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Севастопольский национальный технический университет



МЕТОДИЧЕСКИЕ УКАЗАНИЯ

к практическим занятиям по дисциплине
«Английский язык» для студентов II курса
специальности «Радиотехника»
дневной формы обучения

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Методические указания к практическим занятиям по дисциплине «Английский язык» для студентов II курса специальности «Радиотехника» дневной формы обучения / Сост. И.И.Строева. – Севастополь: Изд-во СевНТУ, 2011. - 28 с.

Целью данных методических указания является привить навыки чтения и понимания литературы по специальности «Радиотехника» факультета РТ студентам 2-го курса и ведения бесед на темы, предусмотренные программой.

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Рецензент: Пастухова С.Е., к.ф.н., доцент кафедры Практики романских и германских языков Севастопольского национального технического университета.

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ВВЕДЕНИЕ

Данные методические указания предназначены для студентов специальности “Радиотехника” 2-го курса, продолжающих изучение английского языка на базе знаний, приобретенных ими в университете на 1-ом курсе.

Целью данных методических указаний является привить навыки чтения и понимания литературы по специальности и умения вести беседу на темы, предусмотренные программой.

В методических указаниях использованы материалы технической литературы на английском языке. Данные указания состоят из 6-ти уроков, которые охватывают следующие темы: Radio, Etymology of Radio, Uses of radio, Audio, Radio in different fields, Navigation и вспомогательных текстов по специальности «Радиотехника» для чтения и обсуждения. В конце указаний представлены работы для контроля, выполненные в виде тестов.

Типовой урок имеет следующую структуру:

- текст, несущий профессиональную информацию;
- поурочный словарь;
- упражнения.

Большое внимание уделяется работе с упражнениями, включающими активную лексику профессионального содержания, слова приведены в порядке их следования в тексте. Вопросы к тексту служат основой для всестороннего и систематизированного обсуждения изучаемой темы. Их цель – проверить понимание содержания текста. Контроль осуществляется при выполнении упражнений на перевод с русского языка на английский и при составлении диалогов по изучаемой теме.

UNIT 1. RADIO

Radio is the transmission of signals, by modulation of electromagnetic waves with frequencies below those of visible light. Electromagnetic radiation travels by means of oscillating electromagnetic fields that pass through the air and the vacuum of space. Early speculation that this required a medium of transport, called luminiferous aether, were found to be false. Information is carried by systematically changing (modulating) some property of the radiated waves, such as their amplitude or their frequency. When radio waves pass an electrical conductor, the oscillating fields induce an alternating current in the conductor. This can be detected and transformed into sound or other signals that carry information.

James Clerk Maxwell, a Scottish scientist, developed the theoretical basis for explaining electromagnetism. He predicted that electric and magnetic fields can couple together to form electromagnetic waves. Heinrich Hertz, a German scientist, is credited with being the first to produce and detect such waves at radio frequencies, in 1888, using a spark gap transmitter in the Ultra High Frequency range.

In 1893, Nikola Tesla, in America, first demonstrated the feasibility of wireless communications. Guglielmo Marconi, an Italian inventor, was one of the first to develop commercial workable radio communication. It is supposed that he sent and received his first radio signal in Italy in 1895.

Albert Einstein, when asked to describe Radio, replied: "You see, Wire Telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And Radio operates exactly the same way: you send signals here, they receive them there. The only difference is that there is no cat."

The word 'radio' is used to describe this phenomenon, and radio transmissions are classed as radio frequency emissions.

