graphic dialog by a display, keyboard and mouse to the devices of virtual reality.

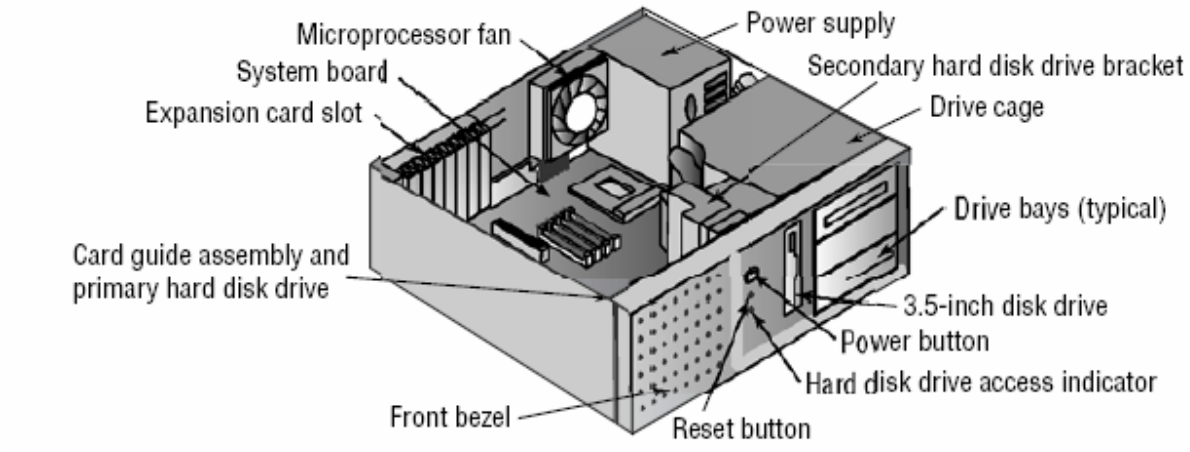
Computer hardware is the physical part of a computer, including the digital circuitry. Most computer hardware is not seen by normal users. It is in embedded systems in automobiles, microwave ovens, compact disk players, and other devices.

A personal computer (PC) is a computing device made up of many distinct electronic components that all function together in order to accomplish some useful task (such as adding up the numbers in a spreadsheet or helping you write a letter). By this definition, note that we're describing a computer as having many distinct parts that work together. Most computers today are modular. That is, they have components that can be removed and replaced with a component of similar function in order to improve performance. Each component has a very specific function.
The components in most computers include:

- The case
- The power supply
- The motherboard
- The processor /CPU
- Memory
- Storage devices
- The adapter cards
- Display devices
- Ports and cables

Figure 1 shows an example of a typical PC and illustrates how some of these parts fit together.

The components of a typical PC



The microprocessor, also known as the central processing unit (CPU), does the actual computing. Memory chips hold data and processing instructions for use by the microprocessor. The computer receives data through input devices, such as a keyboard. Storage devices, which include disks and tapes, hold data and instructions for transfer to memory. Output devices, such as a television like monitor, show results of the computer work.

In desktop PC's, certain components are housed in a box often called simply the computer. Because these components include the microprocessor, the box is sometimes referred to as the CPU. The remaining components are separately housed units called peripherals.

There are two groups of circuits: (1) the control unit and (2) the digital logic unit, sometimes called the arithmetic/logic unit. The control unit directs and coordinates the operations of the entire computer according to instructions stored in the memory. The digital logic unit performs the computations. Almost all microprocessor chips also contain memory devices.

Computer code. All data enter the processor as electric charges that represent numbers. The computer uses only two levels of charge. One level represents the digit (numeral, or number symbol) 0, and the other level represents 1. Thus, the computer uses the binary numeration system. The word binary comes from a Latin word meaning two at a time. In the binary system, a 0 or a 1 by itself is called a bit, which is short for binary digit.

Number symbols in the binary system are much different from those in the decimal system, which we use in almost all other cases. For example, the symbol 10 in the binary system corresponds to 2 in the decimal system.

In the computer, different combinations of bit charges represent numbers, letters, and portions of pictures and sounds-all the data that the computer processes and all the instructions used to process the data. The computer uses combinations of eight bits, called bytes.

Glossary

hardware ['hɑ:dweə] *n* – апаратне забезпечення
display [dɪs'pleɪ] *n* – показ; *v* – показувати
keyboard ['ki:bɔ:d] *n* – клавіатура
device[dɪ'vaɪs] *n* – пристрій
spreadsheet ['spredʃi:t] *n* – велика електронна таблиця
computer case [keɪs] *n* – системний блок
power supply ['pauə sə'plaɪ] *n* – блок живлення
bezel [beɪʒ] *n* – віконце, панель, що прикриває дисковод чи будь-який інший пристрій
motherboard ['mʌðəbɔ:d] *n* – материнська плата
embedded [ɪm'bedɪd] – вмонтований
execute ['eksɪkju:t] *v* – виконувати
button ['bʌtn] *n* – кнопка
circuit ['sə:kɪt] *n* – коло, схема
digit ['dɪdʒɪt] *n* – цифра
chip [tʃɪp] *n* – мікросхема
user ['ju:zə] *n* – користувач
access ['ækses] *n* – доступ
charge [tʃɑ:dʒ] *n* – заряд
data ['deɪtə] *n* – дані, інформація

Exercises

1. **Learn the new words and use them in short phrases of your own.**

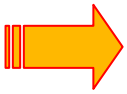
2. **Show that you can analyse what you have read. Render the plot of the text (in 5-6 sentences):**

1. What is the main topic of the text?
2. What components do the most computers include?

Follow these steps: a) plan your essay before you start to write the substance;
b) note down keywords you want to use;
c) put your ideas into a logical order and write the linking text.

3. **Make up the words given in jumbled letters. All of them are parts of computer hardware.**

yetb
yisdlap
aserpiperlh
rdaapet
ncutniof
cwsiht



4. **Read the text and fill in the gaps from below. Render it into Ukrainian. Give it a head-line. Discuss with your partner the main computer function.**

Computer is a device that processes _____with astonishing speed and accuracy. Computers process information by helping to create it and by displaying it, storing it, reorganizing it, calculating with it, and communicating it to other computers. Computers can process numbers, words, still pictures, moving pictures, and sounds. The most powerful computers can _____tens of billions of calculations per second.

The computer has changed the way we work, learn, communicate, and play. Virtually every kind of organization throughout the world conducts business with computers. Students, teachers, and research scientists use the computer as a _____.

Almost all computers are electronic _____computers. They are electronic in their use of electric current (a flow of electric charge) to carry information. They are digital in that they process information as units of electric charge representing numbers. The word digital means having to do with numbers.

To enable a computer to process information that is not numerical – such as words, pictures, or sounds-the computer or some other device must first digitize that information. A device digitizes information by translating it into charges that represent _____. After the computer processes the digitized information by working with the charges, the computer or a device connected to the computer translates its results back into their original form.

(**perform, numbers, digital, learning tool, information**)

5. **What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.**

a) Most computers today are modular.
b) Memory chips hold data and processing instructions for use by the motherboard.
c) Computer software is the physical part of a computer, including the digital circuitry.
d) Number symbols in the binary system are the same as those in the decimal system.
e) The digital logic unit performs the results of the computations.
f) The computer receives data through input devices, such as a motherboard.
g) The computer uses combinations of five bits, called bytes
h) The components in most computers include the case, the motherboard, display devices and storage devices.

6. **Find in the text the English equivalents for the following expressions and make up 4 sentences of your own:**

Користувач, електронний пристрій, набір мікросхем, виконувати команди, показ, материнська плата, блок живлення, десяткова система, електричний заряд, апаратне забезпечення, миша, доступ, пам'ять, обчислення, пристрої виводу, одиниця, цифрові комп'ютери, зберігати інформацію, отримувати результат, визначена функція.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

7. **Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:**

a) Which feature is common to all computers?

_____

b) What can computers process?

_____

c) What combinations does every computer use?

_____

d) How is computer information measured?

_____

e) How does a device digitize information?

_____

f) What does the word "digital" mean?

_____

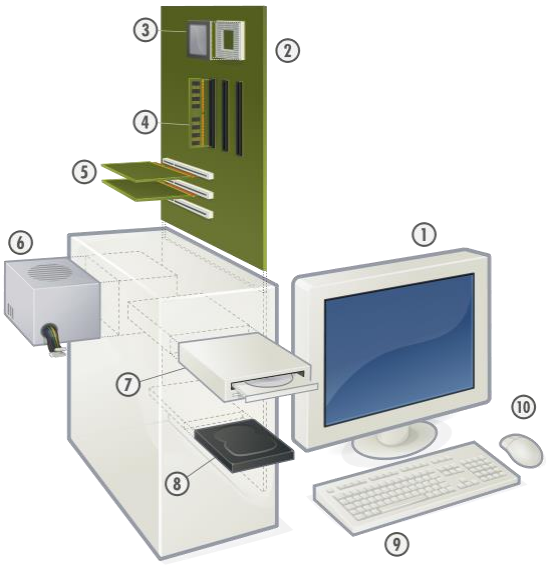
g) What does the digital unit perform?

_____

h) In which way do the computers receive data?

_____

8. Look at the picture and match the components that make up a typical PC. Compare your answers with your partner and discuss them.



A. CPU (microprocessor)
B. Random access memory
C. Expansion cards
D. Power supply
E. Optical disk drive
F. Motherboard
G. Monitor
H. Mouse
I. Keyboard
J. Hard disk drive

9. Read the underlined words aloud. Translate and discuss this information in groups. Computer information is measured in multiples of bytes. A kilobyte equals 1,024 bytes; a megabyte, 1,048,576 bytes; and a gigabyte, 1,073,741,824 bytes. For simplicity, 1 kilobyte, 1 megabyte, and 1 gigabyte are often said to equal 1,000, 1 million, and 1 billion (1,000 million) bytes, respectively.

10. Review Questions

Choose the correct item:

1. Computer information is measured in multiples of _____.
a) bits
b) volts
c) bytes
d) watts
2. Computer hardware is the_____ part of a computer.
a) main
b) physical
c) dynamic
d) soft
3. The computer uses only _____levels of charge.
a) three
b) one
c) two
d) four
4. The word digital means having to do with_____.
a) words
b) letters
c) numbers
d) information
5. _____is the computing and control part of the computer.
a) motherboard
b) keyboard
c) memory
d) Central Processing Unit

6. The word binary comes from a Latin word meaning _____.
    a) three at a time
    b) two at a time
    c) four at a time
    d) one at a time

Test your grammar

Exercices

I. Fill each gap with a preposition from the box.

of	over	by	with	of	into	in	of

1. Computers may be grouped _____four categories.
2. A network consists _____ a group _____computers connected ____ telephone lines or other communications cables.
3. Millions of individuals and organizations communicate _____one another _____a network of computers called the Internet.
4. This means that instead____ spending time going to libraries, you can get the information you need much faster on your computer.
5. Computers represent information _____binary code, written as sequences of 0s and 1s.

II. Read and memorize the plural of the following nouns:

Singular		Plural
criterion	критерій	criteria
maximum	максимум	maxima
minimum	мінімум	minima
analysis	аналіз	analyses
axis	вісь	axes
thesis	тезис, положення	theses

III. Give plural of the following nouns:

mouse _____, bit _____, computer _____, disk _____, symbol _____, child _____, shelf _____, user _____, life _____, woman _____, category _____.

IV. Complete the chart with the missing verb forms:

Infinitive	Past Simple	Past participle
to grow		
to come		
to leave		
to find		
to bring		
to become		
to feel		
to be		
to choose		
to have		
to see		
to set		
to win		
to speak		

V. Learn the examples and translate them into Ukrainian (The Indefinite Tenses):

1. Computers process information with astonishing speed and accuracy.
2. My little brother plays computer games every day.
3. Memory chips hold digitized data.

_____
_____
_____

1. I entered the university three years ago.
2. They bought a new computer case last week.
3. He replaced the motherboard yesterday.

_____
_____
_____

1. I think I'll store this information.
2. We shall meet again one day.
3. He will send you a message in a few days.

_____
_____
_____

VI. Translate into English:

1. Комп'ютери відіграють важливу роль в сучасному житті.
2. В Інтернеті завжди знаходиш необхідну інформацію.
3. Комп'ютерна система складається з п'яти основних блоків.
4. Я вирішив продовжити навчання в магістратурі.
5. Вчора декан нашого факультету відзначив кращих студентів.
6. Після закінчення університету я буду працювати в школі вчителем інформатики.
7. Як правило, ми виконуємо тести після вивчення модуля.
8. Вчора ми працювали в комп'ютерному класі.
9. Ми не прийдемо на співбесіду.
10. Я пам'ятатиму, що пообіцяв виконати це завдання вчасно.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

VII. Make up questions to the following statements:

1. A bit is the basic unit of information in the binary numbering system.

_____

2. The word digital means having to do with numbers.

_____

3. Early users of computers wrote their own software.

_____

4. Students, teachers, and research scientists use the computer as a learning tool.

5. Home users of computers do some of the same kinds of work on personal data.

Notes on the topic studied:

Unit 2

Task 1. Read the following international words and give their Ukrainian equivalents:

concept ['kɔnsept] *n*
bit [bɪt] *n*
valid ['vælɪd] *adj*
byte [baɪt] *n*
visible ['vɪzəbl] *adj*
categorize ['kætɪg(ə)raɪz]*v*
standard ['stændəd] *adj*
component [kəm'pəunənt] *n*
diagram ['daɪəgræm] *n*
disk [dɪsk] *n*
vertical ['və:tɪkəl] *adj*
electronic [ɪlek'trɔnɪk] *adj*

Task 2. Read the phonetic transcription. Practise your pronunciation:

[keɪs] [ni:d] [kəm'pəunənt] ['mʌðəbɔ:d] [dɪ'zaɪn] [dɪ'menʃən] [dɪ'vaɪs] ['flɔpɪ] [saɪz] [rek'tæŋgjulə] ['desktɔp] [ɪn'tə:nl] [taɪp] [kəm'pju:tə] ['sju:təbl] [ɪn'kləuʒə] [beɪʒ] ['skænə] ['dɪdʒɪtl] [ɪks'pænʃən] ['fɪgə] ['kæmərə] ['ju:nɪt] [pə'rɪfərəl] [kə'nekʃən] ['pauə sə'plaɪ] ['sə:kɪt] [ski:m] [ə'tætʃ] ['vəultɪdʒ] ['tɪpɪkl] ['waɪə] [wɪð'ɪn] [rɪ'septəkl] [tæb] ['pə:pəs] ['fæʃən] [ə'pɪərəns] [prə'vaɪd] [grɪd] [kɔn'və:t]

Task 3. Practise saying the following words. Pay attention to the pronunciation:
computer case, motherboard, design, dimension, device, floppy, size, component, rectangular, desktop, internal, type, computer, suitable, enclosure, beige, scanner, digital, expansion, figure, camera, unit, expansion device, mounting platform, color, made of, similar drives, internal layouts, vertically or horizontally, peripheral, connexion, power supply, circuit, scheme, attach, connector, voltage, typical, wire, receptacle, tab, purpose, fashion, various devices, convert, different appearance, disk drives, form factor devices, within, to provide power, dual connectors, ATX motherboards, standby, grid, floppy drive connector.

Task 4. Look at the pictures. Name these different types of computers (PC, Mini, Mainframe or Supercomputer), then say where this equipment can be used.

Task 5. Read the text and make an outline of it.

The Case

A computer case (also known as the computer chassis, cabinet, tower, box, enclosure, housing or simply case) is the enclosure that contains the main components of a computer. All the computer's components mount to the inside of the case - the case is essentially the mounting platform for all the electronic devices that make up the computer. Typically, cases are square or rectangular boxes, usually beige in color (although the current trend is for all-black cases and matching peripherals), and made of steel, aluminum, or plastic.

Figure 1 shows an example of a typical computer case.

Cases are primarily categorized in two ways: by their physical size (full tower, mini tower, and so on) and by the type of motherboard they are designed for (such as AT, ATX, or Mini-ATX). Remember that in addition to their type, cases must also be designed for the motherboard type. You could have two cases with the same physical dimensions and look, but with completely different internal layouts suitable for their motherboards.

Case styles vary in the way they normally sit (vertically or horizontally) as well as the number of device bays they support. A device bay (or *bay* for short) is a large slot into which an expansion device fits (usually a disk drive of some sort). There are two bay sizes: 5 1/4-inch (typically used for CD-ROM and similar drives) and 3'/2-inch (used for floppy, Zip, and hard disk drives).

Several common PC case styles are in use today. These styles include:

- Full tower
- Mid tower
- Mini tower
- Midi tower
- Desktop
- Slimline

Power Supply

The computer's components would not be able to operate without power. The device in the computer that provides this power is the *power supply.*

Figure 2 shows typical power supplies.

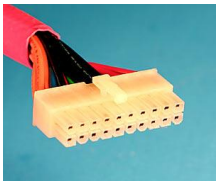
A power supply converts 110 volt or 220 volt AC current into the DC voltages that a computer needs to operate. These are +3.3 volts DC, +5 volts DC, -5 volts DC (ground), +12 volts DC, -12 volts DC (ground), and +5 volts DC standby. The 3.3 volts DC and +5 volts DC standby voltages are used only by ATX motherboards, not AT motherboards.

Power supplies are rated in watts. A *watt* is a unit of power. The higher the number, the more power the power supply (and thus your computer) will use. Most computers use power supplies in the 250- to 400-watt range.

Power supply connectors

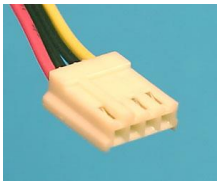
Typically, power supplies use the following types of connectors to power the various devices within the computer. Each has a different appearance and way of connecting to the device. Additionally, each Type is used for a specific purpose:

- **PC Main power connector P1,** that goes to the motherboard to provide it with power. It has 20 or 24 pins.
- **ATX12V 4-pin power connector P4**. The second connector that goes to the MB.
- **4-pin Peripheral Molex power connectors** that go to the various disk drives.
- **4-pin Floppy drive power connectors.**
- **Serial ATA power connectors.**
- **IEC connector C14** to attach the power supply to the local power grid.



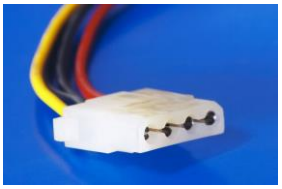
Main P1

P4



Floppy

Serial ATA



Molex

Floppy drive power connectors

Floppy drive power connectors are most commonly used to power floppy disk drives and other small form factor devices. This type of connector is smaller and flatter than any of the other types of power connectors. These connectors are also called *Berg connectors.* Notice that there are four wires going to this connector. These wires carry the 2 voltages used by the motors and logic circuits: +5VDC (carried on the red wire) and+12VDC (carried on the yellow wire) plus 2 black ground wires.

AT system connectors

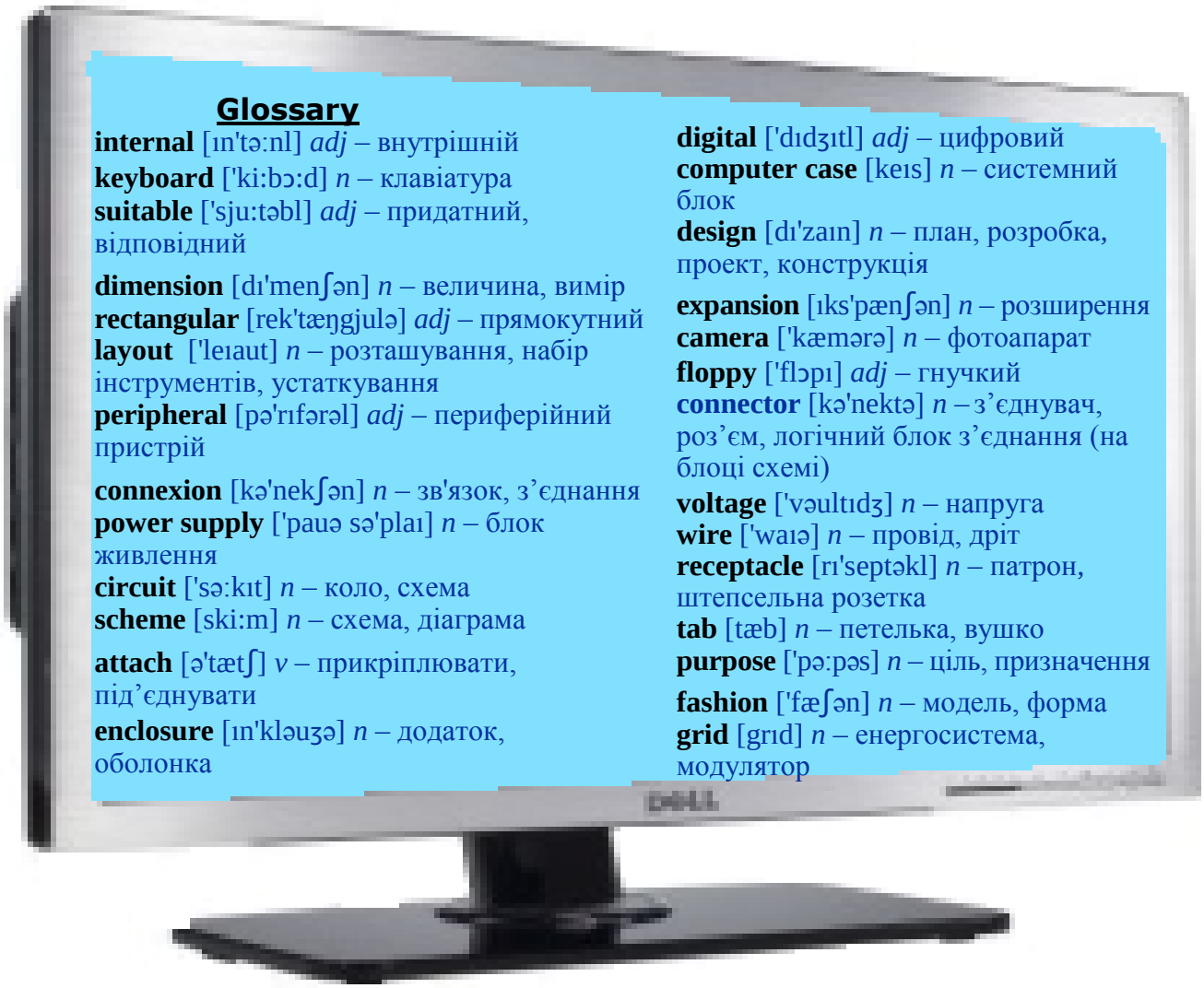
The next type of power connector is called the AT system connector. There are two 6-wire connectors, labeled P8 and P9. They connect to an AT-only motherboard and deliver the power that feeds the electronic components on it. These connectors have small tabs on them that interlock with tabs on the power connector on the motherboard. If there are two connectors, you must install them in the correct fashion. To do this (on most systems), place the connectors side by side with their black wires together, and then push the connectors onto the receptacle on the motherboard. It is important to note that only computers with AT and baby AT motherboards use this type of power connector. Most computers today use the ATX power connector to provide power to the motherboard.

ATX system connector

The *ATX system connector* (also known as the *ATX motherboard power connector)* feeds an ATX motherboard. It provides the six voltages required, plus it delivers them all through one connector: a single 20-pin connector. This connector is much easier to work with than the dual connectors of the AT power supply.

Standard peripheral power connector

The *standard peripheral power connector* is generally used to power different types of internal disk drives. This type of connector is also called a *Molex connector.* This power connector, though larger than the floppy drive power connector, uses the same wiring color code scheme as the floppy drive connector.



Glossary

internal [ɪn'tə:nl] *adj* – внутрішній
keyboard ['ki:bɔ:d] *n* – клавіатура
suitable ['sju:təbl] *adj* – придатний, відповідний

dimension [dɪ'menʃən] *n* – величина, вимір
rectangular [rek'tæŋgjulə] *adj* – прямокутний
layout ['leɪaut] *n* – розташування, набір інструментів, устаткування
peripheral [pə'rɪfərəl] *adj* – периферійний пристрій

connexion [kə'nekʃən] *n* – зв'язок, з'єднання
power supply ['pauə sə'plaɪ] *n* – блок живлення
circuit ['sə:kɪt] *n* – коло, схема
scheme [ski:m] *n* – схема, діаграма

attach [ə'tætʃ] *v* – прикріплювати, під'єднувати
enclosure [ɪn'kləuʒə] *n* – додаток, оболонка

digital ['dɪdʒɪtl] *adj* – цифровий
computer case [keɪs] *n* – системний блок
design [dɪ'zaɪn] *n* – план, розробка, проект, конструкція

expansion [ɪks'pænʃən] *n* – розширення
camera ['kæmərə] *n* – фотоапарат
floppy ['flɔpɪ] *adj* – гнучкий
connector [kə'nektə] *n* – з'єднувач, роз'єм, логічний блок з'єднання (на блоці схемі)
voltage ['vəultɪdʒ] *n* – напруга
wire ['waɪə] *n* – провід, дріт
receptacle [rɪ'septəkl] *n* – патрон, штепсельна розетка
tab [tæb] *n* – петелька, вушко
purpose ['pə:pəs] *n* – ціль, призначення

fashion ['fæʃən] *n* – модель, форма
grid [grɪd] *n* – енергосистема, модулятор

Exercises

1. **Learn the new words and use them in short phrases of your own.**

_____
_____
_____
_____
_____
_____
_____

2. **Show that you can analyse what you have read. Render the plot of the text "Power Supply":**
   a) without details (in three or four minutes' time).
3. **Give a brief summary of the text "The Case".**
4. **Ask one of your fellow-students questions about a computer case and types of connectors. Use the active vocabulary of the texts.**
5. **Make up a story on the basis of the information gained in 5-6 sentences.**
   Follow these steps: a) plan your essay before you start to write the substance;
   b) note down keywords you want to use;
   c) put your ideas into a logical order and write the linking text.

_____
_____
_____

_____
_____
_____
_____

6. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) The case is essentially the mounting platform for all the electronic devices that make up the computer.
b) The case is the plastic cover that surrounds the computer components and provides protection from the elements.
c) Cases are primarily categorized in three ways.
d) Cases are round or rectangular boxes, usually green in color.
e) A computer full tower case is designed to stand vertically on the floor next to a desk (instead of on the desk).
f) The ATX system connector feeds an AT motherboard.
g) The standard peripheral power connector is generally used to power different types of internal disk drives.
h) 4-pin Peripheral Molex power connectors go to the MB.
i) Most computers today use the AT power connector to provide power to the motherboard.

7. Write out as many words as you can concerning computer hardware, and beginning with letters of the given word:

Example:

P	PORT
R	READ ONLY MEMORY
O	OPTICAL DISK
C	CONNECTOR
E	EXPANSION CARD
S	SOCKET
S	SLOT
O	OPERATION
R	RANDOM ACCESS MEMORY

M
O
T
H
E
R
B
O
A
R
D

8. Match the definitions with their descriptions:

1. browser	a) The basic unit of information in the binary numbering system, representing either 0 or 1.
2. cable	b) To load an operating system into memory, usually from a hard disk.
3. case	c) A piece of software used to access the Internet.
4. device bay	d) A medium used to connect another devices to a computer.
5. bit	e) The plastic cover that surrounds the computer components and provides protection from the elements.
6. boot	f) A large slot on the computer into which an expansion device fits.

9. Find in the text the English equivalents for the following expressions and make up 3 sentences of your own:

Гнучкий диск, системний блок, клавіатура, розмір, розширення, прикріплювати, електронний пристрій, жорсткий диск, прямокутний, вертикальний, деталь, набір інструментів, показ, внутрішній, цифровий фотоапарат, горизонтальний, захист, придатний, напруга, штепсельна розетка, модулятор, роз'єм, блок живлення.

_____
_____
_____
_____
_____
_____

10. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

A. Where are the computer's components mounted to?

_____

B. Which device provides power in the computer?

_____

C. Which type of power connector use computers with AT and baby AT motherboards?

_____

D. Which type of power connector is generally used to power different types of internal disk drives?

_____

11. Look at the pictures and say how this equipment can be used in education.

Computer

Visual Display Unit

Desktop Printer

Scanner

Film Recorder

Digital Camera

e.g. Film recorder can be used in an English study to make the lesson more interesting by showing students different films.

12. Review Questions

Choose the correct item:

1. All the computer's components mount to the inside of the_____.
a) monitor
b) case
c) motherboard
d) memory

2. The computer's components would not be able to operate without_____.
a) voltage
b) information
c) power
d) connectors

3. ATX motherboard power connector feeds an _____motherboard.
a) AT
b) ATX
c) ATX
d) All of the above
4. Power supplies are rated in_____.
a) bytes
b) bits
c) watts
d) volts
5. There are _____wires going to Berg connectors.
a) five
b) six
c) three
d) four
6. The standard peripheral power connector is also called a _____connector.
a) ATX
b) Molex
c) AT
d) Berg

Test your grammar

I. Give the comparative and superlative degree of the following adjectives:

rich _____
high _____
beautiful _____
bad _____
easy _____
long _____
warm _____
deep _____
interesting _____
good _____
important _____

II. Form nouns from the following verbs; translate them into Ukrainian:

to mount - _____
to provide - _____
to install - _____
to supply - _____
to configure - _____
to connect - _____
to store - _____
to design - _____
to divide - _____
to create - _____
to operate - _____

III. Learn the examples and translate them into Ukrainian (The Continuous Tenses):

1. The role of computers in our everyday life is increasing greatly.
2. What were you doing at home late in the evening?
3. When I came to the university, my colleague was working in the laboratory.

4. This evening he will be reading at the library.
5. I can't go with you because I'll be working the whole Sunday.

IV. Translate into English:

1. Петро в комп'ютерному класі. А що він там робить?
2. Студенти зараз слухають лекцію.
3. Я не розумію, про що ви говорите.
4. Не шуміть. Студенти нашої групи здають залік з програмування.
5. Коли ми зайшли в лабораторію, вони встановлювали драйвера.
6. Чому ти не виконуєш завдання?
7. Завтра я буду готуватись до екзамену цілий день.
8. Вчора цілий день дув сильний вітер.

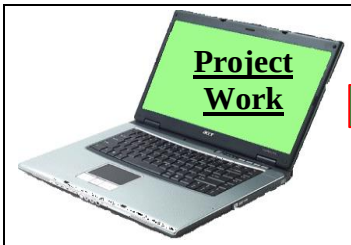
V. Put all possible questions (General, Special, Alternative and Disjunctive) to the following sentences:

a) Pathways allow information and signals to travel between components inside or outside of a computer.

b) The plastic cover surrounds the computer components and provides protection from the elements.

c) Students, teachers, and research scientists use the computer as a learning tool.

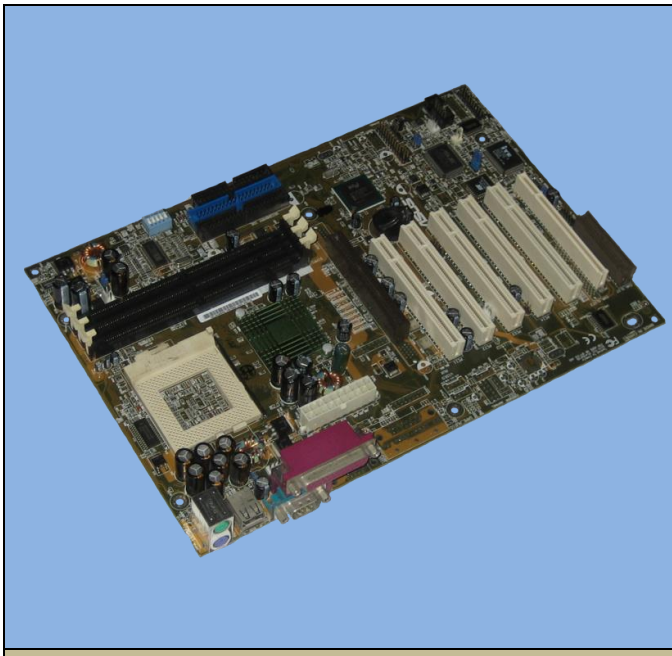
Look at the picture. Can you understand it? Why is it funny? Make up the story of your own.



Prepare a multimedia presentation on the topic "*Computer Case*". Use Power Point.

Notes on the topic studied:

Unit 3



Task 1. Read the following international words and give their Ukrainian equivalents:

complex ['kɔmpleks] *adj*
factor ['fæktə] *n*
code [kəud] *n*
function ['fʌŋkʃən] *n*
clone [kləun] *n*
hybrid ['haɪbrɪd] *adj*
combination [ˌkɔmbɪ'neɪʃ(ə)n] *n*
joystick ['dʒɔɪstɪk] *n*
illustrate ['ɪləstreɪt] *v*
matrix ['meɪtrɪks] *n*
contact ['kɔntækt] *n*
multimedia [ˌmʌltɪ'mi:dɪə] *adj*
design [dɪ'zaɪn] *n*
optical ['ɔptɪkəl] *adj*
minimum ['mɪnɪməm] *n*
maximum ['mæksɪməm] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:

['mʌðəbɔ:d] [kləun] [tʃɪp] ['ku:lɪŋ] [slɔt] ['sɔkɪt] [kəm'pəunənt] [ɪks'pænʃən] ['sə:kɪt] [taɪp] ['tɪpɪkl] [ə'semblɪ] [bɔ:d] [rɪ'pleɪs] ['fæktə] [ˌɔpə'reɪʃən] [tek'nɔlədʒɪ] [ləu'keɪʃən] ['meɪdʒə] ['mɔdjulə] [kənfɪgju'reɪʃ(ə)n] [ɪ'kwɪpmənt] ['æŋgl] [rɪ'pleɪs] ['ɪntɪˌgreɪtɪd] ['sə:kɪtrɪ] ['vɪdɪəu] [vaɪsɪ 'və:sə] ['lɔdʒɪk] [dɪ'zaɪn]

Task 3. Practise saying the following words. Pay attention to the pronunciation:
motherboard, chip, cooling, slot, socket, component, Central Processing Unit (CPU), system board, underlying circuitry, expansion slots, video components, integrated system board, nonintegrated system board, the same number, major assembly, replace, factor, operation, technology, location, logic board, expansion card, right angles, basic types of motherboards, power connectors and circuits, variety of other chips, to overheat, different board layouts, vice versa, clone computers, the most commonly used design, large printed circuit board.

Task 4. Give your viewpoint.

"Describe the role of computers in your studying".

Model: *Computers play an important role in the lives of most of us today, whether we realize it or not. Some people, however, are beginning to ask if we really need them. In my opinion, computers have become a necessary part of modern educational process. Computer allows me .....*

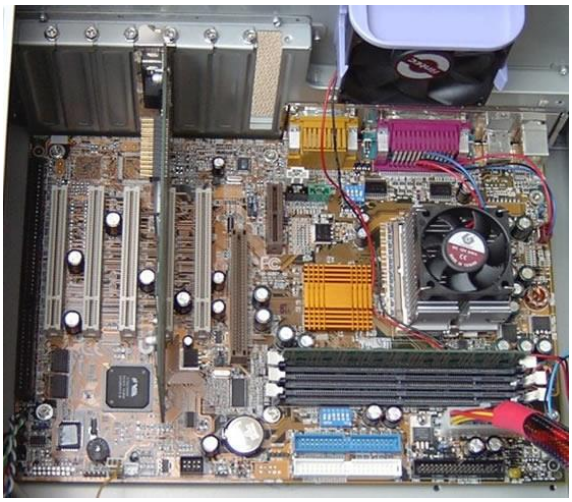
Task 5. Look at the pictures and use your dictionary to find the English word for the computer hardware. Then say how this equipment can be used. Make up sentences of your own.

Task 5. Read the text and make an outline of it.

Motherboard

The spine of the computer is the **motherboard**. A motherboard is the central or primary circuit board making up a complex electronic system, such as a modern computer. It is also known as a main board, baseboard, system board, planar board, or, on Apple computers, a logic board. This is the olive green or brown circuit board that lines the bottom of the computer. It is the most important component in the computer because it connects all the other components of a PC together.

Figure 1 shows a typical PC system board.



All other components are attached on this sheet. On the system board, you will find the Central Processing Unit (CPU), underlying circuitry, expansion slots, video components, random access memory (RAM) slots, and a variety of other chips.

Types of System Boards

There are two major types of system boards: integrated and nonintegrated:

Nonintegrated system board Each major assembly is installed in the computer as an expansion card. The major assemblies we're talking about are items like the video circuitry, disk controllers, and accessories. Nonintegrated boards can be easily identified because each expansion slot is usually occupied by one of these components.

Integrated system board Most of the components that would otherwise be installed as expansion cards are integrated into the motherboard circuitry. Integrated system boards were designed for simplicity. Of course, there's a drawback to this simplicity: when one component breaks, you can't just replace the component that's broken; the whole motherboard must be replaced. Although these boards are cheaper to produce, they are more expensive to repair.

System Board Form Factors

Nonintegrated system boards are also classified by their form factor (design): AT, ATX, or NLX (and variants of these). AT system boards are similar to the motherboards found in the original IBM AT. The processor, memory, and expansion slots are all in line with each other. Because of advances in technology, the same number of components that were on the original AT motherboard (now called a *full AT* board) were later compressed into a smaller area. This configuration is known as the *baby* AT configuration.

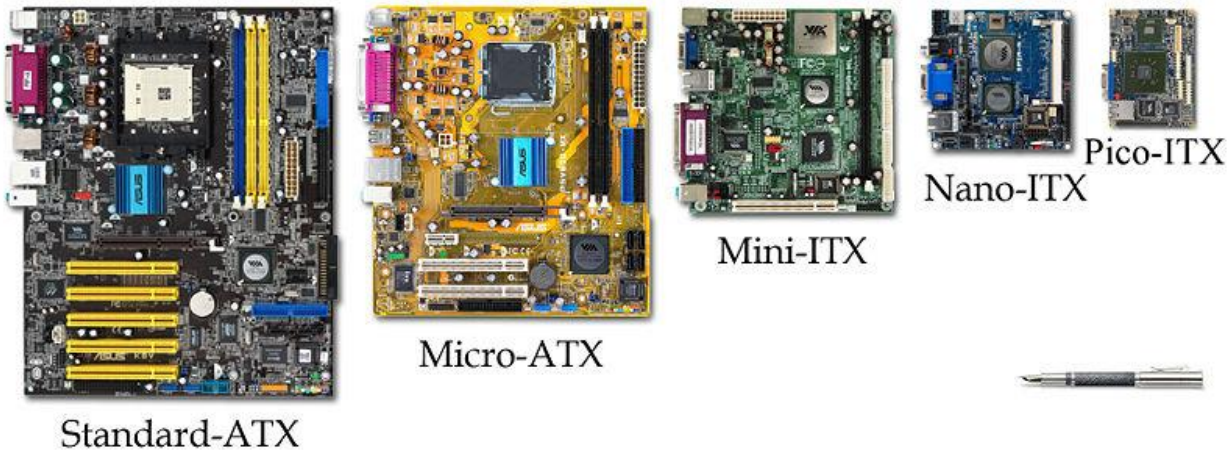
The baby AT used to be the most commonly used design, but it has some fundamental problems. Because the processor and memory were in line with the expansion slots, only one or two full-length cards could be used. Also, the processor was far from the power supply's cooling fan and therefore tended to overheat unless a heat sink or processor fan was directly attached to it. To overcome the limitations of the baby AT design, the ATX motherboard was designed. The *ATX motherboard* has the processor and memory slots at right angles to the expansion cards. This arrangement puts the processor and memory in line with the fan output of the power supply, allowing the processor to run cooler. And, because those components are not in line with the expansion cards, you can install full-length expansion cards in an ATX motherboard machine. AT motherboards are rarely found for sale because ATX (and its derivatives) are the primary motherboards sold today.

Also, because the AT and ATX have different board layouts for their components and expansion slots, they will have different case layouts for the cutouts where expansion ports and slots go at the back of the case. Therefore, an ATX motherboard will not fit into a case designed for an AT motherboard (and vice versa).

A fairly new motherboard form factor that has been gaining popularity in the last couple of years is *NLX*. This form factor is used in low-profile case types. NLX motherboards are unique because the expansion slots are placed sideways on a special *riser card* to use the space optimally.

These motherboard form factors are usually found in what are known as *clone* computers (those not manufactured by a Fortune 500 PC company). Some manufacturers (such as Compaq and IBM) design and manufacture their own motherboards, which don't conform to either the AT or ATX standard. This style of motherboard is known as a *proprietary design* motherboard.

Let’s take a quick look at standard computer form factors:



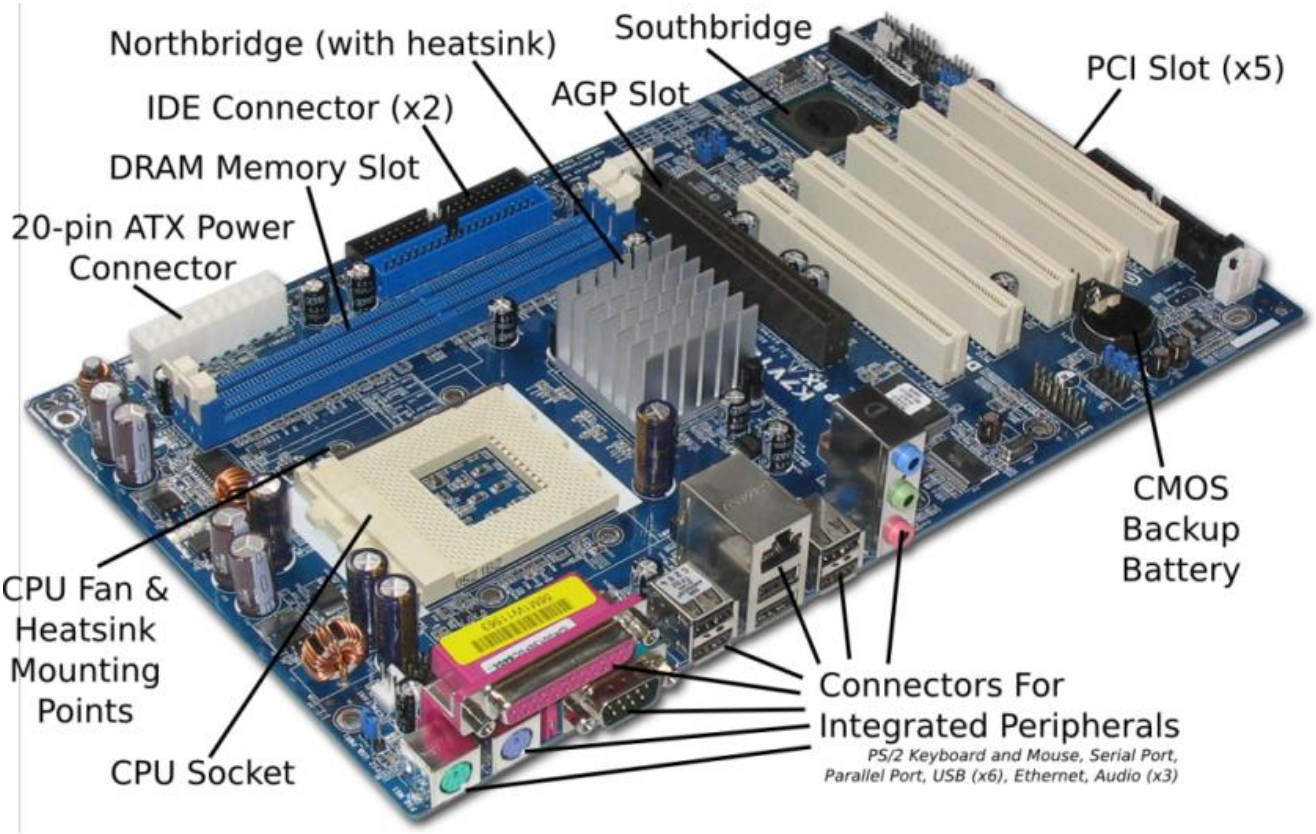
System Board Components

Now that you understand the basic types of motherboards and their form factors, it's time to look at the components found on the motherboard and their locations relative to each other. The

motherboard of a typical desktop consists of a large printed circuit board. It holds electronic components and interconnects, as well as physical connectors (sockets, slots) into which other computer components may be inserted or attached. Most motherboards include, at a minimum:

- sockets (or slots) in which one or more CPUs are installed;
- slots into which the system's main memory is installed ;
- a chipset which forms an interface between the CPU's front-side bus, main memory, and peripheral buses;
- non-volatile memory chips containing the system's BIOS
- slots for expansion cards
- power connectors and circuits, which receive electrical power from the power supply.

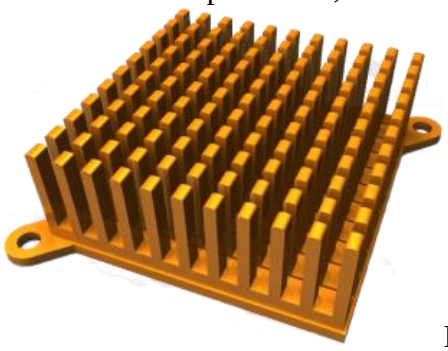
Figure 2 illustrates the components found on a typical motherboard:



Computer cooling

Computer cooling is the process of removing heat from computer components.

A computer system's components, such as CPUs, chipsets and graphics cards produce large amounts of heat during operation. This heat must be dissipated in order to keep these components within their safe operating temperatures. This is done mainly using **heat sinks** to increase the surface area which dissipates heat, and **fans** to speed up the exchange of air.



Motherboard heatsink

Glossary

motherboard ['mʌðəbɔ:d] *n* – материнська плата
cooling ['ku:lıŋ] *n* – охолодження
assembly [ə'semblı] *n* – механізм, агрегат, збирання, монтаж
board [bɔ:d] *n* – плата
slot [slɔt] *n* – область пам'яті, отвір
socket ['sɔkıt] *n* – розетка, гніздо
chipset *n* – набір мікросхем
drawback ['drɔ:bæk] *n* – недолік
replace [rı'pleıs] *v* – заміняти, відновити
accessory [ək'sesərı] *n* – допоміжний пристрій
bus [bʌs] *n* – канал передачі інформації
heat sink [hi:t sıŋk] *n* – радіатор
connector [kə'nektə] *n* – з'єднувач, роз'єм, логічний блок з'єднання (на блоці схемі)
form factor ['fæktə] *n* – коефіцієнт
expansion card *n* – плата розширення

Exercises

1. **Learn the new words and use them in short phrases of your own.**

2. **Show that you can analyse what you have read. Render the plot of the text:**
   a) without details (in three or four minutes' time),
   b) give a brief summary of the text.

3. **Ask one of your fellow-students questions about System Board Components. Use the active vocabulary of the text. Make up a story on the basis of the information gained in 6-7 sentences.**

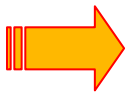
Follow these steps: a) plan your essay before you start to write the substance;
b) note down keywords you want to use;
c) put your ideas into a logical order and write the linking text.

4. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) A motherboard is the central or primary circuit board making up a complex electronic system, such as a modern computer.
b) On the system board, you will find only the Central Processing Unit.
c) The motherboard of a typical desktop consists of two small printed circuit boards.
d) A motherboard is also known as a logic board or system board.
e) Computer cooling is the process of receiving heat from computer components.
f) NLX motherboards are unique because the expansion slots are placed sideways on a special system board to use the space optimally.
g) Most motherboards include, at a minimum 5 components.

5. Make up the words given in jumbled letters.
All of them are parts of computer hardware.

itccrui
aorbd
ellrroonct
tsol
appotl
ssccea



6. Find in the text the English equivalents for the following expressions and make up 2 sentences of your own:

Виробляти велику кількість тепла, основні компоненти материнської плати, отримувати електричну енергію, встановлювати під прямим кутом до плати розширення, комплексна електронна система, охолодження системи постачання енергії, область пам'яті постійно запам'ятовуючого пристрою.

_____
_____
_____
_____
_____
_____
_____

7. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

1. What is the most important component in the computer system?

_____

2. What is computer cooling?

_____

3. How many types of system boards are there?

_____

4. What components does the motherboard of a typical desktop consist of?

_____

5. Why are AT motherboards rarely found for sale?

_____

8. Review Questions

Choose the correct item:

1. A motherboard is the _____circuit board.
a) typical
b) logic
c) central
d) system
2. Each expansion slot is usually occupied by one of _____components.
a) electronic
b) nonintegrated board
c) integrated board
d) system
3. Nonintegrated system boards are also classified by their_____.
a) components
b) sockets
c) systems
d) form factor
4. The motherboard of a typical desktop consists of_____.
a) a large printed circuit board
b) primary circuit board
c) physical connectors
d) chips
5. On the NLX motherboard the expansion slots are placed on a special _____.
a) system board
b) planar board
c) riser card
d) sound card

Test your grammar

I. Find adjectives in the texts. Write them down. Underline the suffixes by means of which the adjectives are build. Translate them into Ukrainian:

_____
_____
_____
_____
_____
_____

II. Match the adjectives with the nouns. Some adjectives can go with more than one noun.

1. primary	a) components
2. system	b) dimensions
3. expansion	c) computer
4. large	d) function
5. electronic	e) system
6. specific	f) amount
7. personal	g) card
8. logic	h) board
9. numeration	i) circuit
10. physical	j) unit

III. Learn the examples and translate them into Ukrainian (The Passive Voice):

a) The problem is studied.
b) These programs were installed.
c) The information is stored on the hard drive.
d) You will be told when she comes.
e) Nothing has been changed in this microprocessor since you mounted it.
f) I have never been spoken to like this before.
g) These cards can be plugged into sockets called expansion slots inside the computer.

_____
_____
_____
_____
_____
_____
_____

IV. Find verbs in Passive Voice in the text. Write them down.

_____
_____
_____
_____
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_____
_____
_____

V. Put the verb into the correct form (use Present Simple Active or Passive):

a) An analog computer (to represent)_____ amounts with physical quantities, such as distances along a scale, rather than with numbers.
b) This use of computers (to know) _____as telecommuting.
c) We (to use) _____our home computers to play games and to communicate over the Internet.
d) Most of the mainframes (to house) _____in several large cabinets.
e) The fastest mainframes (to call) _____supercomputers.
f) Minicomputers and superminis (to have)_____ many of the capabilities of mainframes.
g) It (to include) _____video game units and word processors.

VI. Translate into English:

a) Цей комп'ютер щойно купили.
b) Студентам пояснили правила роботи в комп'ютерному класі.
c) Коли вона прийшла в університет, лекція вже розпочалась.
d) Програма була перевірена до того, як ми почали працювати.
e) Ці драйвера повинні бути установлені найближчим часом.

_____
_____
_____
_____
_____
_____
_____
_____

Notes on the topic studied:

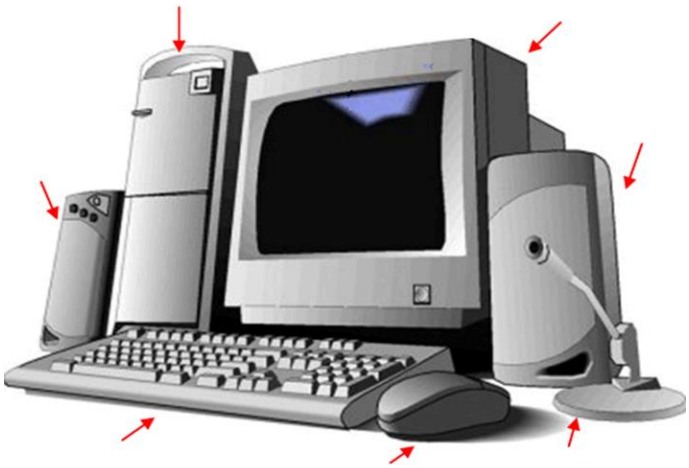
Unit 4

Task 1. Read the following international words and give their Ukrainian equivalents:
peripheral [pə'rɪfərəl] *adj*
processor ['prəusesə] *n*
form [fɔ:m] *n*
printer [prɪntə] *n*
section ['sekʃən] *n*
static ['stætɪk] *adj*
server ['sɜ:və] *n*
technology [tek'nɔlədʒɪ] *n*
function ['fʌŋkʃən] *n*
implementation [ˌɪmplɪmen'teɪʃən] *n*
example [ɪg'za:mpl] *n*
limit ['lɪmɪt] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:
[fæn] ['prəusesə] ['dʒenəreɪt] [hi:t sɪŋk] [breɪn] ['fʌŋkʃən] [ˌɪmplɪmen'teɪʃən] ['eksɪkju:t] ['ju:sɪdʒ] ['sɔkɪt] [ə'plaɪ] [dɪ'zaɪn] [aɪ'dentɪfaɪ] ['waɪdspred] [ˌmaɪkrəuɪlek'trɔnɪks] [ə'reɪndʒ] [dɪ'strʌkt] ['sə:fɪs] ['plentɪfəl] [ɪn'sə:t] [houl] [ə'reɪndʒ] ['ɪntəfeɪs] ['selfdɪs'trʌct]

Task 3. Practise saying the following words. Pay attention to the pronunciation:
Central Processing Unit, fan, processor, generate, function, implementation, execute, usage, socket, brain, apply, design, identify, widespread, fundamental operation, different types of processors, the easiest component, heat sink, microelectronics, self – destruct**,** surface, air, plentiful, insert, hole, arrange, interface, special expansion card.

Task 4. Look at the pictures and identify the objects of computer hardware. Decide how this equipment can be used? Give your motives.



Speaker
Case box
Mouse
Microphone
Keyboard
Monitor

e.g. A microphone translates sound into electric current, which the computer digitizes. The operator of the computer can process the sound by itself, or as part of a different kind of file–a motion-picture file, for example.

Task 5. Read the text and make an outline of it.

Central processing unit (CPU)

The " brain " of any computer is The *Central Processing Unit (CPU).* A central processing unit (CPU) or processor is an electronic circuit that can execute computer programs. This broad definition can easily be applied to many early computers that existed long before the term "CPU" ever came into widespread usage. The form, design and implementation of CPUs have changed dramatically since the earliest examples, but their fundamental operation has remained much the same. This component does all the calculations and performs 90 percent of all the functions of a computer.

There are many different types of processors for computers. Typically, in today's computers, the processor is the easiest component to identify on the motherboard. It is usually the component that has either a fan or a heat sink (sometimes both) attached to it (as shown in Figure 1).

Figure 1

These devices are used to draw away the heat a processor generates. This is done because heat is the enemy of microelectronics. Theoretically, a Pentium (or higher) processor generates enough heat that without the heat sink, it would self-destruct in a matter of hours.

The heat sink is placed directly on heated CPU core (as shown in Figure 2). This offers a far greater surface area for the heat to move to the passing air.

Figure 2

The fan assisted heat sink at transferring heat from the heat sink to the air.

Figure 3 shows a typical CPU cooling

Sockets and slots on the motherboard are as plentiful and varied as processors. A CPU socket is a connector on a computer's motherboard that accepts a CPU and forms an electrical interface

with it. Sockets are basically flat and have several rows of holes arranged in a square, as shown in Figure 4.

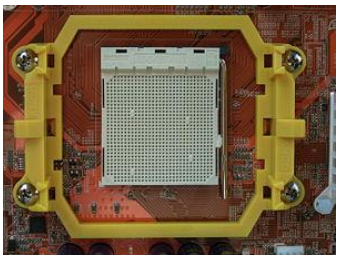
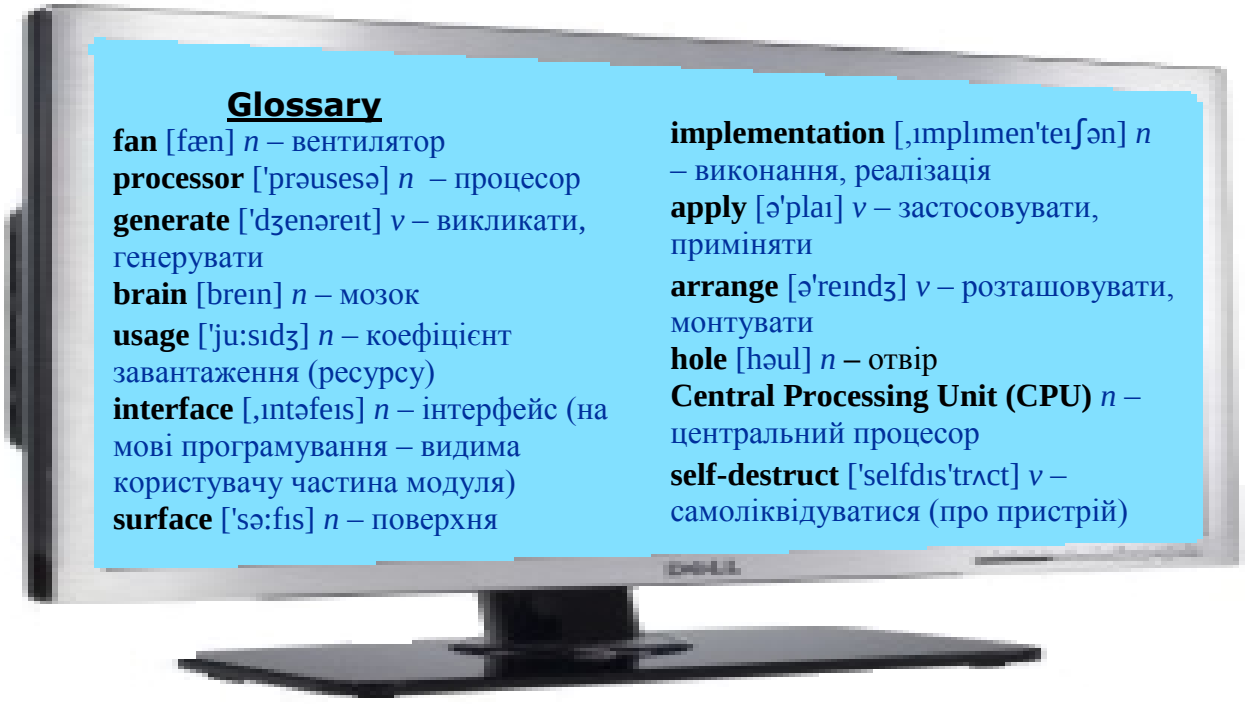


Figure 4

The processor slot is another method of connecting a processor to a motherboard, but one into which an Intel Pentium II or Pentium Ill-class processor on a special expansion card can be inserted.