Words and word combinations:

transmission of signals	передача сигналов
electromagnetic waves	электромагнитные волны
oscillating	осциллирующий, колеблющийся, колебательный
pass through	проходить через/сквозь ч-л.
frequency	частота (радио)
speculation	теория, догадка, размышление
luminiferous aether	люминофорный эфир
false	неверный, ложный
carry	нести, передавать
amplitude	амплитуда, максимальный радиус сигнала
induce	побуждать, вызывать
detect	выявлять, обнаруживать
predict	предсказывать, прогнозировать

couple together	соединять
spark gap transmitter	передатчик искрового промежутка
Ultra High Frequency range	диапазон сверхвысоких частот
feasibility	осуществимость
wireless	беспроводной
operate	работать, функционировать
emission	излучение

Exercises

Ex.1. Translate into Russian:

modulation of electromagnetic waves; by means of oscillating electromagnetic fields; early speculation were found to be false; radio waves pass an electrical conductor; induce an alternating current in the conductor; was one of the first to develop; when asked to describe radio; it is supposed that; radio operates exactly the same way.

Ex.2. Translate into English:

электромагнитное излучение; информация передается путем систематических изменений; обнаружить и преобразовать в звук или другие сигналы; разработать теоретическую основу для объяснения явления электромагнетизма; используя передатчик искрового промежутка в диапазоне сверхвысоких частот; излучений частотных радиоволн.

Ex.3. Insert the prepositions where necessary:

Transmission ... signals; frequencies ... those ... visible light; ... means ... oscillating electromagnetic fields; pass ... the air and the vacuum ... space; this can be detected and transformed ... sound; demonstrated the feasibility ... wireless communication; was one ... the first to develop; radio operates exactly ... the same way.

Ex.4. Choose the correct variant:

- 1) Electromagnetic ... travels by means of oscillating electromagnetic fields that pass through the air and the vacuum of space.
a) emission; b) field; c) radiation; d) induction.
- 2) Information is ... by systematically changing (modulating) some property of the radiated waves, such as their amplitude or their frequency.
a) carried; b) transmitted; c) given; d) digested.
- 3) This can be ... and transformed into sound or other signals that carry information.
a) carried; b) detected; c) taken; d) measured.
- 4) He predicted that electric and magnetic fields can couple together to form ...
a) electromagnetic attraction; b) electromagnetic induction;
c) electromagnetic waves; d) electromagnetic coupling.
- 5) Heinrich Hertz is credited with being the first to produce and ... such waves at radio frequencies, using a ... in the Ultra High Frequency range.
a) transform ... spark gap adjustment; b) detect... analog transmitter; c) detect...

spark gap transmitter; d) induce ... spark gap transmitter.

6) And Radio ... exactly the same way: you send signals here, they receive them there.

a) transmits; b) operates; c) carries information; d) works.

7) The word 'radio' is used to this phenomenon, and radio transmissions are classed as radio

a) prescribe ... frequency emissions; b) describe infrared emissions; c) subscribe electronic emissions; d) describe ... frequency emissions.

Ex.5. Answer the questions:

- 1) How can radio be defined as?
- 2) In what way is the information carried?
- 3) What was the prediction of James Clerk Maxwell?
- 4) What is Nikola Tesla famous for?
- 5) What was the achievement of Guglielmo Marconi?

Ex.6. Make up a plan of the text.

Ex. 7. Retell the text with the help of the annotation composed by yourself.

UNIT 2. ETYMOLOGY OF RADIO

Originally, radio or radiotelegraphy was called 'wireless telegraphy', which was shortened to 'wireless'. The prefix radio- in the sense of wireless transmission was first recorded in the word radioconductor, coined by the French physicist Edouard Branly in 1897 and based on the verb to radiate (in Latin "radius" means "spoke of a wheel, beam of light, ray"). 'Radio' as a noun is said to have been coined by advertising expert Waldo Warren (White 1944). The word appears in a 1907 article by Lee de Forest, was adopted by the United States Navy in 1912 and became common by the time of the first commercial broadcasts in the United States in the 1920s. (The noun 'broadcasting' itself came from an agricultural term, meaning 'scattering seeds'.) The term was then adopted by other languages in Europe and Asia, although British Commonwealth countries retained the term 'wireless' until the mid-20th century. In Japanese, the term 'wireless' is the basis for the term 'radio wave' although the term for the device that listens to radio waves is literally 'device for receiving sounds'.