Exercises

1. Learn the new words and use them in short phrases of your own.

_____

_____

_____

_____

2. Show that you can analyse what you have read. Render the plot of the text:

a) without details (in three or four minutes' time),

b) give a brief summary of the text.

3. Ask one of your fellow-students questions about the different types of processors for computers. Use the active vocabulary of the text.

4. Make up a story on the basis of the information gained in 7-8 sentences.

Follow these steps: a) plan your essay before you start to write the substance;

b) note down keywords you want to use;

c) put your ideas into a logical order and write the linking text.

_____
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_____
_____
_____
_____

5. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) There is only one type of processors for computers.
b) The processor slot is the best method of connecting a processor to a motherboard.
c) In modern computers, the processor is the easiest component to identify on the motherboard.
d) A central processing unit is an electronic circuit that can input computer programs.
e) Sockets and slots on the motherboard form an electrical interface.
f) Heat is very useful for microelectronics.

6. Read the text and fill in the gaps from below. Render it into Ukrainian. **Give it a headline. Discuss with your partner the main functions of a microprocessor.**

_____

Microprocessors control computer systems and process_____. The information is encoded as units of electric _____that represent numbers. The microprocessor consists of thousands, or even millions, of switches called transistors, other electronic _____, and wires. These parts are arranged in circuits and built into a_____, usually made of silicon, that is no larger than a fingernail.

The microprocessor processes the bit charges by switching them from circuit to_____. Each of a computer's thousands or millions of tiny electronic circuits operates much like an ordinary light switch. When a circuit is off, it corresponds to the binary digit 0. When a circuit is on, it corresponds to the digit 1. Binary_____, like decimal numbers, can be added, subtracted, multiplied, and divided. Thus, a computer can perform all the basic arithmetic operations.

(digits, chip, devices, information, charge, circuit)

7. Find in the text the English equivalents for the following expressions and make up 2 sentences of your own:

Передавати тепло, метод під'єднання процесора до материнської плати, виконувати комп'ютерні програми, широке застосування, обчислення, розробка та реалізація, основні арифметичні дії.

_____
_____
_____
_____

8. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

1. Is central processing unit the computing and control part of every computer?

_____

2. How many types of processors for computers are there?

_____

3. What components does the microprocessor consist of?

_____

4. What is a CPU socket?

_____

5. Which methods of connecting a processor to a motherboard do you know?

_____

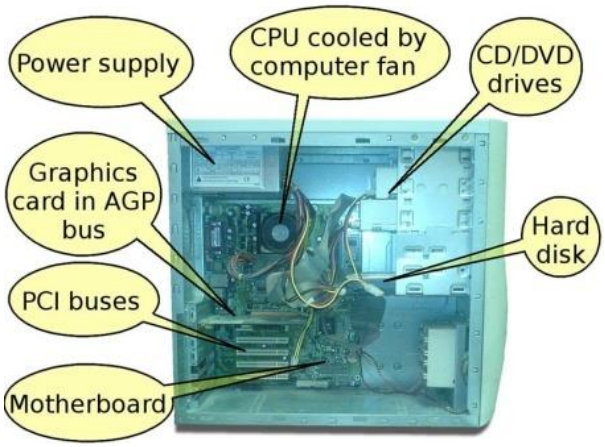
6. How does the microprocessor process the bit charges?

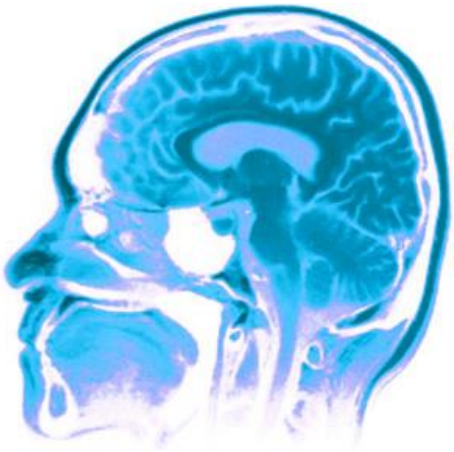
_____

7. Where is the heat sink placed?

_____

9. Look at the pictures. You see internals of typical personal computer and human's brain. Think of the Brain (System). Computer Systems are the same. Compare and contrast them. Describe them with your partner.





Review Questions

10. Choose the correct item:

1. The " brain " of any computer is the _____.
a) motherboard
b) memory
c) processor
d) adapter

2. The heat sink is placed directly on heated CPU_____.
a) board
b) card
c) bus
d) core

3. When a circuit is on, it corresponds to the digit _____.
a) 0
b) 1
c) 00
d) 11

4. A CPU socket is a connector on a computer's _____.
a) sound card
b) adapter
c) motherboard
d) memory

5. When a circuit is off, it corresponds to the digit _____.
e) 00
f) 1
g) 0
h) 11

Test your grammar

I. Learn the examples and translate them into Ukrainian (The Modal Verbs):

1. Computers can process numbers, words, still pictures, moving pictures, and sounds. 2. You may do this task. 3. To enable a computer to process information that is not numerical, the computer must first digitize that information. 4. Computers may be grouped into four categories. 5. You must follow your teacher's advice. 6. You are not to stay at the university so late. 7. My friend didn't pass his credit and I had to help him. 8. You shouldn't work so much. 9. You needn't explain why you have replaced this disk. 10. You ought to learn these terms.

_____
_____
_____
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II. Fill in the blanks with the modal verbs *can, may, must*:

1. The computer _____uses only two levels of charge.
2. Mainframes are the fastest computers, and they use the largest storage systems. As a result, they _____ solve more complex problems.
3. The central computer _____ be a PC, a machine much like a PC with extra-large storage capacity.
4. You _____ do these computations.
5. A single microprocessor, _____do the same work as that pioneering machine.

III. Translate these sentences into English:

1. Які операції може виконувати комп'ютер?

_____

2. Кожен студент повинен володіти основами інформатики.

_____

3. Чи можу я розпочати виконувати вправи на комп'ютері?

_____

4. Швидкість цього комп'ютера мабуть не достатньо велика.

_____

5. Ти можеш не встигнути закінчити інсталяцію цього диска.

_____

6. Нам необхідно добре вивчити тему "Апаратне забезпечення комп'ютера".

_____

7. Не потрібно так багато працювати за комп'ютером.

_____

8**.** Ти міг би попросити допомогти тобі виконати це завдання.

_____

9. Ми зможемо зробити це лише завтра.

_____

Notes on the topic studied:

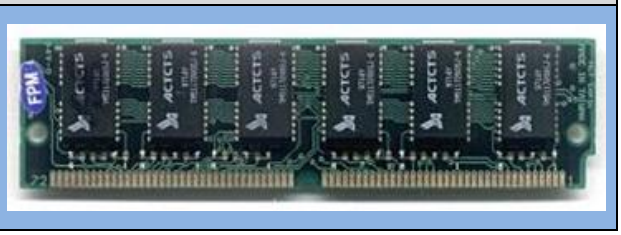
Unit 5

Task 2. Read the phonetic transcription. Practise your pronunciation:

['meməri] ['meɪdʒə] ['sekʃən] ['taɪtlɪ] ['fɪgə] ['dju:əl] [rɪs'pektɪvlɪ] [ɪg'zɪst] [bri:f] [θʌm] ['bætərɪ] [kə'pæsɪtɪ] [stɔ:] [kə'set] [si:s] [ɪks'pænd] ['stætɪk] [bu:t] [kənfɪgju'reɪʃən] ['dju:pleks] ['drɔ:bæk] ['draɪvə] [bu:tstræp] ['bə:nə] ['ræm] [ˌɪnfə'meɪʃən] [daɪ'næmɪk]

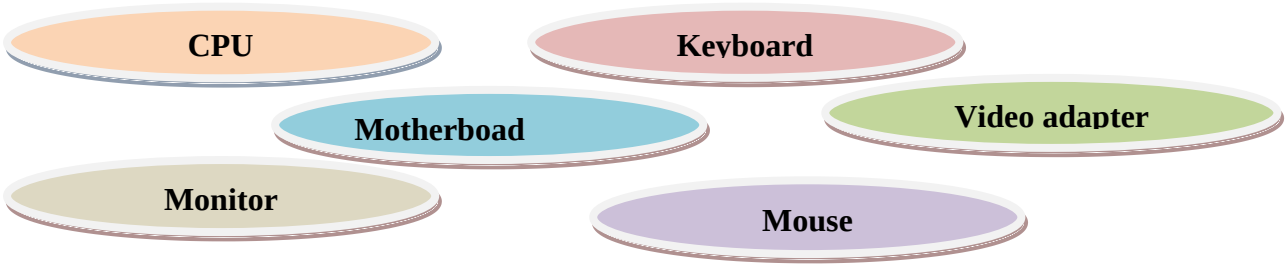
Task 1. Read the following international words and give their Ukrainian equivalents:

modular ['mɔdjulə] *adj*
virus ['vaɪərəs] *n*
monitor ['mɔnɪtə] *n*
cassette [kə'set] *n*
correct [kə'rekt] *adj*
visual ['vɪzjuəl] *adj*
horizontal [ˌhɔ:rɪ'zɔnt(ə)l] *adj*
battery ['bætərɪ] *n*
video ['vɪdɪəu] *n*
university [ˌju:nɪ'və:sɪtɪ] *n*
universal [ˌju:nɪ'və:səl] *adj*
finish ['fɪnɪʃ] *v*
signal ['sɪgnəl] *n*
system ['sɪstɪm] *n*



Task 3. Practise saying the following words. Pay attention to the pronunciation:
memory, major, section, tightly, figure, dual, respectively, exist, brief, thumb, capacity, cassette, store, battery, outline, circuit boards, processor, dual in-line memory, major types, dynamic, random access memory, manufacture, cease, read-only memory, boot sectors, outline, to identify memory within a computer, single in-line memory modules, to keep the information, for boot sectors.

Task 4. Identify logical connection between these devices …

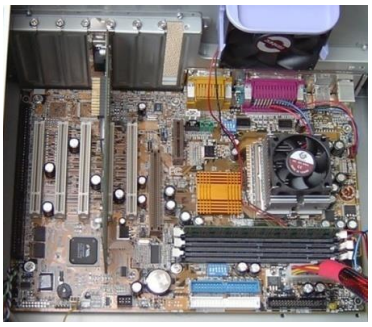


Task 5. Read the text and make an outline of it.

Memory

"More memory, more memory, I don't have enough memory!" Today, memory is one of the most popular, easy, and inexpensive ways to upgrade a computer. As the computer's CPU works, it stores information in the computer's memory. The rule of thumb is, the more memory a computer has, the faster it will operate. In this brief section we'll outline the four major types of computer memory: DRAM, SRAM, ROM, and CMOS. To identify memory within a computer,

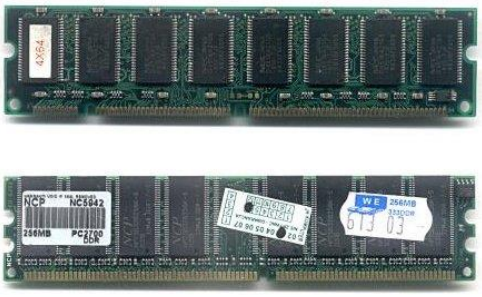
look for several thin rows of small circuit boards sitting vertically, packed tightly together near the processor. Figure 1 shows where memory is located in a system.



Today memory chips arranged on small circuit boards, which called **single in-line memory modules (SIMMs)** or **dual in-line memory modules (DIMMs)** depending on whether there are chips on one side of the circuit board or on both sides, respectively.

There are two types of DIMMs *:*

168-pin SDRAM module 184-pin DDR SDRAM module

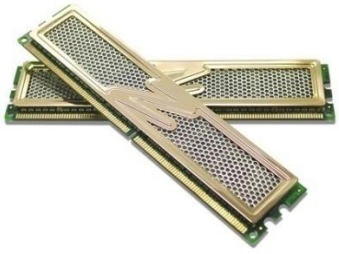


Two types of SIMMs :

30-pin SIMM module 72-pin SIMM module

DRAM

DRAM is dynamic random access memory. (This is what most people are talking about when they mention RAM.) When you expand the memory in a computer, you are adding DRAM chips. You use DRAM to expand the memory in the computer because it's cheaper than any other type of memory. Dynamic RAM chips are cheaper to manufacture than other types because they are less complex. *Dynamic* refers to the memory chips' need for a constant update signal (also called a *refresh* signal) in order to keep the information that is written there. If this signal is not received every so often, the information will cease to exist.



SRAM

The *S* in SRAM stands for *static*. Static random access memory doesn't require a refresh signal like DRAM. The chips are more complex and are thus more expensive. However, they are faster. DRAM access times come in at 80 nanoseconds Ins) or more; SRAM has access times of 15 to 20 ns. SRAM is often used for cache memory.

ROM

ROM stands for read-only memory. IT is called read-only because it can't be written to. Once information has been written to the ROM, it can't be changed. ROM is normally used to store the computer's BIOS, because this information normally does not change.

The system ROM in the original IBM PC contained the Power-On Self Test (POST), basic input/output system (BIOS), and cassette BASIC. Later IBM computers and compatibles include everything but the cassette BASIC. The system ROM enables the computer to "pull itself up by its bootstraps," or *boot* (start the operating system).

CMOS

CMOS is a special kind of memory that holds the BIOS configuration settings. CMOS memory is powered by a small battery so the settings are retained when the computer is shut off. The BIOS reads information such as which hard drive types are configured for this computer to use, which drivers) it should search for boot sectors, and so on. CMOS memory is usually *not* upgradable in terms of its capacity.

Glossary

capacity [kə'pæsıtı] *n* – потужність, об'єм
cassette [kə'set] *n* – касета
store [stɔ:] *v* – уміщати, зберігати
battery ['bætərı] *n* – батарея, акумулятор
enable [ı'neıbl] *v* – давати право, можливість
setting ['setıŋ] *n* – установка, запуск
dynamic [daı'næmık] *adj* – динамічний
memory ['memərı] *n* – пам'ять, запам'ятовувальний пристрій
dual in-line memory modules (DIMMs) *n* – модуль пам'яті з дворядним розташуванням виводів
static ['stætık] *adj* – нерухомий
boot [bu:t] *n* – початкове завантаження системи, самозавантаження
expand [ıks'pænd] *v* – розширювати, збільшувати
search [sə:tʃ] *n* – пощук
configuration [kən,fıgju'reıʃən] *n* – форма, конфігурація
cease [si:s] *v* – припиняти
dual ['dju:əl] *adj* – подвійний
single in-line memory modules (SIMMs) *n* – модуль пам'яті з однорядним розташуванням виводів

Exercises

1. Learn the new words and use them in short phrases of your own.

_____
_____
_____
_____
_____
_____

2. Show that you can analyse what you have read. Render the plot of the text:

a) without details (in three or four minutes' time),
b) give a brief summary of the text.

3. Ask one of your fellow-students questions about the types of DIMMs. Use the active vocabulary of the text.

4. Make up a story on the basis of the information gained in 5-6 sentences.

Follow these steps: a) plan your essay before you start to write the substance;
b) note down keywords you want to use;
c) put your ideas into a logical order and write the linking text.

_____
_____
_____
_____
_____
_____
_____

5. Read and memorize the following information:

Computer Memory Sizes

- 1 KB (KB) =1024 Bytes
- 1 MB =1024 KB
- 1 GB =1024 MB
- 1Tb =1024 GB (about 1 trillion bytes)

6. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) After completing an operation, the microprocessor may send the result to the memory until it is needed for another operation.
b) Memory chips hold data and instructions outside the computer.
c) There are two basic kinds of memory chips: (1) read-only memory (ROM), and (2) random-access memory (RAM).
d) A ROM chip holds its memory even when the computer is turned off. However, the computer user can change the memory.
e) RAM chips store only the information that is currently needed by the microprocessor.
f) RAM chips receive information and instructions from the motherboard.
g) When you expand the memory in a computer, you are adding SRAM chips.
h) CMOS memory is powered by a small battery so the settings are retained when the computer is shut off.

7. Write out as many words as you can concerning computer hardware, and beginning with letters of the given word:
Example:

s	system
o	option
u	unit
r	random
c	circuit
e	enter

M
E
M
O
R
y

8. Find in the text the English equivalents for the following expressions and make up 3 sentences of your own:

Рухомий, потужність, батарея, пошук, оновлювати інформацію, сумісні пристрої, дія, доступ, основні види пам'яті, запускати систему, завантажувати, зберігати інформацію, постійний оновлений сигнал.

_____
_____
_____
_____

9. Review Questions

Choose the correct item:

1. The *S* in SRAM stands for _____.
a) sensor
b) static
c) syllabic
d) suitable

2. There are _____types of DIMMs.
a) one
b) three
c) four
d) two

3. The system ROM enables the computer to _____the operating system.
a) stop
b) install
c) start
d) store

4. Memory chips arranged on small_____, which called single in-line memory modules (SIMMs) or dual in-line memory modules (DIMMs).
a) chips
b) hard drives
c) circuit boards
d) boxes

Test your grammar

1. Complete the chart with the missing verb forms:

Infinitive	Past Simple	Past participle
to find		
to feed		
to draw		
to deal		
to mean		
to lose		
to hide		
to know		
to say		
to speak		
to take		
to think		
to speak		
to write		

II. Learn the examples and translate them into Ukrainian (The Perfect Tenses)

1. The computers have changed the way we work, learn, communicate, and play.
2. The technology of computer hardware has advanced tremendously since 1946.
3. By the mid-2008's, the number of computers had reached about 800 million.
4. The programmer said that he had already written the program.
5. I shall have finished my project work by the end of this month.

III. Translate into English:

1. Ми ніколи не були в Лондоні.
2. Вона вже зберегла цю інформацію на жорсткому диску.
3. Я не бачила її з тих пір, як вступила до університету.
4. Ми навчаємось разом вже три роки.
5. Коли я включив комп'ютер, програма вже була заблокована.
6. Якщо ви почнете працювати зараз, то завершите роботу до 5 годин.
7. Вони щойно створили цей файл.
8. Ми не роздрукували цю статтю, бо принтер вже був зламаний.

Prepare a multimedia presentation on the topic "*Computer Memory*". Use Power Point.

Notes on the topic studied:

Unit 6

Task 1. Read the following international words and give their Ukrainian equivalents:

corporation [ˌkɔ:pə'reɪʃən] *n*
laboratory [lə'bɔrətərɪ] *n*
company ['kʌmpənɪ] *n*
examination [ɪgˌzæmɪ'neɪʃən] n
sensor ['sensə] *n*
period ['pɪərɪəd] *n*
minute ['mɪnɪt] *n*
unique [ju:'ni:k] *adj*
term [tə:m] *n*
natural ['nætʃrəl] *adj*
information [ˌɪnfə'meɪʃən] *n*
general ['dʒenərəl] *adj*
physical ['fɪzɪkəl] *adj*
file [faɪl] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:

['kɔmpækt dɪsk] ['stɔ:rɪdʒ] ['mi:dɪə] [kə'pæsɪtɪ] [faɪl] [dɪ'tekt] ['sɔ:ftweə] ['mægnɪtaɪz] ['baɪnərɪ] ['dɪdʒɪt] ['ækses] [rɪ'zaɪd] ['pə:mənənt] [rɪ'mu:vəbl] ['krɪtɪkəl] ['sensə] ['mi:dɪəm] [kəm'pəunənt] ['sɪgnəl] [ɪn'kləuʒə] ['fɪzɪkəl] [ə'dæptə] [ɪn'kɔ:pərɪt] ['flɔpɪ dɪsk] [bi:m] [spɪn] ['bə:nə] [rɪ'flekʃən] ['leɪzə] ['sə:fɪs] [rɪ'kɔ:də] [kən'trəulə][ˌmʌltɪ'mi:dɪə]

Task 3. Practise saying the following words. Pay attention to the pronunciation:
compact disk, storage, media, capacity, file, detect, software, magnetize, binary digit, reside, removable, critical, sensor, medium, component, signal, enclosure, physical, stack, adapter, advantage, incorporate, floppy disk, directionally, host adapter, computer's peripheral device, optical path, hundreds of gigabytes of information, laser beam, spin, burner, reflection, laser, surface, recorder, controller, ferromagnetic material, permanent storage and quick access, light reflection.

Task 4. Read the text and make an outline of it.

Storage Devices

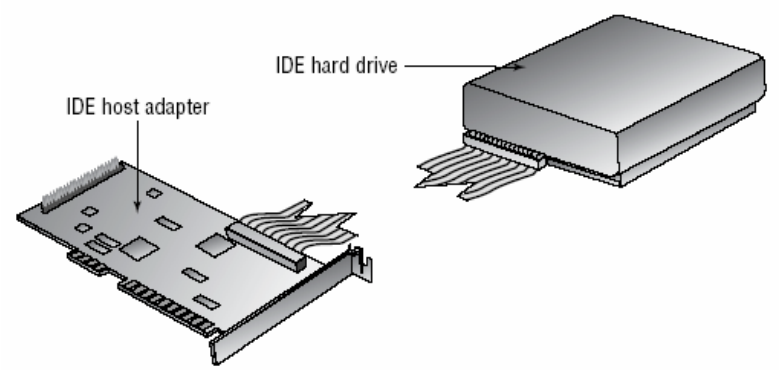
What good is a computer without a place to put everything? Storage media hold the data being accessed, as well as the files the system needs to operate and data that needs to be saved. The many different types of storage differ in terms of their capacity (how much they can store), access time (how fast the computer can access the information), and the physical type of media used.

Hard disk systems

A hard disk drive (often shortened as "hard disk" or "hard drive"). HDDs record data by magnetizing ferromagnetic material directionally, to represent either a 0 or a 1 binary digit. They read the data back by detecting the magnetization of the material.

Hard disk systems are used for permanent storage and quick access (Figure 1). Hard disks typically reside inside the computer (although there are external and removable hard drives) and can hold more information than other forms of storage.

Figure 1 A hard disk system



The hard disk system contains three critical components:

Controller Controls the drive. It understands how the drive operates, sends signals to the various motors in the disk, and receives signals from the sensors inside the drive.

Hard disk The physical storage medium. Hard disk systems store information on small disks (between three and five inches in diameter) stacked together and placed in an enclosure.

Host adapter The translator, converting signals from the hard drive and controller to signals the computer can understand.

Most of today's hard disk technologies incorporate the controller and drive into one enclosure. In addition, most motherboards incorporate the host adapter into the motherboard's circuitry.

Floppy drives

A **floppy disk** is a magnetic storage medium that uses a flexible diskette made of a thin plastic encased in a protective casing. The floppy disk itself enables the information to be transported from one computer to another very easily. There are two main types of floppy disks. The floppy disk, which is 5'/4 inches square, is the older style; the *diskette* is a disk that is 3'/> inches square.

A **floppy drive** is used to read and write information to and from these drives. The advantage of these drives is that they allow portability of data (you can transfer data from one computer to another on a diskette). The downside of a floppy disk drive is its limited storage capacity. Whereas a hard drive can store hundreds of gigabytes of information, most floppy disks were designed to store only about one megabyte.

Optical disk drive

In computing, an **optical disk drive** (**ODD**) is a disk drive that uses laser light as part of the process of reading and writing data. It is a computer's peripheral device, that stores data on optical disks.

Some drives can only read from disks, but commonly drives are both **readers** and **recorders**. Recorders are sometimes called **burners** or **writers**.

Common media and technology families include CD, DVD, and Blue-ray disks.

The most important part of an optical disk drive is an *optical path*, placed in a *pickup head* (*PUH*), usually consisting of semiconductor laser, a lens for guiding the laser beam, and photodiodes detecting the light reflection from disk's surface.
The disks spun and information is written by pickup head**.**

Internal mechanism of Disk Drive

Types of disk drives

There are three main optical-drive types:

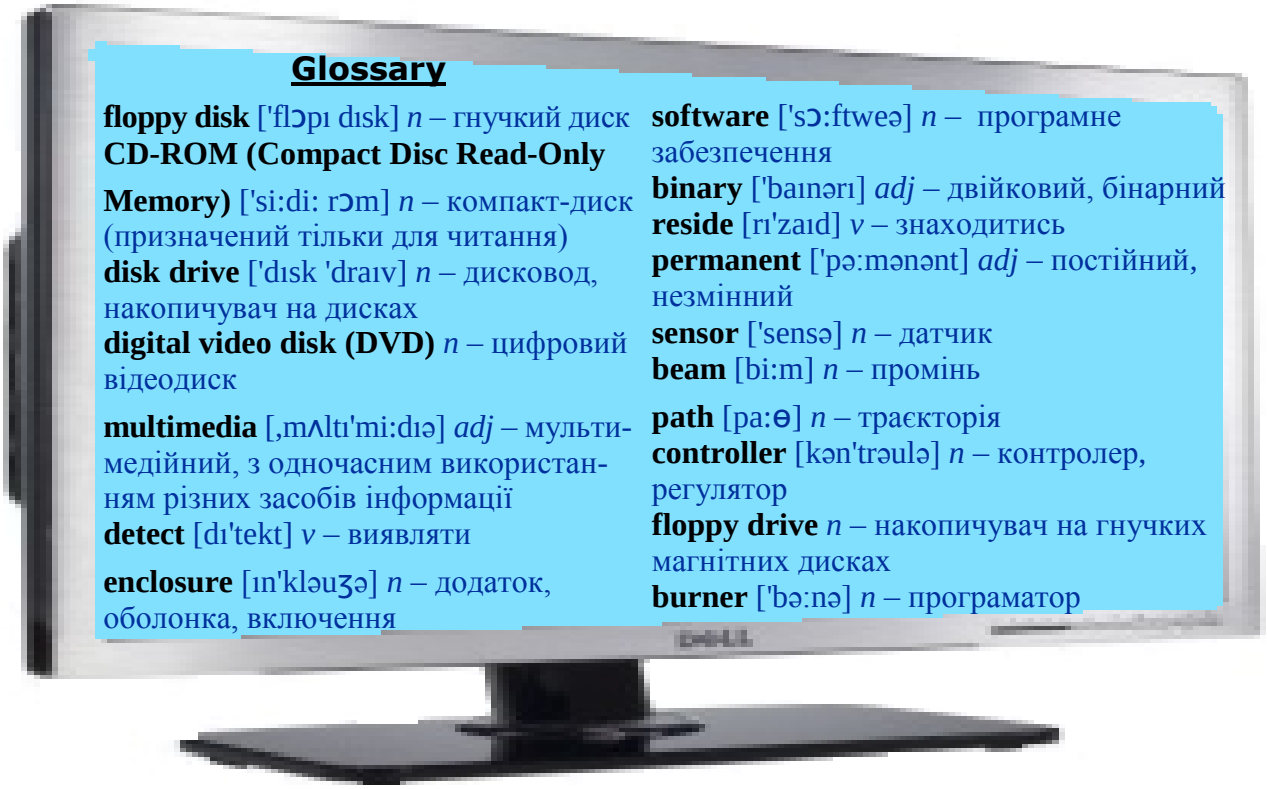
- CD drive;
- DVD drive;
- Blue-ray drive

CD-ROM Drive

Most computers today have a CD-ROM (Compact Disc Read-Only Memory) drive. The compact disks are virtually the same as those used in CD players. The CD-ROM is used to store data for long-term storage. CD-ROMs are read-only, meaning that once information is written to a CD, it can't be erased or changed. Also, it takes much longer to access the information than it does to access data residing on a hard drive. Why, then, are CD-ROMS so popular? Mainly because they make a great software distribution medium. Programs are always getting larger and requiring more disks to install. Instead of installing a program using 100 floppy disks, you can use a single CD, which can hold approximately 650MB. A second reason they are so popular is that CD-ROMs have been standardized across platforms, with the ISO 9660 standard.
CD-ROMs are popularly used to distribute computer software, including games and multimedia applications, though any data can be stored (up to the capacity limit of a disc).
Figure 2 shows an example of a typical CD-ROM drive.

A **Compact Disk** (or **CD**) is an optical disk used to store digital data, originally developed for storing digital audio. Capacity 700Mb.
DVD ("**Digital Video Disk**") Its main uses are video and data storage. Capacity 4,7 Gb.
Blue-ray Disk (or **BD**). Its main uses are high-definition video and data storage. Capacity 25 Gb.

CD disk DVD disk BD disk



Glossary

floppy disk ['flɔpı dısk] *n* – гнучкий диск
CD-ROM (Compact Disc Read-Only Memory) ['si:di: rɔm] *n* – компакт-диск (призначений тільки для читання)
disk drive ['dısk 'draıv] *n* – дисковод, накопичувач на дисках
digital video disk (DVD) *n* – цифровий відеодиск
multimedia [ˌmʌltı'mi:dıə] *adj* – мультимедійний, з одночасним використанням різних засобів інформації
detect [dı'tekt] *v* – виявляти
enclosure [ın'kləuʒə] *n* – додаток, оболонка, включення
software ['sɔ:ftweə] *n* – програмне забезпечення
binary ['baınərı] *adj* – двійковий, бінарний
reside [rı'zaıd] *v* – знаходитись
permanent ['pə:mənənt] *adj* – постійний, незмінний
sensor ['sensə] *n* – датчик
beam [bi:m] *n* – промінь
path [pa:ɵ] *n* – траєкторія
controller [kən'trəulə] *n* – контролер, регулятор
floppy drive *n* – накопичувач на гнучких магнітних дисках
burner ['bə:nə] *n* – програматор

Exercises

1. Learn the new words and use them in short phrases of your own.

2. Show that you can analyse what you have read. Render the plot of the text:
a) without details (in three or four minutes' time),
b) give a brief summary of the text.

3. Ask one of your fellow-students questions about the internal mechanism of Disk Drive. Use the active vocabulary of the text.

4. Make up a story on the basis of the information gained in 7-8 sentences.
Follow these steps: a) plan your essay before you start to write the substance;
b) note down keywords you want to use;
c) put your ideas into a logical order and write the linking text.

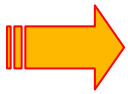
_____
_____
_____
_____
_____

5. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) Hard disk systems are used for permanent storage and quick access.
b) The most important part of an optical disk drive is a surface.
c) An optical disk drive is a disk drive that uses laser light as part of the process of calculating data.
d) There are four main types of floppy disks.
e) Controller sends signals to the various motors in the disk, and receives signals from the sensors inside the drive.
f) Hard disks can hold less information than other forms of storage

6. Make up the words given in jumbled letters. All of them are parts of computer hardware.

o m y m r e
r s c e s r o p o
o m t r d e b o a h r
a s c e
o p y l p f
t o l c r o e n c
d a t a r e p



7. Find in the text the English equivalents for the following expressions and make up sentences of your own:

Накопичувач на оптичних дисках, голівка звукознімача, контролер сервера, поверхня диска, схема материнської плати, жорсткий диск, швидкий доступ, сучасні технології, зберігати велику кількість інформації, передавати інформацію з одного комп'ютера на інший.

_____
_____
_____
_____
_____
_____

8. Match the definitions with their descriptions:

1. cable	a) The computing and control part of the computer.
2. expansion card	b) A medium used to connect another devices to a computer using multiple copper or fiber optic conductors.
3. floppy disk drive	c) The screen element in a laptop computer.
4. disk controller	d) The electronic circuitry that controls and manages the operation of floppy or hard disks installed in the computer.
5. display	e) A device used to read and write data to and from a floppy disk.
6. CPU	f) A device that can be installed into a computer's expansion bus.

9. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

a) Do most computers today have a CD-ROM?

_____

b) How many types of floppy disks are there?

_____

c) What are hard disk systems used for?

_____

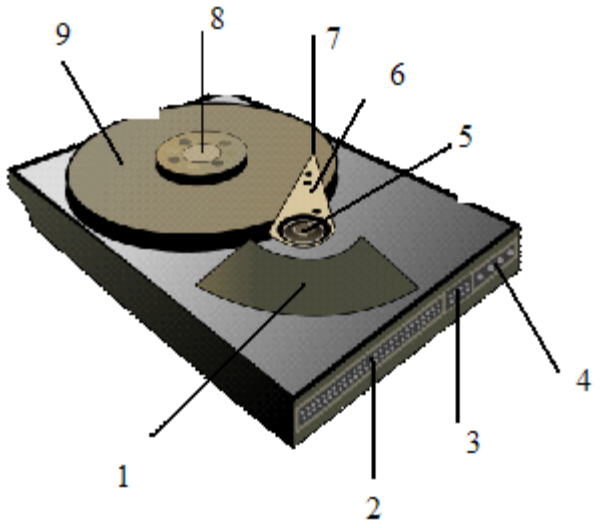
d) What part is the most important of an optical disk drive?

_____

e) What is the CD-ROM used for?

_____

10. Look at the pictures and identify the objects of typical CD-ROM.



a. Actuator
b. Platter
c. Head
d. Jumper Block
e. Actuator Arm
f. Spindle
g. Actuator Axis
h. Power Connector
i. IDE Connector

11. Review Questions

Choose the correct item:

1. The CD-ROM is used to store data for _____storage.
a) short- term
b) once-through
c) long-term
d) limited
2. Commonly drives are both _____.
a) writers and readers
b) readers and recorders
c) recorders and writers
d) types and recorders
3. CD-ROMs are used to distribute computer_____.
a) hardware
b) disks
c) data
d) software
4. The downside of a floppy disk drive is its _____storage capacity.
a) unlimited
b) great
c) limited
d) small

Test your grammar

I. Fill in the correct preposition(s), then choose any three items and make sentences:

1) to be far _____ sth; 2) to ask _____ sth(reguest); 3) to be known _____sth; 4) to have a variety _____ sth; 5) to worry _____ sb/sth; 6) to an example _____ sth

_____

_____

_____

II. Fill in the correct pronoun *(this/that/these/those):*

1. Do you know _____ people? _____is Andy, my friend, and ____ is Paul, brother.
2. Take _____ power supply. It is designed to convert 220-240V AC power.
3. Is _____ your house in the distance?
4. Do you remember _____ students we met in Kyiv?
5. Who said _____ ?
6. Come _____ way, please.

III. Fill in the correct pronoun *(which or what):*

1. _____ languages do you know?
2. _____ way shall we go?
3. _____ are you doing?
4. _____ students have done this test correctly?
5. _____ connectors do we use to the motherboard?
6. _____ exams are you going to take thus term? _____ of them do you find the most difficult?

IV. Fill in the correct pronoun *(some/any/no/no one/none)):*

1. Do you have _____ ideas?
2. I could not answer _____ of her questions.
3. Come _____ day you like.
4. They have _____ friends here.
5. Let me know if you hear _____ news.
6. _____ of us agree with your statement, _____ disagree.
7. We have _____ questions.
8. _____ was happy.
9. May I give you _____ more coffee?
10. _____ of us knows him.

V. Translate these sentences using appropriate pronouns:

1. Скільки часу тобі потрібно для заміни звукової плати?
2. Хто допоміг тобі виконати це завдання?
3. Як ви розумієте слово “апаратне забезпечення”?
4. Ти зустрів кого-небудь біля університету? – Ні, я не бачив нікого.
5. Ця проблема не дуже складна. Ніхто з нас не може її вирішити.
6. Ти вже отримав будь-яку інформацію?
7. Їм подобається спілкуватися в Інтернеті.
8. Чи є тут хто-небудь? Я не бачу нікого.

_____

_____

_____

_____

_____

Look at the picture. Can you understand it? Why is it funny? Make up the story of your own.

Notes on the topic studied:

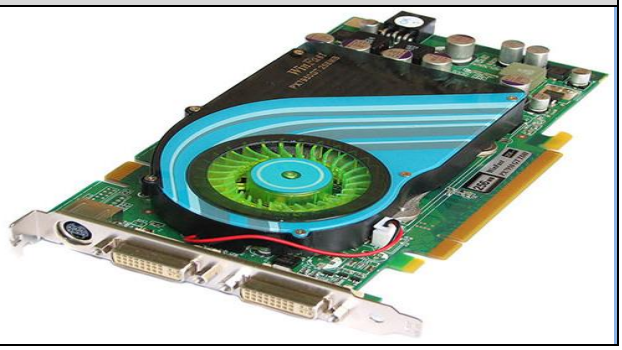
Unit 7

Task 1. Read the following international words and give their Ukrainian equivalents:

position [pə'zɪʃən] *n*
musical ['mju:zɪkəl] *adj*
modem ['məudem] *n*
instrument ['ɪnstrumənt] *n*
monitor ['mɔnɪtə] *n*
abbreviation [ə,bri:vɪ'eɪʃən] *n*
modular ['mɔdjulə] *adj*
microphone ['maɪkrəfəun] *n*
parallel ['pærəlel] *adj*
course [kɔ:s] *n*
convert [kən'və:t] *v*
driver ['draɪvə] *n*
analog ['ænəlɔ:g] *n*
packet ['pækɪt] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:

[ə'dæptə kɑ:d] [keɪpə'bɪlɪtɪ] [ɪn'kri:s] ['fʌŋkʃən] [mætʃ] [ə'lau] ['mɔnɪtə] [ək,selə'reɪʃən] [ɪn'kri:s] [,ɪntəfeɪs] [,mʌltɪ'mi:dɪə] ['meɪdʒə] ['ɪlə,streɪt] [eks'tə:nl] ['dɪsə'semblɪ] [dɪ'rektərɪ] [dɪ'tə:mɪn] ['pɪks(ə)l] [ɪks'pænʃən bʌs] [ɪks'pænʃən kɑ:d] ['netwə:k] [tʃɪp] ['hedfounz] ['deɪtə] ['ju:zə]



Task 3. Practise saying the following words. Pay attention to the pronunciation:
adapter card, capability, increase, function, match, allow, monitor, acceleration, increase, interface, important thing, dedicated chips, expansion bus, serial data stream of packets, digital signals, certain, manufacturers, digital musical instrument, headphones and speakers, to be responsible for, to use the network.

Task 4. What do these abbreviations mean?

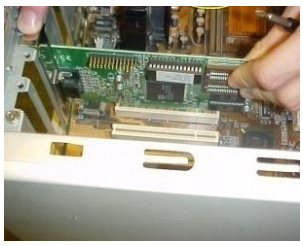
1. **RA M**
2. **ROM**
3. **DIMMs**
4. **CPU**
5. **CD-ROM**
6. **DRA**
7. **MB**
8. **PC**
9. **BIOS**
10. **DOS**
11. **LCD**
12. **DVD**

Task 5. Read the text and make an outline of it.

Adapter cards

An ***adapter card*** (also known as an ***expansion card)*** is simply a circuit board you install into a computer to increase the capabilities of that computer. Adapter cards come in many different

kinds, but the important thing to note is that no matter what function a card has, the card being installed must match the bus type of the motherboard you are installing it into (for example, you can only install a PCI network card into a PCI expansion slot).



Four of the most common expansion cards that are installed today are as follows:

- Video card
- Network interface card (NIC)
- Modem
- Sound card

Let's take a quick look at each of these cards, their functions, and what they look like.

Video card

A *video adapter* (more commonly called a *video card)* is the expansion card you put into a computer in order to allow the computer to display information on some kind of monitor or LCD display. A video card also is responsible for converting the data sent to it by the CPU into the pixels, addresses, and other items required for display. Sometimes, video cards can include dedicated chips to perform certain of these functions, thus accelerating the speed of display.

With today's motherboards, most video cards are AGP expansion cards that fit in the AGP slot on a motherboard.

Figure 1. shows an example of a video card.

Network interface card (NIC)

A *network interface card (NIC)* is an expansion card that connects a computer to a network so that it can communicate with other computers on that network. It translates the data from the parallel data stream used inside the computer into the serial data stream of packets used on the network. It has a connector for the type of expansion bus on the motherboard (PCI or ISA) as well as a connector for the type of network (such as RJ-45 for UTP or BNC for coax). In addition to the NIC, you need to install software or drivers on the computer in order for the computer to use the network.

Figure 2 shows an example of a NIC.

Modem

Any computer that connects to the Internet via a dial-up connection needs a modem. A *modem* is a device that converts digital signals from a computer into analog signals that can be transmitted over phone lines and back again. These expansion card devices have one connector for the expansion bus being used (PCI or ISA) and another for connection to the telephone line. Actually, as you can see in Figure 3, there are two RJ-11 ports: one for connection to the telephone line and the other for connection to a telephone. This is the case primarily so that putting a computer online still lets someone hook a phone to that wall jack (although they won't be able to use the phone while the computer is connected to the Internet).

Sound card

Just as there are devices to convert computer signals into printouts and video information, there are devices to convert those signals into sound. These devices are known *as sound cards.* Many different manufacturers make sound cards, but the standard has been set by Creative Labs with its SoundBlaster series of cards.

A sound card typically has small, round, 1/8-inch jacks on the back of it for connecting to microphones, headphones, and speakers as well as other sound equipment. Many sound cards also have a DB-15 game port which can be used for either joysticks or Musical Instrument Digital Interface (MIDI) connections (allows a computer to talk to a digital musical instrument, like a digital keyboard or similar).

Figure 4 shows an example of a sound card.

Glossary

adapter card [ə'dæptə kɑ:d] *n* – адаптерна плата

sound card [saund kɑ:d] *n* – звукова карта

video card ['vɪdɪəu kɑ:d] *n* – відео карта

network interface card (NIC) *n* – мережева інтерфейсна плата (мережевий адаптер)

expansion bus [ɪk'spænʃən bʌs] *n* – шина розширення

expansion card [ɪks'pænʃən kɑ:d] *n* – плата розширення

capability [keɪpə'bɪlɪtɪ] *n* – здатність

monitor ['mɔnɪtə] *n* – монітор, дісплей

sound blaster *n* – саунд-бластер, звукогенератор

headphones ['hedfounz] *n* – навушники

print out *v* – роздруковувати

analog signal *n* – аналоговий сигнал

pixel ['pɪks(ə)l] *n* – піксель, мінімальний елемент зображення

modem ['məudem] *n* – модем

network ['netwə:k] *n* – мережа

Exercises

1. **Learn the new words and use them in short phrases of your own.**

_____
_____
_____
_____
_____
_____

2. **Show that you can analyse what you have read. Render the plot of the text:**
   a) without details (in three or four minutes' time),
   b) give a brief summary of the text.

3. **Ask one of your fellow-students questions about the main functions of the expansion cards. Use the active vocabulary of the text.**

4. **Make up a story on the basis of the information gained in 7-8 sentences.** 
   Follow these steps: a) plan your essay before you start to write the substance;
   b) note down keywords you want to use;
   c) put your ideas into a logical order and write the linking text.

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5. **Read the text and fill in the gaps from below. Render it into Ukrainian. Give it a head-line. Discuss with your partner the main functions of a microprocessor.**

_____

Input devices send information and instructions to the _____Some input devices are hand-operated, but others work automatically once they are_____. There are five main kinds of hand-operated units: (1) a keyboard, (2) a mouse, (3) a trackball, (4) a light pen, and (5) a touch screen. There are three principal types of automatic units: (1) a modem, (2) a scanner, and (3) a microphone. In addition, all storage devices can function as input devices.
A keyboard is the main_____. Modern computer keyboards are different from typewriter keyboards. For example, along the top of the keyboard of a desktop PC is a row of function keys, which are designated F1, F2, F3, and so on. Function keys perform special tasks, such as removing a passage of text from one part of a document and inserting it in another. Elsewhere on the keyboard are keys that control the movement of an electronic marker called the insertion point that appears on the monitor_____. The insertion point indicates where the next character typed will appear.
Special keys with such names as command, control, and option give other keys extra functions. For example, with some software, pressing the command and p keys at the same time instructs the computer to prepare _____a document. A user can also reprogram the keyboard to change the function of certain keys, or even make them produce letters from a different_____.

The keyboard itself is an electronic device. When the user types a character, electronic circuits in the keyboard translate the character into _____charges. The charges travel through wire to a buffer, a temporary storage location in the computer. As soon as the charges appear in the buffer, the microprocessor moves them to RAM. At the same time, the microprocessor instructs the monitor to put the character on the screen.

(**to print, turned on, alphabet, screen, computer, bit, input device**)

6. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

a) A network interface card translates the data from the parallel data stream used outside the computer into the serial data stream of packets used on the network.
b) A modem is a device that converts analog signals from a computer into analog digital signals.
c) Video cards never include dedicated chips.
d) Any computer that connects to the Internet via a dial-up connection needs a motherboard.
e) Adapter cards come in many different kinds.
f) AC adapter is a device that allows notebook computers to use AC power.

7. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

1. How many common expansion cards are installed today?

_____

2. What is a video card responsible for?

_____

3. Can a user reprogram the keyboard to change the function of certain keys? Name them.

_____

4. Which devices convert computer signals into printouts and video information?

_____

5. Which devices convert computer signals into sound?

_____

6. What special tasks do function keys perform?

_____

8. Find in the text the English equivalents for the following expressions and make up 3 sentences of your own:

Переводити комп'ютерні сигнали в друковану інформацію, бути відповідальним за перетворення інформації, з'єднання по телефонній мережі, функціональні кнопки, додаткові функції, перепрограмувати клавіатуру для зміни функції кнопки, прискорювати швидкість виведення на екран.

_____
_____
_____
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Review Questions

Choose the correct item:

1. There are _____main kinds of hand-operated units.
a) one
b) two
c) five
d) three
2. The keyboard is an _____device.
a) digital
b) electric
c) electronic
d) dynamic
3. The microprocessor moves charges from the buffer to _____.
a) ROM
b) SIMM
c) DIMM
d) RAM
4. NIC is a _____.
a) sound card
b) video card
c) expansion card
d) network interface card

Test your grammar

I. Learn the examples and translate them into Ukrainian (The Subjunctive Mood. Conditional sentences):

1. If we have time tomorrow, we shall discuss this topic.
2. If the students attend the practical lessons on informatics they are able to install motherboard.
3. I should not store this information unless he asked me to.
4. He would have read this article if you had explained its necessity.
5. If she had been wrong, she would have checked out it.
6. We would have replaced the motherboard if it had been bought.

_____
_____
_____
_____
_____
_____
_____
_____

II. Translate into English:

1. Я б охоче вам допоміг, та у мене сьогодні важлива лекція.
2. Було б корисно замінити центральний процесор.
3. Тобі слід було б порадитись з ним.
4. Я б пішов з вами до Інтернет – клубу, та пообіцяв виконати тест.
5. Добре, що ви не змінили своє рішення, інакше вам було б важко виконати це завдання.

_____
_____
_____
_____

III. Make up questions to the following statements:

1. The control unit directs and coordinates computer operations according to instructions stored in the memory.

2. Memory chips hold data and instructions inside the computer.

3. ROM chips are used to hold instructions that a computer runs repeatedly.

4. A modem is an electronic device that communicates with other computers over telephone lines.

5. Millions of individuals, families, and schools bought personal computers.

Notes on the topic studied:

Unit 8

Task 1. Read the following international words and give their Ukrainian equivalents:

concept ['kɔnsept] *n*
bit [bɪt] *n*
standard ['stændəd] *adj*
component [kəm'pəunənt] *n*
diagram ['daɪəgræm] *n*
course [kɔ:s] *n*
convert [kən'və:t] *v*
driver ['draɪvə] *n*
universal [ˌju:nɪ'və:səl] *adj*
finish ['fɪnɪʃ] *v*
signal ['sɪgnl] *n*
system ['sɪstɪm] *n*

Task 2. Read the phonetic transcription. Practise your pronunciation:

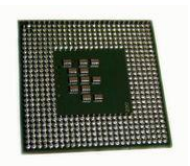
['pɔɪntə] ['pɪks(ə)l] ['meɪtrɪks] ['kæθəud] [rendə] [ləu'keɪʃən] ['praɪmərɪ] ['ɔptɪkəl] ['leɪzə] [læptɔp] [ˌɪnstə'leɪʃən] [dɪ'menʃən] ['dʒʌmpə blɔk] [tju:b] ['nəutbuk] [rɪ'septəkl] [rɪ'flekʃən] [slɔt] [sə'plaɪ] [vaɪsɪ 'və:sə] ['vɪzjuəl] ['waɪəlɪs] [ˌkɔmbɪ'neɪʃ(ə)n] [kəm'pju:tə] [kə:sə] ['hɑ:dweə] ['mɔnɪtə]

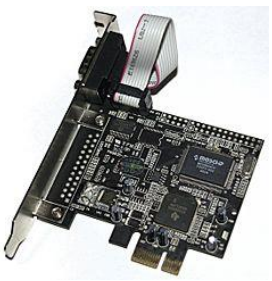
Task 3. Practise saying the following words. Pay attention to the pronunciation:
computer display, laptop, notebook, and palmtop computers, liquid crystal display technology, primary differences, cathode ray tube, palmtop computers, to draw the graphic, special chemicals, the big desktop computers, conversion-related quality loss, the x- and y-coordinate transistors, typically coated, from digital to analog, occasionally, reappear in the new location, monochrome, could easily be added, analog counterparts, Digital Visual Interface.

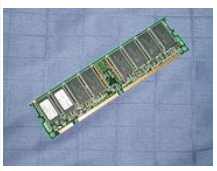
Task 4. Look at the pictures and identify the objects. Make up 4 sentences of your own.









_____
_____
_____
_____
_____

Task 4. Read the text and make an outline of it.

Display Devices

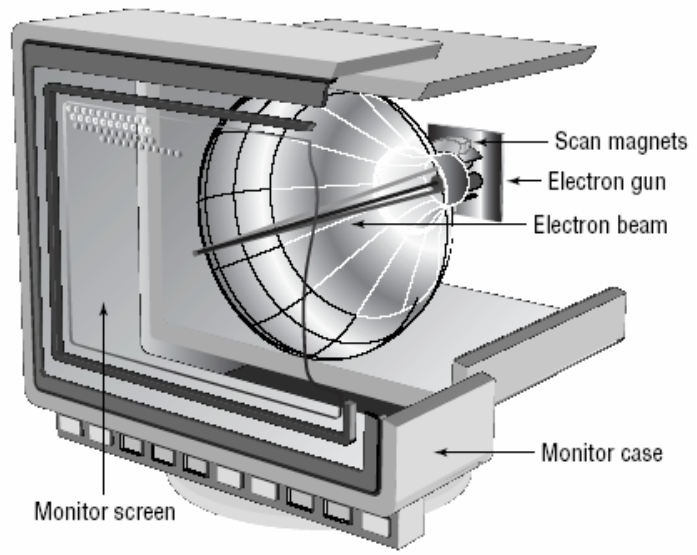
The second way of getting information OUT of a computer is to use a computer display. Display systems convert computer signals into *text* and pictures and display them on a TV-like screen. As a matter of fact, the first personal computers used television screens because it was simple to use an existing display technology rather than to develop a new one. Several types of computer displays are in use today, including the TV. All of them use either the same *cathode ray tube (CRT)* technology found in television sets (almost every desktop monitor uses this technology) or the *liquid crystal display (LCD)* technology found on all laptop, notebook, and palmtop computers.

Display Concepts

Several aspects of display systems make each type of display different. However, most display systems work the same way. First, the computer sends a signal to a device called the *video adapter*—an expansion board installed in an expansion bus slot—telling it to display a particular graphic or character. The adapter then *renders* the character for the display—that is, it converts the single instruction into several instructions that tell the display device how to draw the graphic—and sends the instructions to the display device. The primary differences after that are in the type of video adapter you are using (monochrome, EGA/CGA, VGA, or SuperVGA) and the type of display (CRT or LCD).

Monitor Basically, a device called an *electron gun* shoots electrons toward the back side of the monitor screen (see Figure 1). The back of the screen is coated with special chemicals (called *phosphors)* that glow when electrons strike them. This beam of electrons scans across the monitor from left to right and top to bottom to create the image.

Figure 1 How a monitor works



Liquid crystal displays (LCDs)

Portable computers were originally designed to be compact versions of their bigger brothers. They crammed all the components of the big desktop computers into a small, suitcase-like box called (laughably) a *portable computer.* No matter what the designers did to reduce the size of the computer, the display remained as large as the desktop version's. That is, until an inventor found that when he passed an electric current through a semicrystalline liquid, the crystals

aligned themselves with the current. It was found that by combining transistors with these liquid crystals, patterns could be formed. These patterns could represent numbers or letters. The first application of these *liquid crystal displays* (LCDs) was the LCD watch. It was rather bulky, but it was cool.

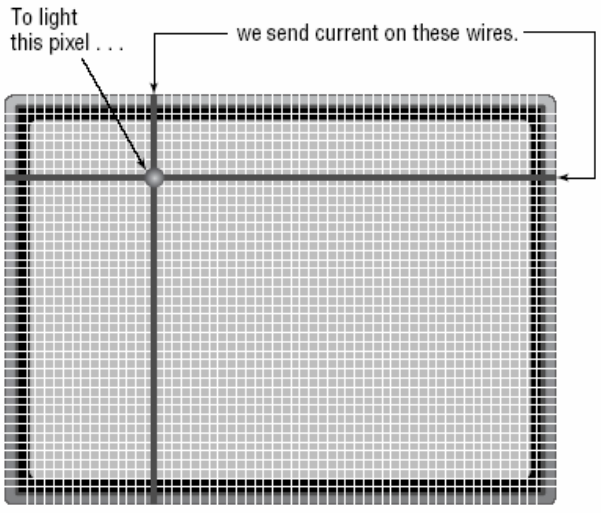
As LCD elements got smaller, the detail of the patterns became greater, until one day someone thought to make a computer screen out of several of these elements. This screen was very light compared to computer monitors of the day, and it consumed little power. It could easily be added to a portable computer to reduce the weight by as much as 30 pounds. As the components got smaller, so did the computer, and the laptop computer was born.

LCDs are not just limited to laptops; desktop versions of LCD displays are available as well. They use the same technologies as their laptop counterparts but on a much larger scale. Plus, these LCDs are available in either analog or digital interfaces for the desktop computer. The analog interface is exactly the same as the interface used for most monitors. All digital signals from the computer are converted into analog signals by the video card, which are then sent along the same 15-pin connector as a monitor. Digital LCDs, on the other hand, are directly driven by the video card's internal circuitry. They require the video card to be able to support digital output (through the use of a Digital Visual Interface, or DVI, connector). The advantage is that since the video signal never goes from digital to analog, there is no conversion-related quality loss. Digital displays are generally sharper than their analog counterparts.

Two major types of LCD displays are used today: active matrix screen and passive matrix screen. The main differences lie in the quality of the image. However, both types use lighting behind the LCD panel to make the screen easier to view.

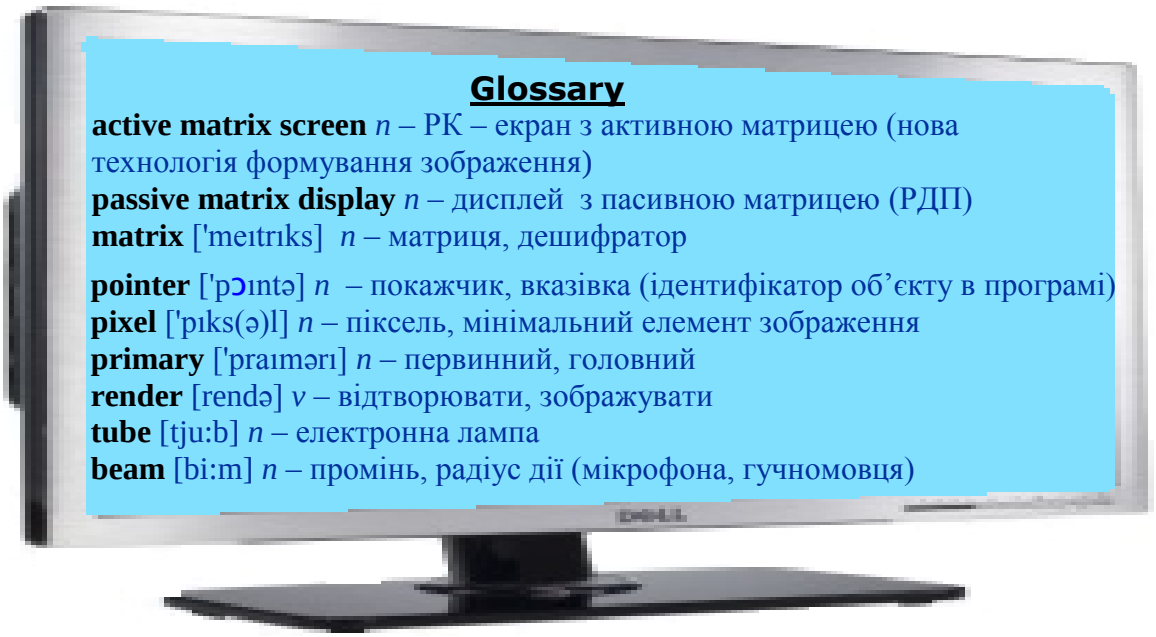
Active matrix an active matrix screen works in a similar manner to the LCD watch. The screen is made up of several individual LCD pixels. A transistor behind each pixel, when switched on, activates two electrodes that align the crystals and turn the pixel dark. This type of display is very crisp and easy to look at. The major disadvantage of an active matrix screen is that it requires large amounts of power to operate all the transistors. Even with the backlight turned off, the screen can still consume battery power at an alarming rate. Most laptops with active matrix screens can't operate on a battery for more than two hours.