In recent years the term 'wireless' has gained renewed popularity through the rapid growth of short range networking, e.g., WLAN ('Wireless Local Area Network'), WiFi and Bluetooth as well as mobile telephony, e.g., GSM and UMTS. Today, the term 'radio' often refers to the actual transceiver device or chip, whereas 'wireless' refers to the system and/or method used for radio communication. Hence one talks about radio transceivers and Radio Frequency Identification (RFID), but about wireless devices and wireless sensor networks.

Words and word combinations:

coin	создавать, придумывать
radiate	излучать
wheel	колесо
beam of light, ray	световой луч
advertising	реклама
common	общепринятый, общественный
scattering seeds	разбрасывать семена
adopt	принимать, заимствовать
Commonwealth countries	содружество стран
retain	сохранять
gain	приобретать, добиваться
renewed	возобновленный
rapid growth	стремительный рост
networking	организация сети
short range	ближняя связь
transceiver device	радиоприемник
chip	микросхема, чип
whereas	в то время как

Exercises**Ex. 1. What do these abbreviations stand for?**

WLAN, GSM, UMTS, RFID

Ex. 2. Translate into Russian:

in the sense of wireless transmission; 'radio' as a noun is said to have been coined; advertising expert; became common; the noun 'broadcasting' itself; 'device for receiving sounds'; the term 'wireless' has gained renewed popularity; the term 'radio' often refers to the actual transceiver device or chip; wireless sensor networks.

Ex.3. Translate into English:

изначально радио называли «беспроводным телеграфом»; первое коммерческое радиовещание; сельскохозяйственный термин; затем термин заимствовали другие страны Европы и Азии; вследствие стремительного роста организаций сети ближней связи; беспроводной доступ в Интернет; радиочастотная идентификация.

Ex. 4. Read the following verbs. Translate them and make up sentences with each of them:

To shorten to, to adopt by, to come from, to listen to, to gain through, to refer to.

Ex. 5. Find the words corresponding to the explanations in the text:

1) an electronic device designed to receive, demodulate and amplify signals from

broadcasting stations etc.;

- 2) the act or process of sending information from one location to one or more other locations by means of radio waves, electrical signals etc.;
- 3) a person who is skilled in the sphere of promotion of goods or services for sale through impersonal media;
- 4) to accept smth., to choose and follow
- 5) widespread, prevailing, of ordinary standard;
- 6) a transmission or program on radio or TV, the act of scattering seeds;
- 7) communicating without connecting wires or other material contacts;
- 8) an increase in very high speed;
- 9) a system of accessing the internet from remote machines such as laptop computers with wireless connection;
- 10) a short-range radio technology that allows wireless communication between a computer and a keyboard, between mobile phones etc.;
- 11) a group of broadcasting stations that all transmit the same program simultaneously.

Ex. 6. Complete the sentences:

- 1) The prefix radio- in the sense of wireless transmission was first
- 2) In recent years the term 'wireless'
- 3) In Japanese, the term 'wireless'
- 4) 'Radio' as a noun is said to
- 5) Today, the term 'radio' often refers to
- 6) The noun 'broadcasting' itself came from

Ex. 7. Answer the questions:

- 1) What was the original name of radio?
- 2) What is the history of the term "Radio"?
- 3) Where did the noun "broadcasting" come from?
- 4) What is the meaning of the term "radio" in Japanese?
- 5) Why has the term "wireless" gained such popularity in recent years?
- 6) What is the meaning of the terms WiFi and Bluetooth?
- 7) What does the term "radio" today refer to?

Ex. 8. Retell the text.