Passive matrix within the passive matrix screen are two rows of transistors: one at the top, another at the side. When the computer's video circuit wants to turn on a particular pixel (turn it black), it sends a signal to the x- and y-coordinate transistors for that pixel, thus turning them on. This then causes voltage lines from each axis to intersect at the desired coordinates, turning the desired pixel black. Figure 2 illustrates this concept.



The main difference between active matrix and passive matrix is image quality. Because the computer takes a millisecond or two to light the coordinates for a pixel in passive matrix displays, the response of the screen to rapid changes is poor, causing, for example, an effect known as *submarining.* On a computer with a passive matrix display, if you move the mouse

pointer rapidly from one location to another, it will disappear from the first location and reappear in the new location without appearing anywhere in between.
To keep the quality of the image on an LCD the best, the screen must be cleaned often. Liquid crystal displays are typically coated with a clear plastic covering. This covering commonly gets dirtied by fingerprints as well as a generous coating of dust. The best way to clean the LCD lens coating is to wipe it off occasionally with a damp cloth. Doing so will ensure that the images stay crisp and clear.



Glossary

active matrix screen *n* – РК – екран з активною матрицею (нова технологія формування зображення)
passive matrix display *n* – дисплей з пасивною матрицею (РДП)
matrix ['meɪtrɪks] *n* – матриця, дешифратор
pointer ['pɔɪntə] *n* – покажчик, вказівка (ідентифікатор об'єкту в програмі)
pixel ['pɪks(ə)l] *n* – піксель, мінімальний елемент зображення
primary ['praɪmərɪ] *n* – первинний, головний
render [rendə] *v* – відтворювати, зображувати
tube [tju:b] *n* – електронна лампа
beam [bi:m] *n* – промінь, радіус дії (мікрофона, гучномовця)

Exercises

1. Learn the new words and use them in short phrases of your own.

_____
_____
_____
_____
_____
_____

2. Show that you can analyse what you have read. Render the plot of the text:
a) without details (in three or four minutes' time),
b) give a brief summary of the text.

3. Ask one of your fellow-students questions about the main difference between active matrix and passive matrix. Use the active vocabulary of the text.

4. Make up a story on the basis of the information gained in 7-8 sentences.
Follow these steps: a) plan your essay before you start to write the substance;
b) note down keywords you want to use;
c) put your ideas into a logical order and write the linking text.

_____
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_____

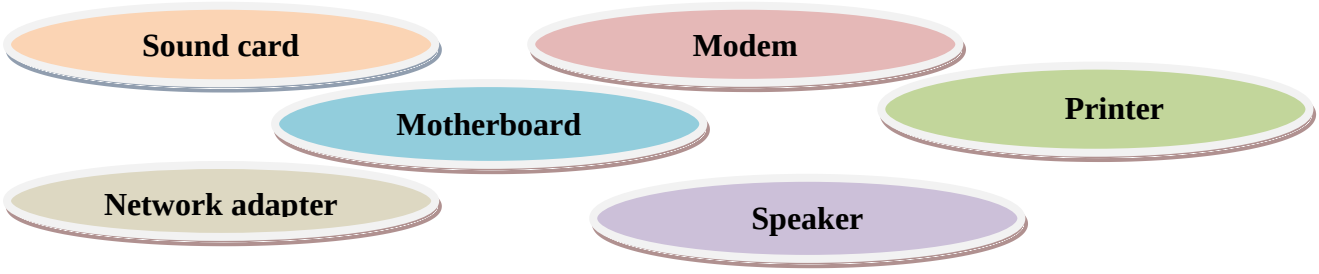
5. Look at the table and fill in the missing information:

INPUT DEVICES	OUTPUT DEVICES	STORAGE DEVICES	DISPLAY DEVICES

6. What do you think? Express your agreement or disagreement with the following statements. If you disagree, say why.

A. Monitors have a screen much like a television screen.
B. Laptop and notebook computers use round panel screens, which can't display color and motion.
C. Output devices display the work done by the computer. These devices include monitors, mice, printers, plotters, speakers, keyboards and sound cards.
D. The most common type, the monitor used with a desktop machine, is a cathode-ray tube (CRT), a vacuum tube like a television picture tube.
E. One type of LCD displays is used today: active matrix screen.
F. The first display systems were nothing more than fancy black-and-white TV monitors called CRTs.

7. Identify logical connection between these devices …



8. Match the definitions with their descriptions:

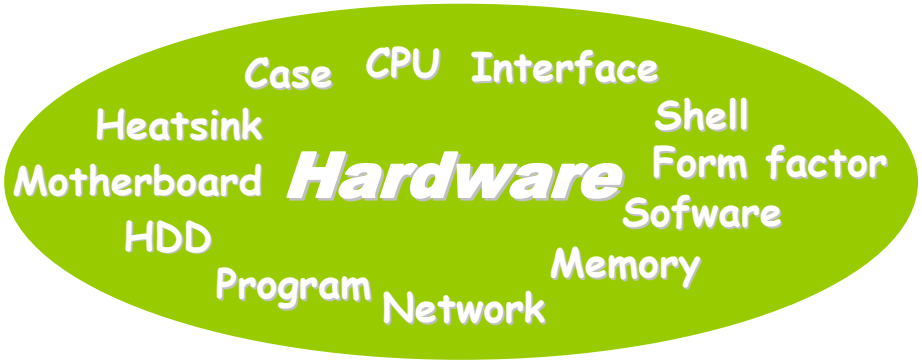
1. port	a) A program intended to damage your computer system without your knowledge or per mission.
2. monitor	b) An input device used for pointing, designed as an alternative to the mouse.
3. terminal	c) A monitor and keyboard attached to a computer (usually a mainframe), used for data entry and display.
4. syntax	d) The proper way of forming a text command for entry into the computer.
5. virus	e) The code that defines what a program is and how it works.
6. trackball	f) In networking, any computer that makes access to files, printing, communications, or other services available to users of the network.
7. server	g) A generic term for any connector on a computer that allows a cable to be plugged into it.
8. mouse	h) A small input device with one or more buttons used as for pointing or drawing.
9. source	i) A video output device capable of displaying text and graphics, often in color.

9. Find in the text the English equivalents for the following expressions and make up sentences of your own:

Якість зображення, основні недоліки рідкокристалічного дисплея з пасивною матрицею, інтерфейси більшості моніторів, рухати курсором миші, цифрове зображення, приводити в дію електроди, перше застосування, потребувати кількість енергії.

_____
_____
_____
_____
_____
_____
_____

10. Look at the following group of words. Which of the surrounding words can't go with the noun in the centre? Give your reasons.



11. Present and justify your own argument and conclusions. Answer the following questions and discuss them with your partner:

1. How many ways of getting information out of a computer do we use today?

_____

2. Which screens did the first personal computers use?

_____

3. What versions of LCD displays are available for desktop computers?

_____

4. What is the main difference between active matrix and passive matrix?

_____

5. What must you do to keep the quality of the image on an LCD the best?

_____

12. Review Questions

Choose the correct item:

1. Monitor is a video _____device capable of displaying text and graphics.

a) input
b) output
c) storage
d) memory

2. An _____screen is made up of several individual LCD pixels.

a) passive matrix
b) cathode-ray tube
c) active matrix
d) vacuum tube

3. The major_____ of an active matrix screen is that it requires large amounts of power.

a) advantage
b) shortcoming
c) disadvantage

4. The best way to clean the LCD lens coating is to wipe it off with a _____cloth.

a) dry
b) cool
c) damp
d) hot

Test your grammar

I. Learn the examples and translate them into Ukrainian (The Adverb):

always - _____, often - _____, never - _____,
seldom - _____, soon - _____, still - _____,
here - _____, there - _____, very - _____,
yesterday - _____, ever - _____, well - _____,
suddenly - _____, clearly -_____, inside - _____.

II. Compare the following adjectives and adverbs. Translate the sentences into Ukrainian:

Adjective	***Adverb***
She ran the fast program.	The program was ran quite fast.
We didn't have a long wait.	We didn't have to wait long.
We have done an early removal.	We have done our work early.

_____
_____
_____

III. Transform the following adjectives into adverbs. Translate them into Ukrainian:

Model: quick – quickly; hot – hot

easy –_____
cold –_____
warm –_____
heavy –_____
clean –_____
opposite –_____
natural –_____
electrical –_____
accurate –_____

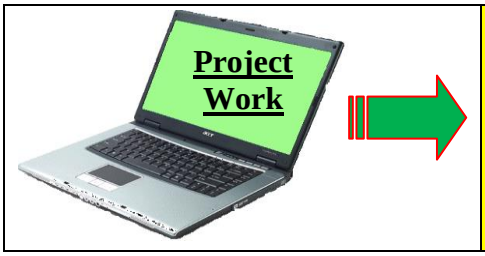
IV. Suggest antonyms of the following words:

input – _____
store – _____
damp – _____
easy – _____
floppy disk – _____
small – _____
mini – _____
passive matrix – _____

V. Put the verbs in brackets in the correct tense:

1. Computers (to be)_____ powerful tools which help to change our life and the world around us.

2. Modern education (to base) _____on the premise that students (to be)_____ at the center of the learning process.
3. Virtually every kind of organization throughout the world (to conduct) _____business with computers.
4. I (to do this task) tomorrow.
5. The word digital (to mean) _____having to do with numbers.
6. Palmtop computer (to have) _____less power.
7. My friend (to communicate) _____over the Skype now.
8. Personal computers (to use) _____by one person at a time.
9. Early users of computers (to write) _____their own software.
10. Because of advances in hardware, the price of computing (to drop) _____sharply.
11. The number of computers in operation (to rise)_____ rapidly ever since the first commercial digital computers (to manufacture) _____in the 1950's.
12. By the mid-1990's, the number of computers (to reach) _____ about 200 million.
13. He (to repair) computer case the whole day yesterday.
14. The first personal computer (to introduce) _____ in 1975.



Prepare a multimedia presentation on the topic *"Computer Hardware"*. Use Power Point.

Notes on the topic studied:

Texts for additional reading

Text 1. **"Printers"**

Impact Printers

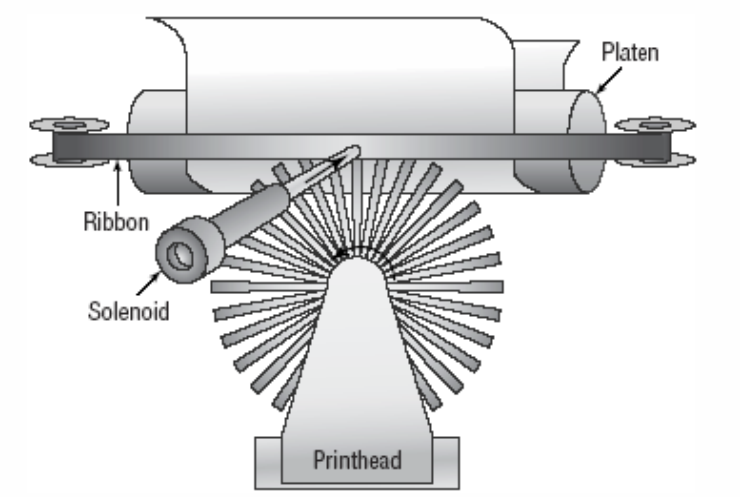
There are several categories of printers, but the most basic type is the category known as *impact printers.* Impact printers, as their name suggests, use some form of impact and an inked ribbon to make an imprint on the paper. In a manner of speaking, typewriters are like impact printers. Both use an inked ribbon and an impact head to make letters on the paper. The major difference is that the printer can accept input from a computer.

There are two major types of impact printers: daisy wheel and dot matrix. Each type has its own service and maintenance issues.

Daisy-Wheel Printers

These printers contain a wheel (called the *daisy wheel* because it looks like a daisy) with raised letters and symbols on each "petal" (see Figure 1). When the printer needs to print a character, it sends a signal to the mechanism that contains the wheel. This mechanism is called the *printhead.* The printhead rotates the daisy wheel until the required character is in place. An electromechanical hammer (called a *solenoid)* then strikes the back of the petal containing the character. The character pushes up against an inked ribbon that ultimately strikes the paper, making the impression of the requested character.

Figure 1 A daisy-wheel printer mechanism



Daisy-wheel printers were one of the first types of impact printer developed. Their speed is rated by the number of *characters per second (cps)* they can print. The early printers could only print between two and four characters per second. Aside from their poor speed, the main disadvantage to this type of printer is that it makes a lot of noise when printing – so much, in fact, that special enclosures were developed to contain the noise.

The daisy-wheel printer has a few advantages, of course. First, because it is an impact printer, you can print on multipart forms (like carbonless receipts), assuming they can be fed into the printer properly. Second, it is relatively inexpensive compared to the price of a laser printer of the same vintage. Finally, the print quality is comparable to a typewriter because it uses a very similar technology. This typewriter level of quality was given a name: *letter quality (LQ).*

Dot-Matrix Printers

The other type of impact printer we'll discuss is the *dot-matrix printer.* These printers work in a manner similar to daisy-wheel printers, but instead of a spinning, character-imprinted wheel, the printhead contains a row *of pins* (short, sturdy stalks of hard wire). These pins are triggered in patterns that form letters and numbers as the printhead moves across the paper.

The pins in the printhead are wrapped with coils of wire to create a solenoid and are held in the rest position by a combination of a small magnet and a spring. To trigger a particular pin, the printer controller sends a signal to the printhead, which energizes the wires around the appropriate print wire. This turns the print wire into an electromagnet, which repels the print pin, forcing it against the ink ribbon and making a dot on the paper. The arrangement of the dots in

columns and rows creates the letters and numbers you see on the page. The main disadvantage of doc-matrix printers is their image quality, which can be quite poor compared to the quality produced with a daisy wheel. Dot-matrix printers use patterns of dots to make letters and images, and the early dot-matrix printers used only nine pins to make those patterns. The output quality of such printers is referred to as *draft quality*—good mainly for providing your initial text to a correspondent or reviser. Each letter looked fuzzy because the dots were spaced as far as they could be and still be perceived as a letter or image. As more pins were crammed into the printhead (17-pin and 24-pin models were eventually developed), the quality increased because the dots were closer together. Dot-matrix technology ultimately improved to the point that a letter printed on a dot-matrix printer was *almost* indistinguishable from typewriter output. This level of quality is known as *near letter quality f\LQ).*

Dot-matrix printers are noisy, but the print wires and printhead are covered by a plastic dust cover, making them quieter than daisy-wheel printers. They also use a more efficient printing technology, so the print speed is faster (typically in the range of 36 to 72cps). Some dot-matrix printers (like the Epson DFX series) can print at close to a page per second! Finally, because dot-matrix printers are also impact printers, they can use multipart forms. Because of these advantages, dot-matrix printers quickly made daisy-wheel printers obsolete.

Bubble-Jet Printers

The next category of printer technology is one of the most popular in use today. This category is actually an advanced form of an older technology known as *ink-jet printers.* Both types of printers spray ink on the page, but ink-jet printers use a reservoir of ink, a pump, and an ink nozzle to accomplish this. They were messy, noisy, and inefficient. Bubble-jet printers work much more efficiently and are much cheaper.

In a *bubble-jet printer** bubbles of ink are sprayed onto a page and form patterns that resemble the items being printed. In this section, you will learn the parts of a bubble-jet printer, as well as how bubble-jet printers work.

Parts of a Typical Bubble-Jet Printer

Bubble-jet printers are simple devices. They contain very few parts (even fewer than dot-matrix printers) and, as such, are inexpensive to manufacture. It's common today to have a $99 bubble-jet printer with print quality that rivals that of basic laser printers.

In this section, you will learn the parts of a typical bubble-jet printer and what they do. The printer parts can be divided into the following categories:

- Printhead/ink cartridge
- Head carriage, belt, and stepper motor
- Paper feed mechanism
- Control, interface, and power circuitry

Printhead/ink Cartridge

The first part of an bubble-jet printer is the one people see the most: *the printhead.* This part of a printer contains many small nozzles (usually 100-200) that spray the ink in small dots onto the page. Many times the printhead is part of the *ink cartridge** which contains a reservoir of ink and the printhead in a removable package. Color bubble-jet printers include multiple print-heads, one for each of the *CMYK* print inks (cyan, magenta, yellow, and black).

Every bubble-jet printer works in a similar fashion. As we just mentioned, each bubble-jet printer contains a special part called an ink cartridge (see Figure 2) that contains the printhead and ink supply (although some printers separate them so they can be replaced separately). The print cartridge must be replaced as the ink supply runs out.

Figure 2 Atypical ink cartridge (size: approximately 3 inches by 11/2 inches)

Inside the ink cartridge are several small chambers. Ac the cop of each chamber is a metal place and a cube leading to the ink supply. At the bottom of each chamber is a small pinhole. These pinholes are used to spray ink on the page to form characters and images as patterns of dots (similar to the way a dot-matrix printer works, but with much higher resolution).

There are two methods of spraying the ink out of the cartridge. The first was developed by Hewlett-Packard (HP): When a particular chamber needs to spray ink, an electric signal is sent to the heating element, energizing it. The elements heat up quickly, causing the ink to vaporize. Because of the expanding ink vapor, the ink is pushed out the pinhole and forms a bubble.

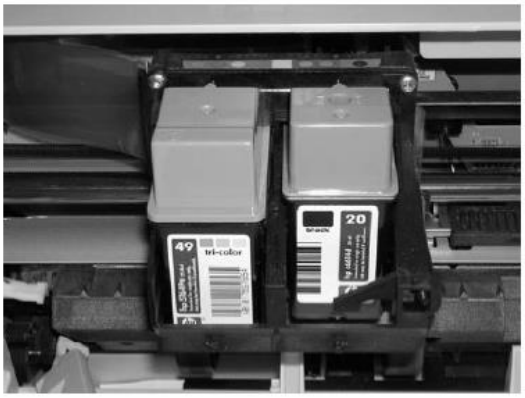
As the vapor expands, the bubble eventually gets large enough to break off into a droplet. The rest of the ink is pulled back into the chamber by the surface tension of the ink. When another drop needs to be sprayed, the process begins again. The second method, developed by Epson, uses a piezoelectric element that flexes when energized. The outward flex pushes the ink from the nozzle; on the return, it sucks more ink from the reservoir.

When the printer is done printing, the printhead moves back to its maintenance station. The *maintenance station* contains a small suction pump and ink-absorbing pad. To keep the ink flowing freely, before each print cycle, the maintenance station pulls ink through the ink nozzles using vacuum suction. This expelled ink is absorbed by the pad. The station serves two functions: to provide a place for the printhead to rest when the printer isn't printing, and to keep the printhead in working order.

Head Carriage, Belt, and Stepper Motor

Another major component of the bubble-jet printer is the head carriage and the associated parts that make it move. The *printhead carriage* is the component of a bubble-jet printer that moves back and forth during printing. It contains the physical as well as electronic connections for the printhead and (in some cases) the ink reservoir. Figure 3 shows an example of a head carriage. Note the clips that keep the ink cartridge in place and the electronic connections for the ink cartridge. These connections cause the nozzles to fire, and if they aren't kept clean, you may have printing problems.

Figure 3 A printhead carriage in a bubble-jet printer



Paper-Feed Mechanism

In addition to getting the ink onto the paper, the printer must have a way to get the paper into the printer. That's where the paper-feed mechanism comes in. *The paper-feed mechanism* picks up paper from the paper drawer and feeds it into the printer. This assembly consists of several smaller assemblies. First you have the *pickup rollers* (Figure 4.), which are several rubber rollers with a slightly flat spot; they rub against the paper as they rotate, and feed the paper into the printer. They work against small cork or rubber patches known *as separator pads* (Figure 5), which help keep the rest of the paper in place (so only one sheet goes into the printer). The pickup rollers are turned on a shaft by *the pickup stepper motor.*

Figure 4 Bubble-jet pickup rollers

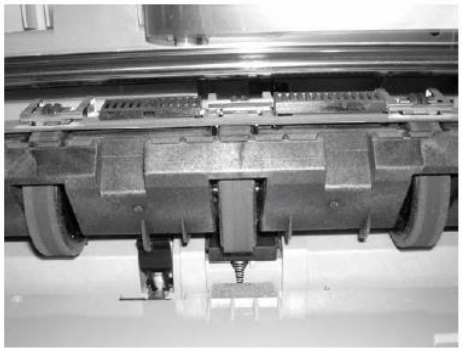
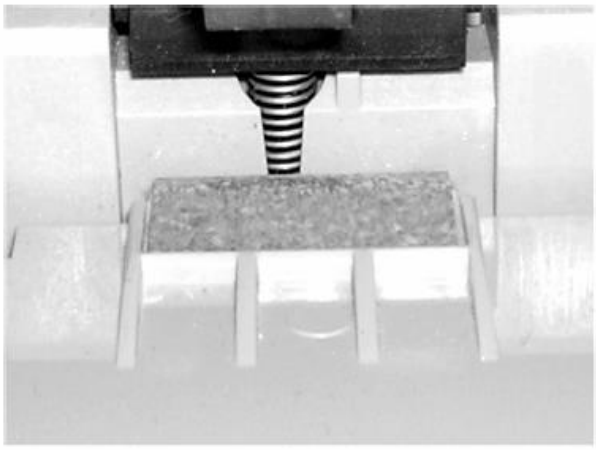


Figure 5 Bubble-jet separator pads



Sometimes the paper that is fed into a bubble-jet printer is placed into a *paper tray*, which is simply a small plastic tray in the front of the printer that holds the paper until it is fed into

the printer by the paper-feed mechanism. On smaller printers, the paper is placed vertically into a *paper feeder* at the back of the printer; it uses gravity, in combination with feed rollers and separator pads, to get the paper into the printer. No real rhyme or reason dictates which manufacturers use these different parts; some models use them, some don't. Generally, more expensive printers use paper trays, because they hold more paper. Figure 6 shows an example of a paper tray on a bubble-jet printer.

Figure 6 A paper tray on a bubble-jet printer

The final pare of the paper-feed mechanism is the *paper-feed sensors*. These components tell the printer when it is out of paper, as well as when a paper jam has occurred during the paper-feed process.

Control, Interface, and Power Circuitry

The final component group is the electronic circuitry for printer control, printer interfaces, and printer power. The *printer control circuits* are usually on a small circuit board that contains

all the circuitry to run the stepper motors the way the printer needs them to work (back and forth, load paper and then stop, and so on). These circuits are also responsible for monitoring the health of the printer and reporting that information back to the PC.

Next, the *interface circuitry* not only makes the physical connection to whatever signal is coming from the computer (parallel, serial, SCSI, network, infrared, and so on), but also connects the interface to the control circuitry. The interface circuitry converts the signals from the interface into the data stream that the printer uses.

The last set of circuits the printer uses are the *power circuits.* Essentially, these conductive pathways convert 11OV or 220V house current into the voltages the bubble-jet printer uses (usually 12V and 5V) and distribute those voltages to the other printer circuits and devices that need it. This is accomplished through the use of a transformer. A transformer, in this case, takes the 11OVAC current and changes it to 12VDC (among others). This transformer can be either internal (incorporated into the body of the printer) or external. Today's bubble-jets can use either design, although the integrated design is preferred because it is simpler and doesn't show the bulky transformer.

The Bubble-Jet Printing Process

Just as with other types of printing, the bubble-jet printing process consists of a set of steps the printer must follow in order to put the data onto the page being printed. The following steps happen whenever you click the Print button in your favorite software (like Microsoft Word or Internet Explorer):

1. You click the Print button (or similar) that initiates the printing process.
2. The software you are printing from sends the data to be printed to the printer driver you have selected.
3. The printer driver uses a page-description language to convert the data being printed into the proper format that the printer can understand. The driver also ensures that the printer is ready to print.
4. The printer driver sends the information to the printer via whatever connection method is being used (parallel, USB, network, and so on).
5. The printer stores the received data in its onboard *print buffer* memory. A print buffer is a small amount of memory (typically 512KB to 16MB) used to store print jobs as they are received from the printing computer. This buffer allows several jobs to be printed at once and helps printing to be completed quickly.
6. If the printer has not printed in a while, the printer's control circuits activate a cleaning cycle. A *cleaning cycle* is a set of steps the bubble-jet printer goes through in order to purge

1. the printheads of any dried ink. It uses a special suction cup and sucking action to pull ink through the printhead, dislodging any dried ink or clearing stuck passageways.

7. Once the printer is ready to print, the control circuitry activates the paper-feed motor. This causes a sheet of paper to be fed into the printer until the paper activates the paper-feed sensor, which stops the feed until the printhead is in the right position and the leading edge of the paper is under the printhead. If the paper doesn't reach the paper-feed sensor in a specified amount of time after the stepper motor has been activated, the Out of Paper light is turned on and a message is sent to the computer.
8. Once the paper is positioned properly, the printhead stepper motor uses the printhead belt and carriage to move the printhead across the page, little by little. The motor is moved one small step, and the printhead sprays the dots of ink on the paper in the pattern dictated by the control circuitry. Typically, this pattern is either a pattern of black dots, or a pattern of *cyan, magenta, yellow, and black (CMYK)* inks that are mixed to make colors. Then the stepper motor moves the printhead another small step; the process repeats all the way across the page. This process is so quick, however, that the entire motion of starts and stops across the page looks like one smooth motion.
9. At the end of a pass across the page, the paper-feed stepper motor advances the page a small amount. Then, the printhead repeats step 8. Depending on the model, the printhead either

returns to the beginning of the line and prints again in the same direction only, or it moves backward across the page so that printing occurs in both directions. This process continues until the page is finished.

10. Once the page is finished, the feed-stepper motor is actuated and ejects the page from the printer into the output tray. If more pages need to print, printing the next page begins again at step 7.

11. Once printing is complete and the final page has been ejected from the printer, the printhead is *parked* (locked into rest position) and the print process is finished.

Laser Printers (Page Printers)

Laser printers are referred to as *page printers* because they receive their print job instructions one page at a time (rather than receiving instructions one line at a time). There are two major types of page printers: those that use the Electrophotographic (EP) print process and those that use the light-emitting diode (LED) print process. Each works in basically the same way, with slight differences.

Electrophotographic (EP) Laser Printers

When Xerox and Canon developed the first laser printers in the late 1980s, they were designed around the Electrophotographic (EP) process (a technology developed by scientists at Xerox). This technology uses a combination of static electric charges, laser light, and a black powder)' substance called *toner.* Printers that use this technology are called EP process laser printers, or just *laser printers.* Every laser printer technology has its foundations in the EP printer process.

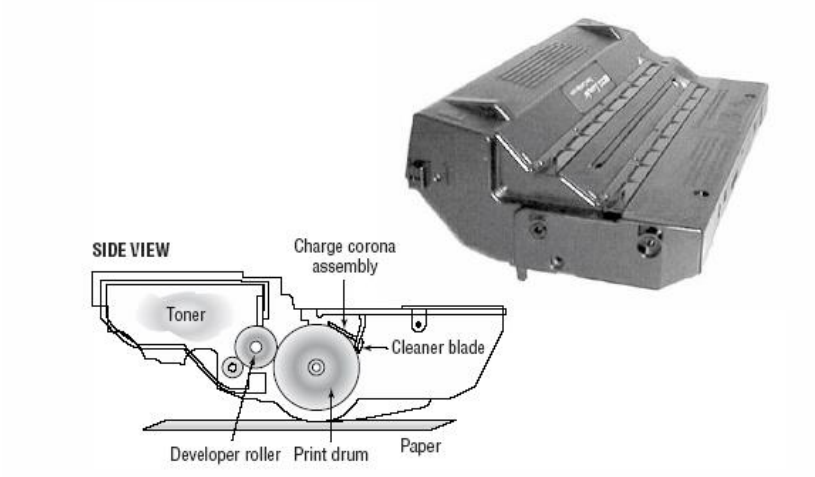
Basic Components

Any printer that uses the EP process contains nine standard assemblies: the toner cartridge, laser scanner, high-voltage power supply, DC power supply, paper-transport assembly (including paper-pickup rollers and paper-registration rollers), corona, fusing assembly, printer controller circuitry, and ozone filter. Let's discuss each of the components individually before we examine how they all work together to make the printer function.

The Toner Cartridge

The EP toner cartridge (Figure 7), as its name suggests, holds the toner. Toner is a black, carbon substance mixed with polyester resins (to make it flow better) and iron oxide particles (to make the toner sensitive to electrical charges). These two components make the toner capable of being attracted to the photosensitive drum and of melting into the paper. In addition to these components, toner contains a medium called the *developer* (also called the *carrier)* which carries the toner until it is used by the EP process. The toner cartridge also contains the EP print drum. This drum is coated with a photosensitive material that can hold a static charge when not exposed to light (but *cannot* hold a charge when it *is* exposed to light—a curious phenomenon, and one that EP printers exploit for the purpose of making images). Finally, the drum contains a cleaning blade that continuously scrapes the used toner off the photosensitive drum to keep it clean.

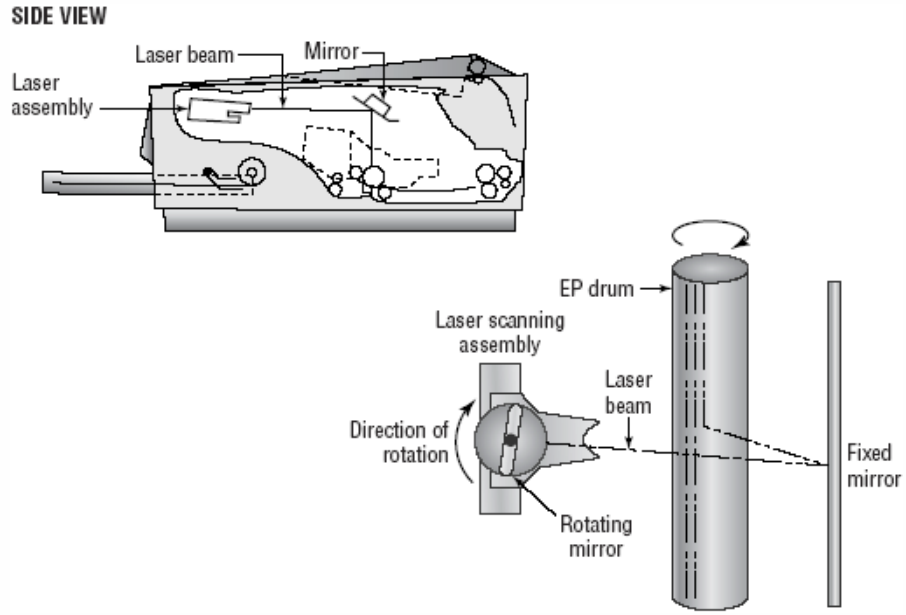
Figure 7 An EP toner cartridge



The Laser Scanning Assembly

As we mentioned earlier, the EP photosensitive drum can hold a charge if it's not exposed to light. It is dark inside an EP printer, except when the laser scanning assembly shines on particular areas of the photosensitive drum. When it does that, the drum discharges, but only in that area. As the drum rotates, the laser scanning assembly scans the laser across the photosensitive drum. Figure 8 shows the laser scanning assembly.

Figure 8 The EP laser scanning assembly (side view and simplified top view)



Laser light is damaging co human eyes. Therefore, ic is kept in an enclosure and will operate only when the laser printer's cover is closed.

High-Voltage Power Supply (HVPS)

The EP process requires high-voltage electricity. The high-voltage power supply (HVPS) provides the high voltages used during the EP process. This component converts house AC current (120 volts, 60 Hertz) into higher voltages that the printer can use. This high voltage is used to energize both the corona wire and the transfer corona wire.

DC Power Supply (DCPS)

The high voltages used in the EP process can't power the other components in the printer (the logic circuitry and motors). These components require low voltages, between +5 and +24VDC. The DC power supply (DCPS) converts house current into three voltages: +5VDC and -5VDC for the logic circuitry and +24VDC for the paper transport motors. This component also runs the fan that cools the internal components of the printer.

Other Printers

The types of printers you have learned about so far in this chapter account for 90 percent of all printers used with home or office computers and that you will see as a repair technician. The other 10 percent consist of other types of printers that primarily differ by the method they use to put colored material on the paper to represent what is being printed. The three other major types of printers in use today are as follows:

- Solid ink
- Thermal
- Dye sublimation

Keep in mind throughout this section that for the most part, these printers operate like other printers in many ways: They all have a paper-feed mechanism (sheet-fed or roll); they all require consumables; they all use the same interfaces, for the most part, as other types of printers; and they are usually about the same size.

Solid-Ink Printers

Solid-ink printers work much like bubble-jet and dot-matrix printers: A printhead moves across the paper that's being printed on. However* in a solid-ink printer, the ink is in a waxy

solid form, rather than in liquid form, which allows it to stay fresh and not cause problems like spillage. In addition, solid-ink printers usually print an entire line at one time, which makes them faster than bubble-jet printers. Because of the type of ink used, solid-ink printers are better for graphics companies that need true color at a price lower than a color laser printer.

Thermal Printers

You almost surely have seen a thermal printer. They can be found in many older fax machines imost newer ones use either ink-jet or laser printing). They print on a kind of special, waxy paper that comes on a roll; the paper turns black when heat passes over it. *Thermal printers* work by using a printhead the width of the paper. When it needs to print, the printhead heats and cools spots on the printhead. The paper below the heated printhead turns black in those spots. As the paper moves through the printer, the pattern of blackened spots forms an image on the page of what is being printed.

Thermal printers typically have long lives because they have few moving parts. However, the paper is somewhat expensive, doesn't last long (especially if it is left in a very warm place, like a closed car in summer), and produces poorer image quality than most of the other printing technologies.

Dye-Sublimation Printers

The last type of printer is the *dye-sublimation printer*. These printers use sheets of solid ink that *sublimate*, or go from the solid phase directly to gas. During printing, a printhead passes over these sheets (one each of cyan, magenta, yellow, and gray for tonal change) inside the printer. As it passes over the page, spots on the printhead heat up, causing the ink under those spots to sublimate into gas. This gas then passes through the paper being printed, where the ink turns back into solid, embedded into the paper. The printhead in most printers make four passes, one for each color.

Dye-sublimation printers are used most often in the graphics or printing industries, because they really do only one thing well: photo-quality images. They take time to produce their images, but those images are of extremely high quality. It would expensive and impractical to use a dye-sublimation printer for word-processing.

Text 2 “Video card”

Video card, also known as a **graphics accelerator card**, **display adapter**, or **graphics card**, is an expansion card whose function is to generate and output images to a display. Some video cards offer added functions, such as video capture, TV tuner adapter, MPEG-2 and MPEG-4 decoding, FireWire, light pen, TV output, or the ability to connect multiple monitors.

A misconception regarding high end video cards is that they are strictly used for video games. High end video cards have a much broader range of capability; for example, they play a very important role for graphic designers and 3D animators, who tend to require optimum displays as well as faster rendering.

Video cards are not used exclusively in IBM type PCs; they have been used in devices such as Commodore Amiga (connected by the slots Zorro II and Zorro III), Apple II, Apple Macintosh, Atari Mega ST/TT (attached to the MegaBus or VME interface), Spectravideo SVI-328, MSX, and in video game consoles. Video hardware can be integrated on the mainboard, as it often happened with early computers; in this configuration it was sometimes referred to as a *video controller* or *graphics controller*.

History

The first IBM PC video card, which was released with the first IBM PC, was developed by IBM in 1981. The MDA (*Monochrome Display Adapter*) could only work in text mode representing 25x80 lines in the screen. It had a 4KB video memory and just one color.

Starting with the MDA in 1981, several video cards were released, which are summarized in the attached table.

VGA was widely accepted, which led some corporations such as ATI, Cirrus Logic and S3 to work with that video card, improving its resolution and the number of colors it used. This

developed into the SVGA (*Super VGA*) standard, which reached 2 MB of video memory and a resolution of 1024x768 at 256 color mode.

In 1995 the first consumer 2D/3D cards were released, developed by Matrox, Creative, S3, ATI and others. These video cards followed the SVGA standard, but incorporated 3D functions. In 1997, 3dfx released the **Voodoo** graphics chip, which was more powerful compared to other consumer graphics cards, introducing 3D effects such mip mapping, Z-buffering and anti-aliasing into the consumer market. After this card, a series of 3D video cards were released, such as **Voodoo2** from 3dfx, **TNT** and **TNT2** from NVIDIA. The bandwidth required by these cards was approaching the limits of the PCI bus capacity. Intel developed the AGP (*Accelerated Graphics Port*) which solved the bottleneck between the microprocessor and the video card. From 1999 until 2002, NVIDIA controlled the video card market (taking over 3dfx) with the GeForce family. The improvements carried out at this time were focused in 3D algorithms and graphics processor clock rate. Video memory was also increased to improve their data rate; DDR technology was incorporated, improving the capacity of video memory from 32 MB with GeForce to 128 MB with GeForce 4.

From 2002 onwards, the video card market came to be dominated almost entirely by the competition between ATI and Nvidia, with their Radeon and Geforce lines respectively, taking around 90% of the independent graphics card market between them, while other manufacturers were forced into much smaller, niche markets.

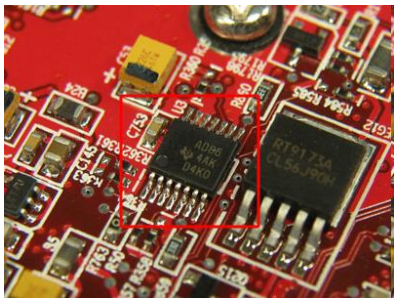
Components

A modern video card consists of a *printed circuit board* on which the components are mounted. These include: Graphics processing unit (GPU).

A GPU is a dedicated processor optimized for accelerating graphics. The processor is designed specifically to perform *floating-point* calculations which are fundamental to 3D graphics rendering. The main attributes of the GPU are the core *clock frequency*, which typically ranges from 250 to 850 MHz, and the number of pipelines (*vertex* and *fragment shaders*), which translate a 3D image characterized by vertices and lines into a 2D image formed by *pixels*.

Video BIOS

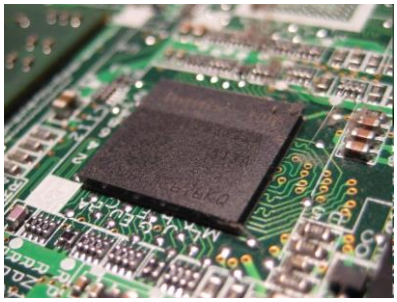
The video BIOS or firmware contains the basic program that governs the video card's operations and provides the instructions that allow the computer and software to interact with the card. It may contain information on the memory timing, operating speeds and voltages of the graphics processor and RAM and other information. It is sometimes possible to change the BIOS (e.g. to enable factory-locked settings for higher performance) although this is typically only done by video card overclockers, and has the potential to irreversibly damage the card.



Video memory

The memory capacity of most modern video cards range from 128 MB to 4.0 GB, though very few cards actually go over 1.0 GB. Since video memory needs to be accessed by the GPU and the display circuitry, it often uses special high speed or multi-port memory, such as VRAM, WRAM, SGRAM, etc. Around 2003, the video memory was typically based on DDR technology. During and after that year, manufacturers moved towards DDR2, GDDR3 and GDDR4 even GDDR5 utilized most notably by the ATI Radeon HD 4870. The effective memory clock rate in modern cards are generally between 400 MHz and 3.8 GHz.

Video memory may be used for storing other data as well as the screen image, such as the Z-buffer, which manages the depth coordinates in 3D graphics, textures, vertex buffers, and compiled shader programs.



RAMDAC

The **RAMDAC**, or Random Access Memory Digital-to-Analog Converter, converts **digital signals** to **analog signals** for use by a computer display that uses analog inputs such as CRT displays. Depending on the number of bits used and the RAMDAC data transfer rate, the converter will be able to support different computer display refresh rates. With CRT displays, it is best to work over 75 Hz and never under 60 Hz, in order to minimize flicker.(With LCD displays, flicker is not a problem.) Due to the growing popularity of digital computer displays and the integration of the RAMDAC onto the GPU die, it has mostly disappeared as a discrete component. All current LCD and plasma displays and TVs work in the digital domain and do not require a RAMDAC. There are few remaining legacy LCD and plasma displays which feature analog inputs (**VGA**, component, **SCART** etc.) *only*; these require a RAMDAC but they reconvert the analog signal back to digital before they can display it, with the unavoidable loss of quality stemming from this digital-to-analog-to-digital conversion.

Outputs

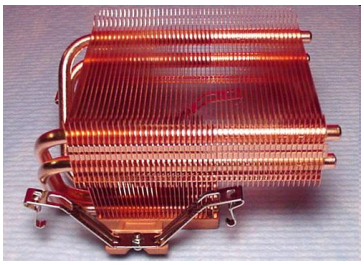
The most common connection systems between the video card and the computer display are:

Video Graphics Array (VGA) (DB-15) Analog-based standard adopted in the late 1980s designed for CRT displays, also called VGA connector. Some problems of this standard are electrical noise, image distortion and sampling error evaluating pixels.**Digital Visual Interface (DVI)** Digital-based standard designed for displays such as flat-panel displays (LCDs, plasma screens, wide High-definition television displays) and video projectors. It avoids image distortion and electrical noise, corresponding each pixel from the computer to a display pixel, using its native resolution. **Video In Video Out (VIVO) for S-Video, Composite video and Component video** Included to allow the connection with televisions, DVD players, video recorders and video game consoles. They often come in two 9-pin Mini-DIN connector variations, and the VIVO splitter cable generally comes with either 4 connectors (S-Video in and out + composite video in and out) or 6 connectors (S-Video in and out + component PB out + component PR out + component Y out (also composite out) + composite in).**High-Definition Multimedia Interface (HDMI)**An advanced digital audio/video interconnect released in 2003, and is commonly used to connect game consoles and DVD players to a display. HDMI supports copy protection through HDCP. **Display Port** An advanced license and royalty-free digital audio/video interconnect released in 2007. Display Port intends to replace VGA and DVI for connecting a display to a computer.

Cooling devices

Video cards may use a lot of electricity, which is converted into heat. If the heat isn't dissipated, the video card could overheat and be damaged. Cooling devices are incorporated to transfer the heat elsewhere. Three types of cooling devices are commonly used on video cards:

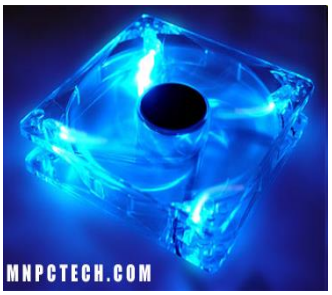
Heat sink: a heat sink is a passive cooling device. It conducts heat away from the graphics card's core, or memory, by using a heat conductive metal, most commonly aluminum or copper, sometimes in combination with **heat pipes.** It uses air (most common) or in extreme cooling situations, water (see water block), to remove the heat from the card. When air is used, a fan is often used to increase cooling effectiveness.



Computer fan: an example of an active cooling part. It is usually used with a heat sink. Due to the moving parts, a fan requires maintenance and possible replacement. The fan speed or actual fan can be changed for more efficient or quieter cooling.

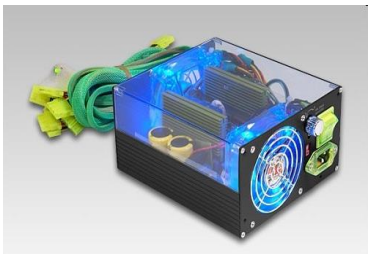
Water block: A water block is a heat sink suited to use water instead of air. It is mounted on the graphics processor and has a hollow inside. Water is pumped through the water block, transferring the heat into the water, which is then usually cooled in a radiator. This is the most effective cooling solution without extreme modification.





Power demand

As the processing power of video cards has increased, so has their demand for electrical power. Present fast video cards tend to consume a great deal of power. While CPU and power supply makers have recently moved toward higher efficiency, power demands of GPUs have continued to rise, so the video card may be the biggest electricity user in a computer. Although power supplies are increasing their power too, the bottleneck is due to the PCI-Express connection, which is limited to supplying 75 W. Nowadays, video cards with a power consumption over 75 watts usually include a combination of six pin (75W) or eight pin (150W) sockets that connect directly to the power supply to supplement

Video Card Manufacturers

Video card manufacturers utilize these processors in their particular brands of video cards. They assemble the GPU with the other components causing differences between video cards with the same chip.

Text 3 **“Interfaces”**

Common Peripheral Interfaces and Cables

An *interface* is a method of connecting two dissimilar items together. *A peripheral interface* is a method of connecting a peripheral or accessory to a computer, including the specification of cabling, connector type, speed, and method of communication used. The most common interfaces used in PCs today include:

- Parallel
- Serial
- USB
- IEEE 1394 (FireWire)
- Infrared
- RCA
- PS/2

For each type, let's look at the cabling and connector used as well as the type(s) of peripherals that are connected.

Parallel

The most popular type of interface available on computers today is the parallel interface. Parallel communications Take the interstate approach to data communications. Normally, interstate travel is faster than driving on city roads. This is the case mainly because you can fit multiple cars going the same direction on the same highway by using multiple lanes. On the return trip, you take a similar path, but on a completely separate road. The *parallel interface* transfers data eight bits at a time over eight separate transmit wires inside a parallel cable (one bit per wire). Normal parallel interfaces use a DB-25 female connector on the computer to transfer data to peripherals.

The most common use of the parallel interface is printer communication. There are three major types: standard, bidirectional, and enhanced parallel ports. Let's look at the differences between the three.

Standard Parallel Ports

The standard parallel port only transmits data *out* of the computer. It cannot receive data (except for a single wire carrying a Ready signal). This parallel port came with the original IBM PC, XT, and AT. It can transmit data at 150KBps and is commonly used to transmit data to printers. This technology also has a maximum transmission distance of 10 feet.

Bidirectional Parallel Ports

As its name suggests, the bidirectional parallel port has one important advantage over a standard parallel port: It can both transmit and receive data. These parallel ports are capable of interfacing with devices like external CD-ROM drives and external parallel port backup drives (Zip, Jaz, and tape drives}. Most computers made since 1994 have a bidirectional parallel port.

Enhanced Parallel Ports

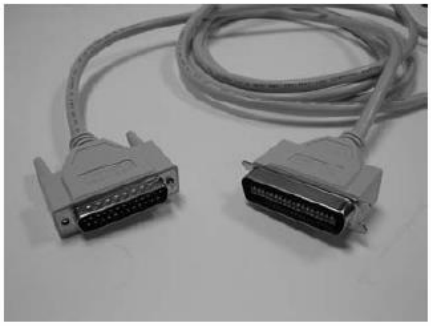
As more people began using parallel ports to interface with devices other than printers, they started to notice that the available speed wasn't good enough. Double-speed CD-ROM drives had a transfer rate of 300KBps, but the parallel port could transfer data at only 150KBps, thus limiting the speed at which a computer could retrieve data from an external device. To solve that problem, the Institute of Electrical and Electronics Engineers (IEEE) came up with a standard for enhanced parallel ports called IEEE 1284. The IEEE 1284 standard provides tor greater data transfer speeds and the ability to send memory addresses as well as data through a parallel port. This standard allows the parallel port to theoretically act as an extension to the main bus. In addition, these ports are backward compatible with the standard and bidirectional ports.

There are two implementations of IEEE 1284: ECP parallel ports and EPP parallel ports. An *Enhanced Capabilities* Port (ECP port} is designed to transfer data at high speeds to printers. It uses a DMA channel and a buffer to increase printing performance. An *Enhanced Parallel Port* (EPP port} increases bidirectional throughput from 150KBps to anywhere from 600KBps to 1.5MBps.

Parallel Interfaces and Cables

MOST parallel interfaces use a DB-25 female connector. MOST parallel cables use a DB-25 male connector on one end and either a DB-25 male connector or CenTronics-36 connector on the other. Printer cables typically used the DB-25M to Cenrronics-36 configuration. Inside a parallel cable, eight wires are used for Transmitting data, so one byte can be transmitted at a time. Figure 1 shows an example of a typical parallel cable (in this case, a printer cable).

Figure 1 A typical parallel cable



Serial

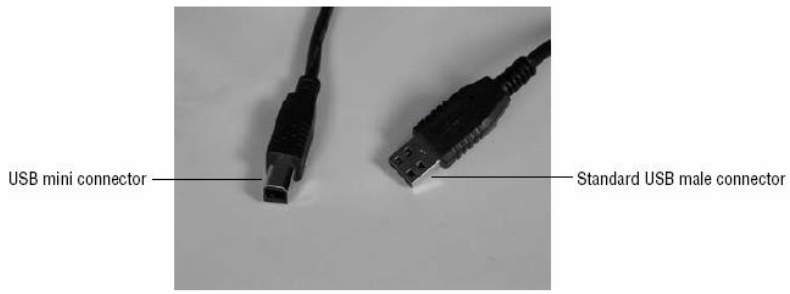
Universal Serial Bus (USB)

Short for Universal Serial Bus, USB is a standard that was introduced in 1995 by Intel, Compaq, Microsoft and several other IT computer companies. USB 1.x is an external bus standard that supports data transfer rates of 12 Mbps and is capable of supporting up to 127 peripheral devices. The image to the right is an example of a USB device, the SMC EZ Connect Wireless Bluetooth adapter adds Bluetooth connectivity for your computer.

USB 2.0, also known as "hi-speed USB", was developed by Compaq, Hewlett Packard, Intel, Lucent, Microsoft, NEC and Philips and was introduced in 2001. Hi-speed USB is capable of supporting a transfer rate of up to 480 Mbps and is backwards compatible, meaning it is capable of supporting USB 1.0 and 1.1 devices and cables.

The USB interface is very straightforward. Essentially, it was designed to be plug and play – just plug in the peripheral, and it should work (providing the software is installed to support it). The USB cable is simple: a USB male connector on each end (as shown in Figure 2). Sometimes manufacturers put a mini connector on one end to make it fit the form factor of the device that needs a USB connection. These connectors vary widely, and we won't cover them here.

Figure 2 AUSB cable



One part of the USB interface specification that makes it so appealing is the fact that if your computer runs out of USB ports, you can simply plug a device known as a *USB hub* in to one of your computer's USB ports, which will give you several more USB ports from one USB port. Figure 1.61 shows an example of a USB hub.

Figure 3 AUSB hub

USB cables are used to connect a wide variety of peripherals To computers, including mice, digital cameras, printers, and scanners. USB's simplicity of use and ease of expansion make it an excellent interface for just about any kind of peripheral.

Bluetooth

A computing and telecommunications industry specification that describes how different types of components such as mobile phones, computers or personal digital assistants can communicate with each other. Bluetooth is a RF technology that operates at 2.4 GHz, has an effective range of 32-feet (10 meters) (this range can change depending on the type of power class), and has a transfer rate of 1 Mbps and throughput of 721 Kbps. An example of how Bluetooth could be used is the ability to connect to a computer with a cell phone without needing any wires or special connectors. To the right is a graphic example of a USB Bluetooth adapter from SMC.

SMC EZ Connect Wireless
Bluetooth USB Adapter

Infrared

Method of transferring data without the use of wires. A common example of an infrared device is a TV remote. However, infrared is also used with computers with devices such as a wireless keyboard or mouse.

PS/2

Often referred to as the mouse and/or keyboard port, the PS/2 port was developed by IBM and is used to connect a computer mouse or keyboard to an IBM compatible computer. The PS/2 port is a mini DIN plug that contains six pins and is still found on all IBM compatible computers today, however, is starting to be replaced by USB.

Computer PS/2 ports

To the right are two pictures of what the PS/2 ports look like on the back of your computer. As can be seen by both of these pictures many computers have adopted the color codes purple and teal as identifications for each of the port. The mouse is teal and the keyboard is purple.

Below is a picture of an actual PS/2 plug as well as a graphic illustration of the connection.

PS/2 Plug

PS/2 was also an IBM computer that was first introduced in 1987 that had improved graphics, a 3.5-inch diskette drive, and proprietary bus to help prevent clone makers competition, and a bidirectional 8-bit port.

PS2 is also short for PlayStation 2, a gaming console system developed by Sony.

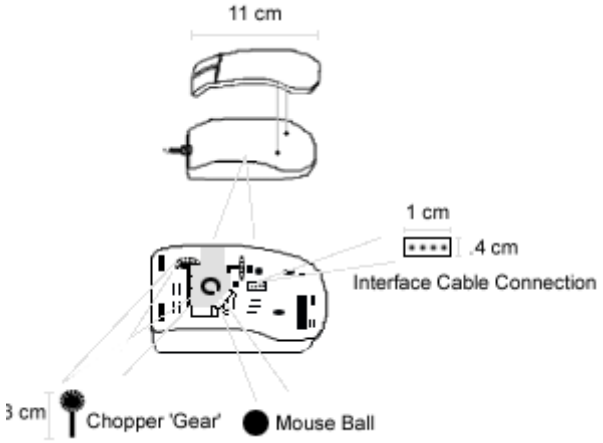
Serial port

Asynchronous port on the computer used to connect a serial device to the computer and capable of transmitting one bit at a time. Serial ports are typically identified on IBM compatible computers as COM (communications) ports. For example, a mouse might be connected to COM1 and a modem to COM2. With the introduction of USB, FireWire, and other faster solutions serial ports are rarely used when compared to how often they've been used in the past. To the right is a close up of a DB9 serial port on the back of a computer.

Text 4 **"Mouse"**

Mouse disassembly

The illustration below shows the disassembly of a standard mouse. As shown you can see the internal components of a mouse. We have illustrated the general location of four main components within the mouse.



First, you will notice the two Choppers and or Gears; these two represent the axis of where the cursor is located. The chopper furthest to the represents the X axis, which is the vertical axis. The other chopper, which is only partially shown, represents the Y axis, which is the horizontal axis.

Second, you notice the mouse ball. The mouse ball is the main part within the mouse which allows the user to move the mouse which moves the appropriate axis which then moves the mouse cursor on the screen. Without the mouse ball the mouse would be useless.

Third, you notice the four pin Interface Cable Connection, which is where the information is transferred from the mouse to the computer.

Mouse Technologies

Mechanical Mice - Mechanical Mice requires that the mouse be set on a flat surface. The distance and the speed of the rollers inside the mouse determines how far the mouse cursor moves on the screen depending on the software configuration.

Optical Mice - Optical Mice require a special mouse pad which has a grid pattern. A sensor inside the mouse determines the movement by reading the grid as the mouse passes over it while emitting a light from an LED or sometimes a laser. This type of mouse is much more accurate than the ordinary optical mechanical mouse which relies on the traction between the mouse ball and the rollers. One drawback to an optical mouse is they can have problems in bright lights.

New Optical Mice no longer have the disadvantages of earlier mice and are capable of being utilized on any surface. In comparison to the traditional Optical-Mechanical mouse, the Optical is a much better solution for a computer mouse.

Optical-Mechanical - The optical-mechanical hybrid consists of a ball which rolls a wheel inside the mouse. This wheel contains a circle of holes and or notches to read the LED by a sensor as it spins around when the mouse is moved. This mouse is much more accurate than the mechanical mouse. This mouse is now the most commonly used mouse with PC and Macintosh computers.

Also known as a wheel mouse or a scroll mouse, the IntelliMouse is a mouse developed by Microsoft in 1996 that has a wheel between the left and right mouse buttons that enables the user to easily scroll up and down using the wheel instead of having to use the vertical scroll bar. In addition to being able to scroll, these types of mice also have the ability to use the wheel as a button by pressing down on the wheel. An example of how this button could be used is users who are using Mozilla Firefox can use the middle-button (wheel) to open a link in a tab. The image to the right is an example of what the Microsoft IntelliMouse looks like.

Because of the wide popularity and great functionality of this wheel, this type of mouse has become a standard mouse used with all new computers. Although "IntelliMouse" is a Microsoft Trademark, these types of mice are developed by numerous different companies today. Another popular manufacturer of these types of mice is Logitech.

Appendix I

Test for Eagers:

1. What was the original name for a monitor?
A. Video Display Unit
B. CRT
C. LCD
D. Optical Display Unit

2. Which motherboard design style is the most popular?
A. ATX
B. AT
C. Baby AT
D. NLX

3. Which is another term for the motherboard?
A. A fiberglass board
B. A planar board
C. A bus system
D. An IBM system board XR125

4. Which of the following is used to store data and programs for repeated use? Information can be added and deleted at will, and it does *not* lose its data when power is removed.
A. Hard drive
B. RAM
C. Internal cache memory
D. ROM

5. Which motherboard form factor places expansion slots on a special riser card and is used in low-profile PCs?
A. AT
B. Baby AT
C. ATX
D. NLX

6. What type of expansion slot is almost always used for high-speed, 3D graphics video cards?
A. USB
B. AGP
C. PCI
D. ISA

7. When you try to turn on the computer, you notice that it will not activate. The monitor is blank, and the fan on the power supply is not active. Turning the switch off and then back on makes no difference. What is the most likely cause of this problem?
A. The computer is unplugged.
B. The BIOS on the motherboard needs to be upgraded.
C. The monitor is malfunctioning.
D. Both the fan on the power supply and the video card are bad.
E. The power supply is bad.
F. None of the above.

8. What was the original name for a monitor?
A. Video Display Unit
B. CRT
C. LCD
D. Optical Display Unit

9. Which laptop input device is a flat surface that you can draw on with your finger to control the mouse pointer?
A. Touch pad
B. Touch ball
C. Touch point
D. Touch way

10. Which of the following is the best method for cooling a PC's case and components?
A. To have the front fan blowing in and the rear fan(s) blowing out
B. To have the rear fan(s) blowing in and the front fan blowing out
C. To have all fans blowing into the case
D. To have all fans blowing air out of the case

11. When building a computer, what is the first step to perform?
A. Install the motherboard
B. Install the disk drives
C. Configure the CMOS
D. Install the power supply

12. Which primer contains a wheel that looks like a flower with raised letters and symbols on each petal?
A. Bubble-jet printers
B. Daisy-wheel printer
C. Dot-matrix printer
D. Laser printer

13. Which of the following are possible interfaces for printers?
A. Parallel
B. Mouse port
C. Serial
D. Network

14. A typical hard drive has how many bytes per sector?
A. 512
B. 501
C. 515
D. 520

15. You have just replaced the floppy drive in a PC. When you turn on the computer, you discover you can't boot to the floppy drive. The drive light turns on during power-up and stays lit until you turn the computer off. What should you do to solve this problem? (Select all that apply.)
A. Change the drive type in the CMOS setup.
B. Reverse the floppy drive cable.
C. Remove the terminating resistor on the floppy drive.
D. Move the floppy drive to the end of the floppy cable.