UNIT 3. USES OF RADIO

Early uses were maritime, for sending telegraphic messages using Morse code between ships and land. The earliest users included the Japanese Navy scouting the Russian fleet during the Battle of Tsushima in 1905. One of the most memorable uses of marine telegraphy was during the sinking of the RMS Titanic in 1912, including communications between operators on the sinking ship and nearby vessels, and communications to shore stations listing the survivors. The first radio couldn't transmit sound or speech and was called the "wireless telegraph".

Radio was used to pass on orders and communications between armies and navies on both sides in World War I; Germany used radio communications for diplomatic messages once its submarine cables were cut by the British. The United States passed on President Woodrow Wilson's Fourteen Points to Germany via radio during the war. Broadcasting began from San Jose in 1909, and became feasible in the 1920s, with the widespread introduction of radio receivers, particularly in Europe and the United States. Besides broadcasting, point-to-point broadcasting, including telephone messages and relays of radio programs, became widespread in the 1920s and 1930s. Another use of radio in the pre-war years was the development of detecting and locating aircraft and ships by the use of radar (Radio detection and ranging).

Today, radio takes many forms, including wireless networks and mobile communications of all types, as well as radio broadcasting. Before the advent of television, commercial radio broadcasts included not only news and music, but dramas, comedies, variety shows, and many other forms of entertainment. Radio was unique among methods of dramatic presentation in that it used only sound.

Words and word combinations:

maritime	морской, приморский
Morse code	азбука Морзе
include	включать в себя
navy scouting	военно-морская разведка
fleet	флот
nearby	находящийся рядом, поблизости
survivors	ущевшие, выжившие
pass on	передавать
feasible	выполнимый, осуществимый
widespread	широко распространенный
point-to-point	двухточечный
relay	переключатель
ranging	регулирование диапазона
advent	приход, наступление
variety show	эстрадный концерт
entertainment	развлечение

Exercises

Ex. 1. Find the proper names in the text and translate them.

Ex. 2. Translate into Russian:

sending telegraphic messages using Morse code; the sinking ship and nearby vessels; listing the survivors; radio was used to pass on orders and communications; broadcasting became feasible; widespread introduction of radio receivers; point-to-point broadcasting; before the advent of television; many other forms of entertainment.

Ex.3. Match the synonyms together:

Marine, extended, double-point, advertising, include, widespread, prevalent, read into, advent, widely distributed, maritime, next to, publicity, transfer, coastal, radar, beginning, involve, feasible, sea, point-to-point, propagate to, nearby, pass on, practicable, approach, commercial, near, enclose, two-point, coming, transmit, nautical, relay, seaside, realizable, radiolocator, close by.

Ex. 4. Translate the sentences:

- 1) (Морской телеграф) was widely spread at the beginning of the XX century.
- 2) Radio (использовали) to pass on orders.
- 2) Radio served (не только) for sending messages (но и) for (обнаружения и идентификации) aircraft and ships by the use of radar.
- 4) (Известно, что) the first radio could not transmit sound.

Ex.5. Answer the questions:

- 1) What were the earliest uses of radio?
- 2) Which of the most remarkable use of radio do you know?
- 3) What did the first radio transmit?
- 4) What uses of radio during pre-war years do you know?
- 5) What is radio today?

Ex. 6. Make up a dialogue on the basis of the text.

UNIT 4. AUDIO

AM broadcast radio sends music and voice in the Medium Frequency (MF—0.300 MHz to 3 MHz) radio spectrum. AM radio uses amplitude modulation, in which the amplitude of the transmitted signal is made proportional to the sound amplitude captured (transduced) by the microphone while the transmitted frequency remains unchanged. Transmissions are affected by static and interference because lightning and other sources of radio that are transmitting at the same frequency add their amplitudes to the original transmitted amplitude.