16. Which device converts signals from an IDE drive into signals the CPU can understand?
A. Controller
B. Host bus adapter
C. Bus
D. Paddle board

17. Suppose you have an internal SCSI hard drive and two external devices: a scanner and a CD-ROM drive. The scanner is the last device on the chain. Which device(s) should be terminated?
A. Hard disk
B. Scanner
C. CD-ROM drive
D. Host bus adapter

18. Which processor(s) can access as much as 4GB of RAM?
A. 8088
B. 8086
C. 80286
D. 80386
E. 80486
F. Pentium

Appendix II

Glossary in the Pictures

Adapter card

A circuit hoard that is installed into a computer to increase the computer's capabilities. Also known as an *expansion card.*

BIOS

The BIOS is boot firmware, designed to be the first code run by a PC when powered on.
BIOS programs are stored on a chip and are built to work with various devices that make up the complementary chipset of the system

Bluetooth

Bluetooth is a RF technology that operates at 2.4 GHz, has an effective range of 32-feet (10 meters) (this range can change depending on the type of power class), and has a transfer rate of 1 Mbps and throughput of 721 Kbps. An example of how Bluetooth could be used is the ability to connect to a computer with a cell phone without needing any wires or special connectors. To the right is a graphic example of a USB Bluetooth adapter from SMC.

CD-ROM Drive

The CD-ROM is used to store data for long-term storage. CD-ROMs are read-only, meaning that once information is written to a CD, it can't be erased or changed.

Compact Disk

A **Compact Disk** (or **CD**) is an optical disk used to store digital data, originally developed for storing digital audio.

Computer case

A computer case (also known as the computer chassis, cabinet, tower, box, enclosure, housing or simply case) is the enclosure that contains the main components of a computer.

Chipset

A chipset or chip set refers to a group of integrated circuits, or chips, that are designed to work together. They are usually marketed as a single product.

Computer fan

A computer fan is any fan inside a computer case used for cooling purposes, and may refer to fans that draw cooler air into the case from the outside, expel warm air from inside, or move air across a heat sink to cool a particular component.

Computer speakers

The computer speakers typically packaged with computer systems are small plastic boxes with mediocre sound quality. Some of the slightly better computer speakers have equalization features such as bass and treble controls, improving their sound quality somewhat.

Hard disk

The physical storage medium. Hard disk systems store information on small disks (between three and five inches in diameter) stacked together and placed in an enclosure.

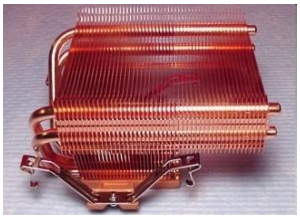
Headsets

A headset is a headphone combined with a microphone.

Many people use headsets at the computer so they can converse and type comfortably. Headsets typically have only one speaker like a telephone, but also come with speakers for both ears.

Heat sink

A heat sink is a passive cooling device. It conducts heat away from the graphics card's core, or memory, by using a heat conductive metal, most commonly aluminum or copper, sometimes in combination with heat pipes. It uses air (most common) or in extreme cooling situations, water (see water block), to remove the heat from the card. When air is used, a fan is often used to increase cooling effectiveness.



J-Mouse

Also known as a J Mouse or J Mouse, a J-Mouse is a type of mouse solution used with older portable computers that utilized the "J" key on the keyboard and commonly had two separate buttons for the left and right-click below the space bar. As can be seen in the picture to the right of the Zenith or ZDS Z-Star EX keyboard the J-mouse is uniquely identified with a picture of a mouse and an indented circle so it can be easily identified visually and physically from the other keys on the keyboard. Below is an example of the left and right mouse buttons found on the laptop.

Joystick

A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Joysticks are often used to control video games.

Keyboard

This is one of main inputting devices, we use it in games and then write a text.

Laptop

Small portable computer.

Microphone

They are used in many applications, from high-quality recording to built-in microphones in small sound recording devices.

Monitor

A monitor (display) is a default device of leading out, intended for the visual reflection of text and graphic information.

Motherboard

A motherboard is the central or primary circuit board making up a complex electronic system, such as a modern computer. It is also known as a main board, baseboard, system board, planar board. It is the most important component in the computer because it connects all the other components of a PC together.

Mouse

In computing, a mouse (plural mouse, mice, or mouse device) is a pointing device.
Physically, a mouse consists of an object held under one of the user's hands, with one or more buttons.

Optical disk drive

In computing, an **optical disk drive** (**ODD**) is a disk drive that uses laser light as part of the process of reading and writing data. It is a computer's peripheral device, that stores data on optical disks.

Power supply

Power supply is a reference to a source of electrical power.
A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU.

Printer

A device that prints text or illustrations on paper. There are many different types of printers. Such as:

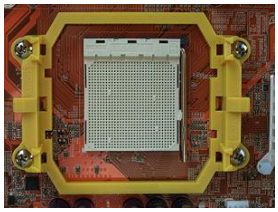
- Line printer
- Thermal printer
- Laser
- Dot-matrix

Scanner

In computing, a scanner is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image.

Socket

A CPU socket is a connector on a computer's motherboard that accepts a CPU and forms an electrical interface with it. Sockets are basically flat and have several rows of holes arranged in a square.



Sound card

A sound card (also known as an audio card) is a computer expansion card that facilitates the input and output of audio signals to/from a computer under control of computer programs.

Touchpad

Also known as a glidepoint, pressure sensitive tablet, or trackpad, a touchpad is an input device found on the majority of portable computers, and now also available with some external keyboards, that allow you to move the mouse cursor without the need of an external mouse.

Trackball

Type of input device that looks like an upside-down mouse. The onscreen pointer is moved by the trackball with a thumb or finger. A trackball requires less arm and wrist motion that a regular mouse takes. To the right is a picture of the Logitech Cordless Trackman Optical and an example of a trackball mouse.

Track Point

Also known as a style pointer or nub, Track Point is a type of mouse solution used with portable computers that was first introduced by IBM in 1992 and is a small isometric joystick that resembles a pencil's eraser head and is located between the "G", "H" and "B" keys on the keyboard.

This technology enables a user to keep their hands on the keyboard and still be able to control the mouse. The left and right buttons for this mouse are commonly located under the space bar. To the right is a picture of this type of mouse.

Water block

A water block is a heat sink suited to use water instead of air. It is mounted on the graphics processor and has a hollow inside. Water is pumped through the water block, transferring the heat into the water, which is then usually cooled in a radiator. This is the most effective cooling solution without extreme modification.

Webcam

Webcams are video capturing devices connected to computers or computer networks.

As for usual webcams use in videoconferencing.

Appendix III

Computer Terms

active-matrix screen A liquid crystal display (LCD) mechanism that uses an individual transistor to control each pixel on the screen. Active-matrix screens are characterized by high contrast, a wide viewing angle, vivid colors, and fast screen refresh rates, and they do not show the streaking or shadowing that is common with cheaper LCD technology.

active The designation of the partition that is the location of the hoot-up files for DOS or Windows.

active hub A type of hub that uses electronics to amplify and clean up the signal before it is broadcast to the other ports.

adapter card A circuit hoard that is installed into a computer to increase the computer's capabilities. Also known a**s** an ***expansion card.***

address The precise location in memory or on disk where a piece of information is stored. Every byte in memory and every sector on a disk has its own unique addresses.

address bus The internal processor bus used for accessing memory. The width of this bus determines how much physical memory a processor can access.

allocation unit A portion of the hard drive that is used by the computer when saving information to the drive. Smaller allocation units are generally more efficient, because they result in less wasted space.

analog Describes any device that represents changing values by a continuously variable physical property such as voltage in a circuit, fluid pressure, liquid level, and soon. An analog device can handle an infinite number of values within its range.

ATX motherboard A motherboard type that has the processor and memory slots at right angles to the expansion cards, allowing the installation of full-length expansion cards. This arrangement also puts the processor and memory in line with the fan output of the power supply, allowing the processor to run cooler.

ATX system connector Also known as the ATX motherboard power connector. This type of power connector feeds an ATX motherboard. It provides the six voltages required and delivers them all through a single 20-pm connector.

baby AT A type of motherboard form factor wherein the motherboard is smaller than the original AT form factor.

binary Any scheme that uses two different states, components, conditions, or conclusions. In mathematics, the binary (base-2) numbering system uses combinations of the digits 0 and 1 to represent all values.

BIOS (basic input/output system) The ROM-based software on a motherboard that acts as a kind of interpreter between an operating system and a computer's hardware.

bit Contraction of BInary digiT. A bit is the basic unit of information in the binary numbering system, representing either 0 (for off) or 1 (for on). Bits can be grouped together to make up larger storage units, the most common being the 8-bit byte. A byte can represent all kinds of information including the letters of the alphabet, the numbers 0 through 9, and common punctuation symbols.

boot To load an operating system into memory, usually from a hard disk, although occasionally from a floppy disk. This is an automatic procedure begun when you first turn on or reset your computer. A set of instructions contained in ROM begin executing, first running a series of power on self-tests (POSTs) to check that devices such as hard disks are in working order, then locating and loading the operating system, and finally passing control of the computer over to that operating system.

bps (bits per second) A measurement of how much data (how many bits) is transmitted in one second.

Typically used to describe the speed of asynchronous communications (modems).

broadcast To send a signal to all entities char can listen to it. In networking, it refers to sending a signal to all entities connected to that network.

bubble-jet printer A type of sprayed ink printer. It uses an electric signal that energizes a heating element, causing ink to vaporize and be pushed out of the pinhole and onto the paper.
buffer A special area of memory set aside to receive data from the expansion card.
bug A logical or programming error in hardware or software that causes a malfunction of some sort. If the problem is in software, it can be fixed with changes to the program. If the fault is in hardware, new circuits must be designed and constructed. Some bugs are fatal and cause the program to hang or result in data loss, others are just annoying, and many are never even noticed.
bus A set of pathways that allows information and signals to travel between components inside or outside of a computer.
bus clock A chip on the motherboard that produces a type of signal (called a clock signal) that indicates how fast the bus can transmit information.
bus connector slot A slot made up of several small copper channels that grab the matching "fingers" of the expansion circuit boards. The fingers connect to copper pathways on the motherboard.
byte Contraction of BinarY digiT Eight. A group of 8 bits that, in computer storage terms, usually holds a single character, such as a number, letter, or other symbol.
cable A medium used to connect another devices to a computer using multiple copper or fiber optic conductors inside a common wrapping or sheath.
cable modem A device that is used to connect computers and other devices to a cable television data network.
cache Pronounced "cash." A special area of memory, managed by a cache controller, that improves performance by storing the contents of frequently accessed memory locations and their addresses. When the processor references a memory address, the cache checks to see if it holds that address. If it does, the information is passed directly to the processor; if not, a normal memory access takes place instead. A cache can speed up operations in a computer in which RAM access is slow compared with its processor speed, because the cache memory is always faster than normal RAM.
cache memory Fast SRAM memory used to store, or cache, frequently used instructions and data.
case The plastic cover that surrounds the computer components and provides protection from the elements.
case fan A small fan that is used to bring air into, or take air out of, the computer's case.
case frame The metal reinforcing structure inside a laptop that provides rigidity and strength and that most components mount to.
CD-ROM (compact disc read-only memory) A high-capacity optical storage device that uses compact disc technology to store large amounts of information, up to 650MB (the equivalent of approximately 300,000 pages of text), on a single 4."2-inch disk.
Central Processing Unit (CPU) The computing and control part of the computer. The CPU in a mainframe computer may be contained on many printed circuit boards, the CPU in a minicomputer may be contained on several boards, and the CPU in a PC is contained in a single extremely powerful microprocessor.
coaxial cable A medium for connecting computer components that contains a center conductor, made of copper, surrounded by a plastic jacket, with a braided shield over the jacket.
core voltage The voltage that a processor uses internally while running at a separate voltage externally.
daisy-wheel printer An impact printer that uses a plastic or metal print mechanism with a different character on the end of each spoke of the wheel. As the print mechanism rotates to the correct letter, a small hammer strikes the character against the ribbon, transferring the image onto the paper.
data bits In asynchronous transmissions, the bits that make up the data. Usually, 7 or 8 data bits make up the data word.

desktop case **A** computer case designed to he horizontally, with at least three $5^{l}/_{4}$-mch bays oriented horizontally and the S'/^inch bays oriented vertically-**Desktop Control Panel** Windows control panel applet that is used to configure the system so it easier to use. Control Panel contains the settings for the background color and pattern as well as screen saver settings.
desktop replacement laptop A laptop designed to replace a standard desktop computer for day-to-day use. Thus it is more full featured than other laptops.
device bay A large slot on the computer into which *in* expansion device fits (usually a disk drive of some sort).
digital camera *A camera* that works much like a standard camera, except that a *charge-coupled device* replaces the film and records the picture as a pattern of bits.
DIMM (Dual Inline Memory Module) A memory module that is similar to a SIMM (Single Inline Memory Module), except that a DIMM is double-sided. There are memory chips on both sides of the memory module. DIMMs have since been introduced with chips on one side of the memory stick.
directory Used to organize files on the hard drive. Another name for a directory is a folder. Directories created inside or below others are called subfolders or subdirectories.
direct-solder method A method of attaching chips to the motherboard. The chips are soldered directly to the motherboard.
disk cache An area of computer memory where data is temporarily stored on its way to or from a disk. A disk cache mediates between the application and the hard disk; when an application asks for information from the hard disk, the cache program first checks to see whether that data is already in the cache memory. If it is, the disk-cache program loads the information from the cache memory rather than from the hard disk. If the information is not m memory, the cache program reads the data from the disk, copies it into the cache memory for future reference, and then passes the data to the requesting application.
disk controller The electronic circuitry that controls and manages the operation of floppy or hard disks installed in the computer. A single disk controller may manage more than one hard disk; many disk controllers also manage floppy disks and compatible tape drives.
disk drive A peripheral storage device char reads and writes to magnetic or optical disks. When more than one disk drive is installed on a computer, the operating system assigns each drive a unique name—for example A: and C: in DOS, Windows, and OS/2.
display The screen element in a laptop computer.
dot-matrix printer An impact printer that uses columns of small pins and an inked ribbon to create the tiny pattern of dots that form the characters. Dot-matrix printers are available in 9-, 18-, or 24-pin configurations.
dumb terminal A combination of keyboard and screen that has no local computing power, used to input information to a large, remote computer, often a minicomputer or a mainframe. This remote computer provides all the processing power for the system.
duplex In asynchronous transmissions, the ability to transmit and receive on the same channel at the same time; also referred to as full duplex. Half-duplex channels can transmit only or receive only. Most dial-up services available to PC users take advantage of full-duplex capabilities, but if you cannot see what you are typing, switch to half duplex. If you are using half duplex and you can see two of even' character you type, change to full duplex.
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electron gun The component of a monitor that fires electrons at the back of the phosphor-coated screen.
electronic stepper motor A special electric motor in a printer that can accurately move in very small increments. It powers all of the paper transport rollers as well as the fuser rollers.
electrostatic discharge (ESD) The exchange of electrons that occurs when two objects of dissimilar charge come in contact with one another, to standardize the electrostatic charge between the objects. This exchange, or discharge, can sometimes be seen as a spark or arc of electricity. Even when it cannot be seen it is damaging to electronic components.
expansion bus An extension of the main computer bus that includes expansion slots for use by compatible adapters, such as memory boards, video adapters, hard disk controllers, and SCSI interface cards.
expansion card A device that can be installed into a computer's expansion bus.
expansion slot One of the connectors on the expansion bus that gives an adapter access to the system bus. You can add as many additional adapters as there are expansion slots inside your computer.
external bus An external component connected through expansion cards and slots that allows the processor to talk to other devices and vice versa.
external cache memory A separate expansion board that installs in a special processor-direct bus containing cache memory.
external hard disk A hard disk packaged in its own case with cables and an independent power supply, as opposed to a disk drive housed inside and integrated with the computer's system unit.
fiber optic cable A transmission technology that sends pulses of light along specially manufactured optical fibers. Each fiber consists of a core, thinner than a human hair, surrounded by a sheath with a much lower refractive index. Light signals introduced at one end of the cable are conducted along the cable as the signals are reflected from the sheath.
floppy disk A flat, round, magnetically coated plastic disk enclosed in a protective jacket. Data is written onto the floppy disk by the disk drive's read/write heads as the disk rotates inside the jacket. It can he used to distribute commercial software, to transfer programs from one computer to another, or to back up files from a hard disk. Floppy disks in personal computing are of two physical sizes, $5^{l}/_{4}$-inch and 3′/,--inch, and a variety of storage capacities. The $5\ ^{1}/_{4}$-inch floppy disk has a stiff plastic external cover, whereas the 3′/,-inch floppy disk is enclosed in a hard plastic case. IBM-compatibles use $5^{l}/_{4}$-inch and 3′/,-inch disks, and the Macintosh uses $3^{l}/$,-inch disks.
floppy disk controller The circuit board that is installed in a computer to translate signals from the CPU into signals the floppy disk drive can understand. Often it is integrated into the same circuit board that houses the hard disk controller; however, it can be integrated into the motherboard in the PC.
floppy disk drive A device used to read and write data to and from a floppy disk. Floppy disk drives may be full-height drives, but more commonly these days they are half-height drives.
form factor The physical characteristics and dimensions of a drive style.
fragmentation A disk storage problem that exists after several smaller files have been deleted from a hard disk. The deletion of files leaves areas of free disk space scattered throughout the disk. The fact that these areas of disk space are located so far apart on the disk causes slower performance, because the disk read/write heads have to move all around the disk's surface to find the pieces of one file.
free memory An area of memory not currently m use.
full installation An installation procedure that installs every component, even chose that may not he required or used frequently.
gigabyte One billion bytes. However, bytes are most often counted in powers of 2, so a gigabyte becomes 2 to the thirtieth power, or 1,073,741,824 bytes.
hard disk drive A storage device that uses a set of rotating, magnetically coated disks called platters to store data or programs. A typical hard disk platter rotates at up to 7200rpm, and the

read/write heads float on a cushion of air from 10 to 25 millionths of an inch thick so that the heads never come into contact with the recording surface. The whole unit is hermetically sealed to prevent airborne contaminants from entering and interfering with these close tolerances. Hard disks range incapacity from a few tens of megabytes to several gigabytes of storage space; the bigger the disk, the more important a well-thought-out backup strategy becomes.

hardware All the physical electronic components of a computer system, including peripherals, printed-circuit boards, displays, and printers.

heatsink A device attached to an electronic component that removes heat from the component by induction. It is often a plate of aluminum or metal with several vertical fingers.

host adapter A device that translates signals from the hard drive and controller to signals the computer's bus can understand.

hub A connectivity device used to link several computers together into a physical star topology. A hub repeats any signal that comes in on one port and copies it to the other ports.

impact printer Any printer that forms *An* image on paper by forcing a character image against an inked ribbon. Dot-matrix, daisy-wheel, and line printers are all impact printers, whereas laser printers are not.

jumper A small plastic and metal connector that completes a circuit, usually to select one option from a set of several user-definable options. Jumpers are often used to select one particular hardware configuration rather than another.

kilobyte Abbreviated K, KB, or Kbyte. 1024 bytes.

laser printer A generic name for a printer that uses the electrophotographic (EPJ print process.

laser scanner The assembly in an EP process printer that contains the laser. This component is responsible for writing the image to the EP drum.

liquid crystal display (LCD) A display technology common in portable computers that uses electric current to align crystals in a special liquid. The rod-shaped crystals are contained between two parallel transparent electrodes, and when current is applied, they change their orientation, creating a darker area. Many LCD screens are also backlit or side-lit to increase visibility and reduce the possibility of eyestrain.

megabyte (MB) Usually 1,048,5"6 bytes. Megabytes are a common way of representing computer memory or hard-disk capacity.

memory The primary random access memory (RAM) installed in the computer. The operating system copies application programs from disk into memory, where all program execution and data processing takes place; results are written hack out to disk again. The amount of memory installed in the computer can determine the size and number of programs it can run, as well as the size of the largest data file.

memory address The exact location in memory that stores a particular data item or program instruction.

memory optimization The process of making the most possible conventional memory available to run DOS programs.

modem Contraction of modulator/demodulator. A device that allows a computer to transmit information over a telephone line. The modem translates between the digital signals the computer uses and analog signals suitable for transmission over telephone lines. When transmitting, the modem modulates the digital data onto a carrier signal on the telephone line. When receiving, the modem performs the reverse process and demodulates the data from the carrier signal.

monitor A video output device capable of displaying text and graphics, often in color.

motherboard The main printed circuit board in a computer that contains the central processing unit, appropriate coprocessor and support chips, device controllers, memory, and also expansion slots to give access to the computer's internal bus. Also known as a logic board or system board.

mouse A small input device with one or more buttons used as for pointing or drawing. As you move the mouse in any direction, an on-screen mouse cursor follows the mouse movements; all movements are relative. Once the mouse pointer is in the correct position on the screen, you can

press one of the mouse buttons to initiate an action or operation; different user interfaces and file programs interpret mouse clicks in different ways.

multimedia A computer technology char displays information by using a combination of full-motion video, animation, sound, graphics, and text with a high degree of user interaction.

multipurpose server **A** server that has more than one use. For example, a multipurpose server can be both a file server and a print server.

network A group of computers and associated peripherals connected by a communications channel capable of sharing files and other resources between several users. A network can range from a peer-to-peer network (that connects a small number of users in an office or department) to a local area network (that connects many users over permanently installed cables and dial-up lines) or to a wide area network (that connects users on several different networks spread over a wide geographic area).

network adapter Expansion hardware designed to interface with a network. In order to access network resources, a physical connection to the network must be made, generally via a network adapter.

network install An installation procedure during which the installation CD is copied to a shared location on the network. Individual workstations boot and access the network share.

network interface card (NIC) In networking, the PC expansion board that plugs into a personal computer or server and works with the network operating system to control the flow of information over the network. The network interface card is connected to the network cabling (twisted-pair, coaxial, or fiber optic cable), which in turn connects all the network interface cards in the network.

nonintegrated system board A type of motherboard wherein the various subsystems (video, disk access, and so on) are not integrated into the motherboard, but rather placed on expansion cards that can be removed and upgraded.

Northbridge A subset of a motherboard's chipset or circuitry that manages high-speed peripheral communications. The Northbridge subset is responsible primarily for AGP communications and processor-to-memory communications.

notebook computer A small portable computer, about the size of a computer book, with a flat screen and a keyboard that fold together. A notebook computer is lighter and smaller than a laptop computer. Some models use flash memory rather than conventional hard disks for program and data storage, whereas other models offer a range of business applications in ROM. Many offer PCMCIA expansion slots for additional peripherals such as modems, fax modems, or network connections.

optical drive A type of storage drive that uses a laser to read from and write to the storage medium.

optical mouse A mouse that uses a special mouse pad and a beam of laser light. The beam of light shines onto the mouse pad and reflects back to a sensor in the mouse. Special small lines crossing the mouse pad reflect the light into the sensor in different ways to signal the position of the mouse.

optical touch screen A type of touch screen that uses light beams on the top and left side and optical sensors on the bottom and right side to detect the position of your finger when you touch the screen.

packet A group of bits ready for transmission over a network. It includes a header, data, and a trailer.

parallel port An input/output port that manages information 8 bits at a time; often used to connect a parallel printer.

parallel processing A processor architecture wherein a processor essentially contains two processors in one. The processor can then execute more than one instruction per clock cycle.

passive hub A type of hub that electrically connects all network ports together. This type of hub is not powered.

passive-matrix screen An LCD display mechanism that uses a transistor to control every row of pixels on the screen. This is in sharp contrast to active-matrix screens, where each individual pixel is controlled by its own transistor.
path A description of where a file on a computer's hard drive exists within the directory structure. If a file is on the D: drive in a folder named TEST, its path is d: test.
peripheral Any hardware device attached to and controlled by a computer, such as a monitor, keyboard, hard disk, floppy disk, CD-ROM drives, printer, mouse, tape drive, or joystick.
peripheral interface A method of connecting a peripheral or accessory to a computer, including the specification of cabling, connector type, speed, and method of communication used.
pixel Contraction of *picture element.* The smallest element that display software can use to create text or graphics. A display resolution described as being 640 x 480 has 640 pixels across the screen and 480 down the screen, for a total of 307,200 pixels. The higher the number of pixels, the higher the screen resolution. A monochrome pixel can have two values, black or white; this value can be represented by 1 bit as either 0 or 1. At the other end of the scale, true color is capable of displaying approximately 16.7 million colors, requires 24 bits of information for each pixel.
port A generic term for any connector on a computer that allows a cable to be plugged into it.
portable computer Any computer that contains all the functionality of a desktop computer system but is portable.
portable installation An installation procedure that installs components needed for portable system installations on laptops. This includes features like power management and LCD display software.
printed-circuit board (PCB) Any flat board made of plastic or fiberglass that contains chips and other electronic components. Many PCBs are multilayer boards with several different sets of copper traces connecting components together.
processor form factor A term that describes how the package of a processor is laid out, including how many pins it has and what its size and composition are.
RAM (random access memory) The main system memory in a computer, used for the operating system, application programs, and data.
resistor An electronic device used to resist the flow of current in an electrical circuit.
resource Anything on a network that clients might want to access or use.
restore The process of getting data from a backup restored to the computer it originally came from
retaining clips. The two white or brown levers on the sides of the socket in which memory is installed.
scanner An optical device used to digitize images such as line art or photographs, so that they can be merged with text by a page-layout or desktop publishing program or incorporated into a CAD drawing.
semiconductor Any material that, depending on some condition, is either a conductor or nonconductor.
serial port A computer input/output port that supports serial communications in which information is processed one bit at a time. RS-232-C is a common serial protocol used by computers when communicating with modems, printers, mice, and other peripherals.
server In networking, any computer that makes access to files, printing communications, or other services available to users of the network. In large networks, a server may run a special network operating system; in smaller installations, a server may run a personal computer operating system.
software An application program or an operating system that a computer can execute. Software is a broad term that can imply one or many programs, and it can also refer to applications that may actually consist of more than one program.
standard peripheral power connector A type of connector used to power various internal drives. Also called a Molex connector.

standard serial cable A cable used to hook various peripherals like modems and printers to a computer.
standby power supply The backup power supply that kicks in when the power drops below a preset threshold.
static RAM (SRAM) A type of computer memory that retains its contents as long as power is supplied. It does not need constant refreshment like dynamic **RAM** chips.
system board The sturdy sheet or hoard to which all other components on the computer are attached. These components consist of the CPU, underlying circuitry, expansion slots, video components, and RAM slots, just to name a few. Also known as a logic hoard, motherboard, or planar board.
tabs A display element found on many windows, to save space. A single window can have many tabs, each of which can be selected to display particular information.
terminal A monitor and keyboard attached to a computer (usually a mainframe), used for data entry and display. Unlike a personal computer, a terminal does not have its own central processing unit or hard disk.
touchpad A device that has a pad of touch-sensitive material. You draw with your finger on the touchpad, and the onscreen pointer follows your finger motions. Included with the touchpad are two buttons for left- or right-clicking (although with some touch pads it is possible to perform the functions of the left-click by tapping on the touchpad).
touch screen A special monitor that lets you make choices by touching icons or graphical buttons on the screen.
trackball An input device used for pointing, designed as an alternative to the mouse.
transistor Abbreviation for transfer resistor. A semiconductor component that acts like a switch, controlling the flow of an electric current. A small voltage applied at one pole controls a larger voltage on the other poles. Transistors are incorporated into modern microprocessors by the million.
USB (Universal Serial Bus) A technology used to connect peripheral devices to a computer. Each USB channel supports 127 devices and has a total transfer rate of up to 12Mbps.
vacuum tube An electronic component that is a glorified switch. A small voltage at one pole switches a larger voltage at the other poles on or off.
virus A program intended to damage your computer system without your knowledge or permission. A virus may attach itself to another program or to the partition table or the boot track on your hard disk. When a certain event occurs, a date passes, or a specific program executes, the virus is triggered into action. Not all viruses are harmful; some are annoying.
volt A unit of electrical potential.
volume A named chunk of disk space. This chunk can exist on part of a disk, can exist on all of a disk, or can span multiple disks. Volumes provide a way of organizing disk storage.
watt A single unit of power.