FM broadcast radio sends music and voice with higher fidelity than AM radio. In frequency modulation, amplitude variation at the microphone causes the transmitter frequency to fluctuate. Because the audio signal modulates the frequency and not the amplitude, an FM signal is not subject to static and interference in the same way as AM signals. Due to its need for a wider bandwidth, FM is transmitted in the Very High Frequency (VHF—30 MHz to 300 MHz) radio spectrum. VHF radio waves act more like light, traveling in straight lines, hence the reception range is generally limited to about 50-100 miles. During unusual upper atmospheric conditions, FM signals are occasionally reflected back towards the Earth by the ionosphere, resulting in Long distance FM reception. FM receivers are subject to the capture effect, which causes the radio to only receive the strongest signal when multiple signals appear on the same frequency. FM receivers are relatively immune to lightning and spark interference.

High power is useful in penetrating buildings, diffracting around hills, and refracting for some distance beyond the horizon. Consequently, 100,000 watt FM stations can regularly be heard up to 100 miles (160 km) away, and farther (e.g., 150 miles, 240 km) if there are no competing signals.

Words and word combinations:

AM broadcast radio	АМ радиовещание
radio spectrum	спектр радиочастот
amplitude modulation	амплитудная модуляция
capture (transduce)	захватывать (преобразовывать сигнал)
static	атмосферные помехи
interference	помеха, препятствие
original	первоначальный, исходный
FM broadcast radio	ФМ радиовещание
fidelity	точность(воспроизведения)
frequency modulation	частотная модуляция
fluctuate	меняться, колебаться
to be subject to	быть подверженным (воздействию)
bandwidth	полоса частот
reception	прием
multiple	составной

immune to	устойчивый к ч-л.
spark	искра, искриться
penetrating	проникающий
diffract	преломлять
refract	преломлять

Exercises

Ex. 1. Translate into Russian:

to send music and voice in the Medium Frequency radio spectrum; captured (transduced) by the microphone; transmissions are affected by static and interference; amplitude variation at the microphone causes the transmitter frequency to fluctuate; an FM signal is not subject to static and interference; due to its need for a wider bandwidth; hence the reception range is generally limited; FM signals are occasionally reflected back; there are no competing signals.

Ex. 2. Translate into English:

Амплитуда переданного сигнала пропорциональна звуковой амплитуде; более точно; из-за того, что аудио сигнал модулирует частоту; высокочастотные радиоволны; проходя по прямым линиям; ФМ приемники относительно устойчивы к помехам.

Ex.3. Answer the questions:

- 1) What is AM broadcast radio?
- 2) What does amplitude modulation include?
- 3) What is FM broadcast radio?
- 4) What is the process of frequency modulation?
- 5) Does FM radio send signals with higher or lower fidelity than AM radio?
- 6) What are FM receivers immune to?
- 7) Why is FM signal not subject to static and interference?

Ex. 4. Make up a dialogue on the basis of the text.

Ex. 5. Make up a plan of the text.

Ex. 6. Retell the text on the basis of your plan.

UNIT 5. RADIO IN DIFFERENT FIELDS

Aviation voice radios use VHF AM. AM is used so that multiple stations on the same channel can be received. (Use of FM would result in stronger stations blocking out reception of weaker stations due to FM's capture effect). Aircraft fly high enough that their transmitters can be received hundreds of miles (or kilometers) away, even though they are using VHF.

Marine voice radios can use AM in the short-wave High Frequency (HF—3 MHz to 30 MHz) radio spectrum for very long ranges or narrowband FM in the VHF spectrum for much shorter ranges. Government, police, fire and commercial voice services use narrowband FM on special frequencies. Fidelity is sacrificed to use a smaller range of radio frequencies, usually five kHz of deviation, rather than the 75 kHz used by FM broadcasts and 25 kHz used by TV sound. Early police radios used am receivers to receive one-way dispatches.

Civil and military HF (high frequency) voice services use short-wave radio to contact ships at sea, aircraft and isolated settlements. Most use single sideband voice (SSB), which uses less bandwidth than AM. On an AM radio SSB sounds like ducks quacking. Viewed as a graph of frequency versus power, an AM signal shows power where the frequencies of the voice add and subtract with the main radio frequency. SSB cuts the bandwidth in half by suppressing the carrier and (usually) lower sideband. This also makes the transmitter about three times more powerful, because it doesn't need to transmit the unused carrier and sideband.

TETRA, Terrestrial Trunked Radio is a digital cell phone system for military, police and ambulances. Commercial services such as XM, WorldSpace and Sirius offer encrypted digital Satellite radio.

Words and combinations:

VHF (Very High Frequency)	сверхвысокая частота
multiple stations	разные (радио)станции
due to	из-за, вследствие
capture effect	захват частоты
narrowband	узкая полоса частот
sacrifice (to)	жертвовать
deviation	отклонение
settlement	поселение
single sideband voice	звуковой сигнал по одной боковой полосе
view	рассматривать
versus	в сравнении
subtract	вычитать
TETRA (Terrestrial Trunked Radio)	наземное транкинговое радио
digital	цифровой
cell phone	мобильный телефон

encrypt
satellite

шифровать
спутник

Exercises

Ex. 1. Translate into Russian:

multiple stations on the same channel can be received; for very long ranges or narrowband FM; police radios used am receivers to receive one-way dispatches; to contact ships at sea, aircraft and isolated settlements; a graph of frequency versus power; to offer encrypted digital Satellite radio.

Ex.2. Translate into English:

вследствие захвата частоты ФМ; морское голосовое радио может использовать АМ в спектре коротковолновой сверхвысокой частоты; большинство используют звуковой сигнал по одной боковой полосе; цифровая система мобильной связи; предлагает шифрованное цифровое спутниковое радио.

Ex.3. Distribute the words given below into three columns:

Action, process, doer, receive, transmitter, user, carrying, receiver, reception, carry, suppress, use, carrier, transmit, suppressing, transmission, using.

Ex.4. Answer the questions:

- 1) In what fields is voice radio used?
- 2) What is the difference between AM and FM radio?
- 3) For what purpose do the civil and military services use short-wave radio?
- 4) How does SSB sound on an AM radio?
- 5) What makes the transmitter about three times more powerful?
- 6) What is TETRA?

Ex.5. Make up a dialogue using the questions from ex.4

Ex.6. Retell the text.

UNIT 6. NAVIGATION

All satellite navigation systems use satellites with precision clocks. The satellite transmits its position, and the time of the transmission. The receiver listens to four satellites, and can figure its position as being on a line that is tangent to a spherical shell around each satellite, determined by the time-of-flight of the radio signals from the satellite. A computer in the receiver does the math.

Radio direction-finding is the oldest form of radio navigation. Before 1960 navigators used movable loop antennas to locate commercial AM stations near cities. In some cases they used marine radiolocation beacons, which share a range of frequencies just above AM radio with amateur radio operators. Loran systems also used time-of-flight radio signals, but from radio stations on the ground. VOR (Very High Frequency Omnidirectional Range), systems (used by aircraft), have an antenna array that transmits two signals simultaneously. A directional signal rotates like a lighthouse at a fixed rate. When the directional signal is facing north, an omnidirectional signal pulses. By measuring the difference in phase of these two signals, an aircraft can determine its bearing or radial from the station, thus establishing a line of position. An aircraft can get readings from two VORs and locate its position at the intersection of the two radials, known as a "fix." When the VOR station is collocated with DME (Distance Measuring Equipment), the aircraft can determine its bearing and range from the station, thus providing a fix from only one ground station. Such stations are called VOR/DMEs. The military operates a similar system of nav aids, called TACANs, which are often built into VOR stations. Such stations are called VORTACs. Because TACANs include distance measuring equipment, VOR/DME and VORTAC stations are identical in navigation potential to civil aircraft.