Appendix IV Latin words and phrases

appendix	додаток
copia vera	копія вірна
e.g. (exempli gratia)	наприклад
i.e. (id est)	тобто
NB (nota bene)	зверни увагу
per annum	щорічно
verso folio	на звороті
via	через, при посередництві
vice versa	навпаки

Appendix V

Irregular Verbs

Infinitive	Past Indefinite	Past Participle	
be	was,were	been	бути
bear	bore	borne	нести, переносити
become	became	become	ставати, робитися
begin	began	begun	починати
bind	bound	bound	зв'язувати
break	broke	broken	ламати
bring	brought	brought	приносити
broadcast	broadcast broadcasted	broadcast broadcasted	поширювати, передавати по радіо
build	built	built	будувати
burn	burnt	burnt	горіти
buy	bought	bought	купувати
catch	caught	caught	ловити
choose	chose	chosen	вибирати, обирати
come	came	come	приходити
cost	cost	cost	коштувати
cut	cut	cut	різати
deal	dealt	dealt	розглядати питання (with)
do	did	done	робити, виконувати
draw	drew	drawn	креслити,малювати, добувати (інформ.)
dream	dreamt	dreamed	мріяти, уявляти
drink	drank	drunk	пити
fall	fell	fallen	падати, спускатися
feed	fed	fed	годувати, постачати
feel	felt	felt	почувати, відчувати, вважати
fight	fought	fought	битися, боротися
find	found	found	знаходити, вважати
forbid	forbade	forbidden	забороняти, не дозволяти
forget	forgot	forgotten	забувати
forgive	forgave	forgiven	прощати
freeze	froze	frozen	заморожувати
get	got	got	одержувати, діставати
give	gave	given	давати, віддавати
go	went	gone	йти, ходити, рухатися
grow	grew	grown	рости, збільшуватися
have	had	had	мати, володіти
hear	heard	heard	чути, слухати
hide	hid	hid hidden	ховати, приховувати
hold	held	held	тримати, мати, володіти
keep	kept	kept	зберігати, берегти
know	knew	known	знати, уміти
lay	laid	laid	класти, покласти
lead	led	led	вести, керувати
learn	learnt learned	learnt learned	учитися, учити, навчатися

leave	left	left	залишати, покидати
let	let	let	дозволяти
lie	lay	lain	лежати, бути розташованим
light	lit	lit	запалювати, світити
	lighted	lighted	
lose	lost	lost	утрачати (властивість, якість), втратити
make	made	made	робити, виробляти, створювати
mean	meant	meant	мати намір, означати, значити
meet	met	met	зустрічати
pay	paid	paid	платити
put	put	put	класти, ставити
read	read	read	читати
ring	rang	rung	дзвонити
rise	rose	risen	піднімати
run	ran	run	бігти
say	said	said	сказати
see	saw	seen	бачити
seek	sought	sought	шукати
sell	sold	sold	продавати
send	sent	sent	посилати
set	set	set	ставити
shoot	shot	shot	стріляти
show	showed	shown	показувати
shut	shut	shut	закривати
sing	sang	sung	співати
sit	sat	sat	сидіти
sleep	slept	slept	спати
speak	spoke	spoken	говорити
speed	sped	sped	поспішати
spell	spelt	spelt	писати або вимовляти по літерах
	spelled	spelled	
spend	spent	spent	витрачати, проводити (час)
spoil	spoilt	spoilt	псувати
	spoiled	spoiled	
spread	spread	spread	розгортати, поширювати
stand	stood	stood	стояти, ставити
strike	struck	struck	ударяти, бити
swim	swam	swum	плавати
take	took	taken	брати
teach	taught	taught	учити, навчати, викладати
tell	told	told	говорити, повідомляти
think	thought	thought	думати, вважати
understand	understood	understood	розуміти, мати на увазі
wake	woke	woken	будити, прокидатися
	waked	waked	
win	won	won	виграти, перемогти
write	wrote	written	писати

Appendix VI English–Ukrainian Vocabulary

Aa

acceleration [ək,selə'reɪʃən] *n* – прискорення, вдосконалення
access ['ækses] *n* – доступ
accessory [ək'sesərɪ] *n* – допоміжний пристрій
active matrix screen *n* – рідкокристалічний екран (РК) – екран з активною матрицею (нова технологія формування зображення)
actuator ['æktjueɪtə] *n* – силовий привід, виконавчий механізм
adapter [ə'dæptə] *n* – адаптер, перехідний пристрій
adapter card [ə'dæptə kɑ:d] *n* – адаптерна плата
add [æd] *v* – додавати, приєднувати, підсумовувати, складати
align [ə'laɪn] *v* – вирівнювати
allow [ə'lau] *v* – дозволяти, надавати можливість
analog ['ænəlɔg] *n* – моделюючий пристрій або система
analog signal – аналоговий сигнал
angle ['æŋgl] *n* – кут, "уголок" – назва символу
appearance [ə'pɪərəns] *n* – зовнішній вигляд, поява
application [,æplɪ'keɪʃən] *n* – застосування, використання, додаток
apply[ə'plaɪ] *v* – застосовувати, додавати, прикладати
argument ['ɑ:gjumənt] *n* – аргумент, довід
arm ['ɑ:m] *n* – плече, *v* – активізувати
assembly [ə'semblɪ] *n* – механізм, агрегат, збирання. монтаж
attach [ə'tætʃ] *v* – прикріплювати, під'єднувати
available [ə'veɪləbl] *adj* – доступний
axe ['æks] *n* – вісь

Bb

back-lit ['bæklɪt] *n* – екран з підсвічуванням
backlit LCD *n* – рідкокристалічний екран з підсвічуванням
battery ['bætərɪ] *n* – батарея, акумулятор
bay [beɪ] *n* – панель, рама
beam [bi:m] *n* – промінь, радіус дії (мікрофона, гучномовця)
beige [bezl] *n* – колір беж
bezel[beɪʒ] *n* – віконце, панель, що прикриває дисковод чи будь-який інший пристрій
bidirectional *adj*– двонаправлений, реверсивний
binary ['baɪnərɪ] *adj* – двійковий, бінарний
BIOS [baɪəs] – БІОС, базова система вводу / виводу
bit [bɪt] *n* – мінімальна одиниця кількості інформації
Bluetooth ['blu:tu:ɵ] – нова універсальна технологія безпровідникового зв'язку мікропроцесорних пристроїв різного типу
board [bɔ:d] *n* – плата, пульт
boot [bu:t] *n* – початкове завантаження системи, самозавантаження
bootstrap [bu:tstræp] *n* – програма самозавантаження, ініціалізація
bracket ['brækɪt] *n* – дужка
brief [bri:f] *adj* – короткий, стислий
buffer ['bʌfə] *n* – буфер
bulky ['bʌlkɪ] *adj* – великий, об'ємистий
burner ['bə:nə] *n* – програматор
bus [bʌs] *n* – шина, канал (передачі інформації)
button ['bʌtn] *n* – кнопка
byte [baɪt] *n* – одиниця виміру пам'яті, одиниця інформації = 8 біт

Cc

cable [keıbl] *n* – кабель

cache ['kæʃ] *n* – кеш (швидкодіюча буферна пам'ять великого об’єму)

cage [keıdʒ] *n* – клітка

camera ['kæmərə] *n* – фотоапарат

capability [keıpə'bılıtı] *n* – здатність

capacity [kə'pæsıtı] *n* – потужність, об’єм

card [kɑ:d] *n* – карта

carriage['kærıdʒ] *n* – каретка, супорт

carry ['kærı] *v* – переносити, нести

case [keıs] *n* – корпус, каркас

cassette [kə'set] *n* – касета

categorize ['kætıg(ə)raız] *v* – класифікувати, розподіляти по категоріям

cathode ['kæθəud] *n* – катод, *adj* – катодний

CD-ROM (Compact Disc Read-Only Memory) ['sı:dı: rɔm] – компакт-диск (призначений тільки для читання)

cease [si:s] *v* – припиняти

Central Processing Unit (CPU) – центральний процесор

charge [tʃɑ:dʒ] *n* – заряд

chip [tʃıp] *n* – мікросхема

chipset – *n* набір мікросхем

chopper [tʃɔpə] *n* – переривник, тикер

chunk [tʃʌŋk] *n* – ділянка пам’яті

circuit ['sə:kıt] *n* – коло, схема

circuitry ['sə:kıtrı] *n* – схеми, схематика

click [klık] – *n* клацання по кнопці миші; *v* – клацати

clone [kləun] – *n* клон, *v* – забезпечувати абсолютну сумісність

code [kəud] – *n* код

combination [ˌkɔmbı'neıʃ(ə)n] *n* – комбінація, поєднання

compact disc (CD) ['kɔmpækt dısk] *n* – компакт-диск, лазерний диск

compatible [kəm'pətəbl] *adj* – сумісний

compatibles [kəm'pətəblz] *n* – сумісні пристрої

component [kəm'pəunənt] *n* – складова,компонент, частина, деталь

computation [ˌkɔmpju:'teıʃ(ə)n] *n* – обчислення, розрахунок

computer [kəm'pju:tə] *n* – комп’ютер

computer case [keıs] *n* – системний блок

configuration [kənfıgju'reıʃ(ə)n] *n* – форма, конфігурація

configure [kən'fıgə] *v* – конфігурувати (змінювати існуючі установки клієнта, сервера чи мережі)

connect [kə'nekt] *v* – зв’язувати, з’єднувати, встановлювати зв'язок

connector [kə'nektə] *n* – з’єднувач, роз’єм, логічний блок з’єднання (на блоці схемі)

connexion [kə'nekʃ(ə)n] *n* – зв'язок, з’єднання

console [kən'səul] *n* – пульт, пульт оператора, консоль

contact ['kɔntækt] *n* – контакт, зв'язок

control unit [kən'trəul] *n* –пристрій керування, блок контролю

controller [kən'trəulə] *n* – контролер (виділений комп’ютер в мережі), регулятор

convert [kɔn'və:t] *v* – перетворювати

cooler ['ku:lə] *n* – охолоджувальний пристрій

cooling ['ku:lıŋ] *n* – охолодження
core ['kɔ:] *n* – ядро (операційної системи)
critical ['krıtıkəl] *adj* – критичний, небезпечний
cursor [kə:sə] *n* – курсор

Dd
data ['deıtə] *n* – дані, інформація
data stream *n* – інформаційний потік
decimal ['desıməl] *adj* – десятковий, десяткове число
delete [dı'li:t] *v* – видаляти, викреслювати, стирати
design [dı'zaın] *n* – план, розробка, проект, конструкція
desktop ['desktɔp] *adj* – настільний
detect [dı'tekt] *v* – виявляти
determine [dı'tə:mın] *v* – визначати, встановлювати
device[dı'vaıs] *n* – пристрій, апарат, механізм
diagram [daıəgræm] *n* – діаграма, графік, схема
digit ['dıdʒıt] *n* – цифра, однозначне число
digital ['dıdʒıtl] *adj* – цифровий
digital unit *n*– цифровий блок
digital video disk (DVD) *n*– цифровий відеодиск
dimension [dı'menʃən] *n* – величина, вимір
direct [dı'rekt] *v* – управляти, керувати, направляти, *adj* – прямий, безпосередній
directory [dı'rektərı] *n* – каталог, папка, довідник
disassembly [dısə'semblı] *n* – демонтаж (пристрою) на частини
disk [dısk] *n* – диск
disk drive ['dısk 'draıv] *n* – дисковод, накопичувач на дисках
display [dıs'pleı] *n* – показ; *v* – показувати
domain[dəumeın] *n* – область, домен (в Інтернеті – частина ієрархії імен)
drawback ['drɔ:bæk] *n* – недолік
driver ['draıvə] *n* – драйвер (програма, що керує пристроєм)
dual ['dju:əl] *adj* – подвійний
dual in-line memory modules (DIMMs) – модуль пам'яті з дворядним розташуванням виводів
duplex ['dju:pleks] *n* – дуплекс (двосторонній режим зв'язку), *adj* – дубльований, подвійний
dynamic [daı'næmık] *adj* – динамічний
dynamic random access memory (DRAM) – динамічний ОЗП

Ee
electronic [ılek'trɔnık] *adj* – електронний
embedded [ım'bedıd] *adj* – вмонтований
enable [ı'neıbl] *v* – давати право, можливість, полегшувати
enclosure [ın'kləuʒə] *n* – додаток, оболонка
encourage [ın'kʌrıdʒ] *v* – заохочувати, підтримувати
environment [ın'vaırənmənt] *n* – режим роботи, умови експлуатації, обладнання, зовнішні фактори
equal ['i:kwəl] *adj* – рівний, однаковий; v - вирівнювати
equipment [ı'kwıpmənt] *n* – устаткування, апаратура
error ['erə] *n* – помилка, похибка
execute ['eksıkju:t] *v* – виконувати
exist [ıg'zıst] *v* – існувати, знаходитися

expand [ɪksp'ænd] *v* – розширювати, розгортати (напр. структуру каталогів), збільшувати

expansion [ɪks'pænʃən] *n* – розширення, збільшення

expansion bus [ɪks'pænʃən bʌs] *n* – шина розширення

expansion card [ɪks'pænʃən kɑ:d] *n* – плата розширення
external [ɪks'tə:n)l] *adj* – зовнішній

Ff
factor ['fæktə] *n* – фактор, коефіцієнт, особливість
fan [fæn] *n* – вентилятор

fashion ['fæʃən] *n* – модель, форма

fiberglass ['faɪbəglɑ:s] *n* – скловолокно
figure ['fɪgə] *n* – малюнок, зображення, ілюстрація

file [faɪl] *n* – файл, картотека, архів
fit [fɪt] *v* – установлювати, монтувати

floppy ['flɔpɪ] *adj* – гнучкий
floppy disk *n* – гнучкий диск
floppy drive *n* – накопичувач на гнучких магнітних дисках, дисковод
form factor *n* – коефіцієнт

fragmentation [,frægmen'teɪʃən] *n* – фрагментація, поділ на фрагменти

function ['fʌŋkʃən] *n* – функція, призначення

Gg
gear [gɪə] *n* – знак, «зірочка»

generate ['dʒenəreɪt] *v* – викликати, робити, генерувати
grid [grɪd] *n* – енергосистема, модулятор

gun [gʌn] *v* – переривати (процес)

Hh
hard disk ['hɑ:d 'dɪsk] *n* – жорсткий диск

hardware ['hɑ:d,weə] *n* – апаратне забезпечення
head ['hed] *n* – голівка, магнітна голівка
headphone ['hedfəun] *n* – навушники
heat pipe [hi:t paɪp] *n* – теплова труба
heat sink [hi:t sɪŋk] *n* – радіатор
hit [hɪt] *n* – елемент файла (що завантажується), звернення (в кеш-буфері), відповідь, співпадіння (під час пошуку), індекс популярності(в Інтернеті)
hole [həul] *n* – отвір, діра
host [həust] *n* – головна обчислювальна машина, хост (будь-який пристрій в мережі, що використовує протоколи TCP/IP)
host adapter *n* – хост-адаптер (контролер сервера)

hub ['hʌb] *n* – ядро (в мережі), концентратор (мережевий апаратний вузол), підбірка (веб-сторінки)

hybrid ['hɑɪbrɪd] *adj* – гібридний, змішаний

Ii
identify [ɑɪ'dentɪfɑɪ] *v* – установлювати тотожність (with), ототожнювати
illustrate ['ɪlə,streɪt] *v* – ілюструвати, пояснювати

image ['ɪmɪdʒ] *n* – образ, зображення; *v* – відображати, створювати зображення

implementation [ˌɪmplɪmen'teɪʃən] *n* – виконання, реалізація, етап в технологічному процесі розробки
increase ['ɪnkri:s] *v* – збільшувати, підсилювати

information [ˌɪnfə'meɪʃən] *n* – інформація, дані, повідомлення
infrared [ˌɪnfrə'red] *adj* – інфрачервоний
input ['ɪnput] *n* – введення інформації, *v* - вводити інформацію
input device *n* – пристрій вводу
insert ['ɪnsət] *n* – вставка; *v* – вносити виправлення, доповнення

insertion point [ɪn'sə:ʃən pɔint] *n* – точка вводу (положення курсору в діалоговому вікні)

inside [ɪn'sɑɪd] *n* – внутрішня сторона; *adj* – внутрішній; *adv* – усередині

install [ɪn'stɔ:l] *v* – інсталювати, установлювати, монтувати

installation [ˌɪnstə'leɪʃən] *n* – інсталяція, установка

instruction [ɪn'strʌkʃən] *n* – команда, інструкція, програма дій
instrument ['ɪnstrumənt] *n* – інструмент, прилад, апарат
integrated ['ɪntɪˌgreɪtɪd] *adj* – складений, комплексний, об'єднаний
integrated system – інтегрована система
interface [ˌɪntəfeɪs] *n* – інтерфейс (на мові програмування - видима користувачу частина модуля)
internal [ɪn'tə:nəl] *adj* – внутрішній
irreversibly [ˌɪrɪ'və:səblɪ] *adv* – необоротно, нереверсивно
item ['aɪtem] *n* – окремий предмет, елемент, одиниця

Jj
joystick ['dʒɔɪstɪk] *n* – джойстік, важіль керування
jumper ['dʒʌmpə] *n* – навісний провідник, з'єднувальний дріт
jumper block ['dʒʌmpə blɔk] *n* – блок перемичок (для вибору необхідної конфігурації пристрою)

Kk
key ['kɪ:] *n* – клавіша, кнопка, перемикач
keyboard ['kɪ:ˌbɔ:d] *n* – клавіатура, комутаційна панель

L l
laptop [læptɔp] *n* – невеликий портативний комп'ютер
laser ['leɪzə] *n* – лазер, оптичний квантовий генератор (підсилювач)
layout ['leɪaut] *n* – розташування, набір інструментів, устаткування
limit ['lɪmɪt] *n* – границя, межа, *v* – обмежувати
liquid-crystal display (LCD) – рідкокристалічний дисплей (РКД)

location [lə'ukeɪʃən] *n* – розміщення, комірка пам'яті

logic ['lɔdʒɪk] *n* – логіка, *adj* – логічна схема

Mm
mainframe ['meɪnfreɪm] *n* – універсальна обчислювальна машина (на відміну від міні-машин)
main frame – центральний блок обробки даних, (основний комплект ЄОМ, що включає оперативну пам'ять, центральний процесор та канали вводу/ виводу)

major ['meɪdʒə] *adj* – головний

match [mætʃ] *v* – відповідати, підбирати під пару, поєднати

matrix ['meɪtrɪks] *n* – матриця, дешифратор

measure ['meʒə] *n* – міра, критерій, показник, масштаб, форма; *v* – вимірювати, оцінювати
memory ['meməri] *n* – пам'ять, запам'ятовувальний пристрій, машинна пам'ять

message ['mesɪdʒ] *n* – повідомлення; *v* – посилати повідомлення
microphone ['maɪkrəfəun] *n* – мікрофон
microprocessor [,maɪkrəu'prəusesə] *n* – мікропроцесор
modem ['məudem] *n* – модем, модулятор-демодулятор

module ['mɔdju:l] *n* – модуль

modular ['mɔdjulə] *adj* – модульний

monitor ['mɔnɪtə] *n* – монітор, дисплей, програмний засіб синхронізації

motherboard ['mʌðə,bɔ:d] *n* – материнська плата, системна плата
mount [maunt] *v* – установлювати, закріпляти, монтувати
mouse [maus] *n* – миша (маніпулятор для управління курсором)

multimedia [,mʌltɪ'mi:dɪə] *adj* – мультимедійний, з одночасним використанням різних засобів інформації

Nn
need [ni:d] *n* – потреба; *v* – потребувати
network (net) ['net,wə:k] *n* – мережа, схема, мережевий графік
network interface card (NIC)– мережева інтерфейсна плата (мережевий адаптер)
notebook ['nəutbuk] *n* – ноутбук, портативний комп'ютер

number ['nʌmbə] *n* – число, кількість; *v* – нараховувати

Oo
on-screen [ɔn'skrɪ:n] *adj* – екранний

operate ['ɔpəreɪt] *v* – працювати, приводити у рух

operation [,ɔpə'reɪʃən] *n* – робота, експлуатація, приведення в дію, процес

optical ['ɔptɪkəl] *adj* – оптичний
optical disk drive (**ODD**) *n* – накопичувач на оптичних дисках

original [ə'rɪdʒənl] *adj* – справжній, новий, первісний
output ['autput] *n* – вихідні дані, пристрої виводу, вихідна потужність
output device *n* – пристрій виводу

outside ['aut'sɑɪd] *n* – зовнішня частина, поверхня; *adj* – зовнішній; *adv* – зовні
overclocking *n* – розгін процесора

Pp
packet ['pækɪt] *n* – пакет, блок інформації

palmtop [pa:mtɔp] *n* – кишеньковий комп'ютер
passive matrix display *n* – рідкокристалічний дисплей з пасивною матрицею (РДП)

path [pa:ɵ] *n* – траєкторія

pathway [pa:ɵweɪ] *n* – траєкторія
pattern ['pætən] *n* – модель, зразок, шаблон

perform [pə'fɔ:m] *v* – виконувати, робити

performance [pə'fɔ:məns] *n* – дія, виконання, продуктивність
peripheral [pə'rɪfərəl] *n* – периферійний пристрій
permanent ['pə:mənənt] *adj* – постійний, незмінний
personal ['pə:snl] *adj* – персональний
pick- up *n* – адаптер, звукознімач

pickup head *n* – голівка звукознімача
pixel ['pıks(ə)l] *n* – піксель, мінімальний елемент зображення
planar board *n* – материнська плата
platter ['plætə] *n* – жорсткий диск
plug ['plʌg] *n* – штепсельна вилка
pointer ['pɔıntə] *n* – покажчик, вказівка (ідентифікатор об'єкту в програмі)
port [pɔ:t] *n* – порт (багаторозрядний вхід чи вихід для пристрою)
portable ['pɔ:təbl] *adj* – портативний, переносний
portability [,pɔ:tə'bılıtı] *n* – портативність
power ['pauə] *n* – потужність, енергія, здатність, сила
power connector ['pauə kə'nektə] *n* – силовий роз'єм, роз'єм живлення
power supply ['pauə sə'plaı] *n* – блок живлення, джерело живлення
primary ['praımərı] *adj* – первинний, головний
print [prınt] *v* – друкувати, відображати (інформацію на екрані дисплея)
printer [prıntə] *n* – принтер, друкуючий пристрій
printhead (print(ing) head) *n* – друкуюча голівка, вузол
print out *v* – роздруковувати
process ['prəuses] *v* – обробляти
processor ['prəusesə] *n* – процесор
profile ['prəufaıl] *n* – профіль, розріз, контур
program ['prəugræm] *n* – програма; *v* – програмувати
programmer ['prəugræmə] *n* – програміст, програмуючий пристрій (ПЗП)
protection [prə'tekʃən] *n* – захист
provide [prə'vaıd] *v* – забезпечувати, надавати, постачати
purpose ['pə:pəs] *n* – намір, мета, призначення

R r
random access memory RA M ['ræm] *n* – оперативна пам'ять, ОЗП
rate [reıt] *n* – коефіцієнт, ступінь, відсоток, частка; *v* – оцінювати, обчислювати, визначати
read-only memory ROM *n* – постійна пам'ять, ПЗП
receptacle [rı'septəkəl] *n* – патрон, штепсельна розетка
recorder [rı'kɔ:də] n – звукозаписуючий пристрій
rectangular [rek'tæŋgjulə] *adj* – прямокутний
reflection [rı'flekʃən] *n* – відображення
refresh [rı'freʃ] *v* – відновлювати
render [rendə] *v* – відтворювати, зображувати
replace [rı'pleıs] *v* – заміняти, заміщати, відновити
reset [ri:'set] *v* – знову встановлювати
reside [rı'zaıd] *v* – знаходитись, бути властивим (in)
respectively [rıs'pektıvlı] *adv* – відповідно, у зазначеному порядку
restore [rıs'tɔ:] *v* – відновлювати
re-store ***v*** – переписувати в пам'ять заново
row [rəu] *n* – ряд
run [rʌn] *n* – запуск програми; *v* – запускати програму

Ss
scan ['skæn] *v* – сканувати
scanner ['skænə] *n* – сканер
scheme [sk:m] *n* – схема, план, програма
screen ['skri:n] *n* – екран; *v* – демонструвати на екрані

scroll ['skrəul] *v* – прокручувати для перегляду

search [sə:tʃ] *v* – пощук

section ['sekʃən] *n* – частина, деталь, сегмент, секція

self-destruct ['selfdıs'trʌct] *v* – самоліквідуватися (про пристрій)

semiconductor [ˌsemıkən'dʌktə] *n* – напівпровідник

sensor ['sensə] *n* – сенсор, датчик, чуттєвий елемент

server ['sɜ:və] *n* – сервер, пристрій для обслуговування ПК

setting ['setıŋ] *n* – установка, запуск, параметри настройки

shader ['ʃeıdə] *n* – програма – ретушер

shut off *v* – виключати

single in-line memory modules (SIMMs) – модуль пам'яті з однорядним розташуванням виводів

size [saız] *n* – розмір, величина

slot [sɔlt] *n* – область пам'яті, отвір

socket ['sɔkıt] *n* – розетка, гніздо

software ['sɔ:ftweə] *n* – програмне забезпечення

sound [saund] *n* – звук; *v* – звучати, видавати звук

sound blaster *n* – саунд-бластер, звукогенератор

sound card [saund kɑ:d] *n* – звукова карта, звукова плата

speaker ['spi:kə] *n* – динамік ПК, гучномовець

speed [spi:d] *n* – швидкість, число обертів

spin [spın] (**spun** [spʌn]) *v* – обертатись

spindle [spındl] *n* – вісь, шпиндель (дисковода)

spreadsheet ['spredʃi:t] *n* – велика електронна таблиця

stand by *v* – виконувати

static ['stætık] *adj* – нерухомий

stemming – морфологічний пошук

storage ['stɔ:rıdʒ] *n* – пам'ять, запам'ятовувальний пристрій

store [stɔ:] *v* – уміщати, зберігати, ЗП

storage device *n* – запам'ятовуючий пристрій (елемент), ЗП

subset [sʌbset] *n* – підмножина

suitable ['sju:təbl] *adj* – придатний, відповідний

supplement ['sʌplımənt] *n* – додаток, доповнення

supply [sə'plaı] *n* – живлення; *v* – живити, подавати напругу струм

surface ['sə:fıs] *n* – поверхня

Tt

tab [tæb] *n* – табуляція (вирівнювання тексту), клавіша

technology [tek'nɔlədʒı] *n* – техніка, технологія

tightly ['taıtlı] *adj* – міцно, туго, щільно

through [θru:] *adv*– через, завдяки

thumb [θʌm] *n* – курсор

touchpad *n* – сенсорна панель

track [træk] *n* – доріжка, канал

trackball [trækbɔ:l] *n* – кульковий маніпулятор

tube [tju:b] *n* – електронна лампа

type [taıp] *n* – тип, вид, символ

typical ['tıpıkəl] *adj* – типовий

U u

unavoidable [ˌʌnə'vɔɪd(ə)bl] *adj* – неминучий
unit ['ju:nɪt] *n* – одиниця, блок
universal [ˌju:nɪ'və:səl] *adj* – загальний, універсальний
Universal Serial Bus (USB) – універсальна послідовна шина (канал)
update [ʌp'deɪt] *n* – оновлення, корегування; *v* – модернізувати
upgrade ['ʌpgreɪd] *n* – засоби, що забезпечують збільшення обчислювальних можливостей
upgradable *adj* – розширений (по функціональним можливостям)
usage ['ju:sɪdʒ] *n* – коефіцієнт завантаження (ресурсу), частота використання
user ['ju:zə] *n* – користувач

Vv

vertex ['və:teks] *n* – вершина
vice versa [vaɪsɪ 'və:sə] *adv* – навпаки, обернено
video ['vɪdɪəu] *n* – зображення, відео
video card ['vɪdɪəu k*a*:d] *n* – відеокарта
virtual ['və:tjuəl] *adj* – віртуальний, дійсний
virus ['vaɪərəs] *n* – вірус
visual ['vɪzjuəl] *adj* – візуальний, видимий
volt [vɔlt] *n* – вольт (одиниця виміру ел. напруги)
voltage ['vəultɪdʒ] *n* – напруга

Ww

watt [wɔt] *n* – ват
webcam [webkæm] *n* – веб-камера, мережева камера
wheel ['wɪ:l] *n* – коліщатко, диск,що обертається
wire ['waɪə] *n* – провід, дріт
wireless ['waɪəlɪs] *adj* – бездротовий
within [wɪð'ɪn] *prep* – усередині, у межах

Xx

Xerox ['zɪərɔks] *n* – ксерокс
X-line ['ekslaɪn] *n* – вісь іксів

Zz

zip –[ɪp] *n* – zip-диск (дискета 100 і більше МГ байт), миттєво переміщати (напр., курсор з однієї точки екрана в іншу), файловий архів, *v* – заархівувати (файли)
zero ['zɪərəu] *n* – нуль, нульова точка

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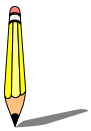
For personal notes:



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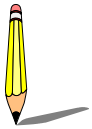

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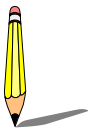

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