Words and combinations:

navigation	навигация, судоходство
precision clock	точный счетчик
figure tangent	изображать касательный
(to) spherical shell	(к) сферическая оболочка
time-of-flight	времяпролётный
math	вычисления
direction	направление
loop	виток
beacon	маяк
amateur	радиолюбитель
omnidirectional range	всенаправленный курсовой радиомаяк
array	антенная решетка
simultaneously	одновременно
rotate	вращать
lighthouse	маяк

rate	темп, скорость
face	столкнуться (с)
establish	организовать
radial	двигатель со звездообразно расположенными цилиндрами
a fix	местоположение
collocate	сочетаться
navaids	средства обеспечения судовождения
equipment	оборудование

Exercises

Ex. 1. Translate into Russian:

figure its position as being on a line that is tangent to a spherical shell; determined by the time-of-flight of the radio signals; direction-finding is the oldest form of radio navigation; marine radiolocation beacons; an antenna array that transmits two signals simultaneously; the directional signal is facing north; thus establishing a line of position; providing a fix from only one ground station; a similar system of navaids; stations are identical in navigation potential to civil aircraft.

Ex.2. Translate into English:

спутниковые навигационные системы; спутник передает свое местоположение; компьютер в приемнике выполняет вычисления; навигаторы использовали передвижные спиральные антенны; направленный сигнал вращается как маяк, с определенной скоростью; когда всенаправленный курсовой радиомаяк УКВ диапазона сочетается с дальномерным оборудованием.

Ex.3. What do these abbreviations stand for?

AM, VOR, DME, TACAN, VORTAC.

Ex.4. Insert prepositions where necessary:

- 1) All satellite navigation systems use satellites ... precision clocks.
- 2) The receiver listens ... four satellites, and can figure its position as being ... a line that is tangent.... a spherical shell.
- 3) Loran systems also used time-of-flight radio signals, but ... radio stations ... the ground.
- 4) A directional signal rotates like a lighthouse ... a fixed rate.
- 5) When the directional signal is facing north, an omnidirectional signal pulses.
- 6) When the VOR station is collocated DME, the aircraft can determine its bearing and range the station, thus providing a fix from only one ground station.
- 7) The military operates ... a similar system of navaids, called TACANs, which are

often built... VOR stations.

8) Because TACANs include distance measuring equipment, VOR/DME and VORTAC stations are identical navigation potential ... civil aircraft.

Ex.5. Answer the questions:

- 1) What do all satellite navigation systems use?
- 2) What is the task of the receiver?
- 3) What is the oldest form of radio navigation?
- 4) How can the principle of radio navigation system be described?
- 5) What will happen, when the directional signal faces north?
- 6) Which radio stations do aviation and military services use?

Ex.6. Make up a plan of the text.

Ex. 7. Retell the text using your plan.

MATERIALS FOR READING AND DISCUSSING

Radar

Radar (Radio Detection And Ranging) detects objects at a distance by bouncing radio waves off them. The delay caused by the echo measures the distance. The direction of the beam determines the direction of the reflection. The polarization and frequency of the return can sense the type of surface. Navigational radars scan a wide area two to four times per minute. They use very short waves that reflect from earth and stone. They are common on commercial ships and long-distance commercial aircraft.

General purpose radars generally use navigational radar frequencies, but modulate and polarize the pulse so the receiver can determine the type of surface of the reflector. The best general-purpose radars distinguish the rain of heavy storms, as well as land and vehicles. Some can superimpose sonar data and map data from GPS position.

Search radars scan a wide area with pulses of short radio waves. They usually scan the area two to four times a minute. Sometimes search radars use the doppler effect to separate moving vehicles from clutter. Targeting radars use the same principle as search radar but scan a much smaller area far more often, usually several times a second or more. Weather radars resemble search radars, but use radio waves with circular polarization and a wavelength to reflect from water droplets. Some weather radar use the doppler to measure wind speeds.

Data (digital radio)

Most new radio systems are digital. The oldest form of digital broadcast was spark gap telegraphy, used by pioneers such as Marconi. By pressing the key, the



operator could send messages in Morse code by energizing a rotating commutating spark gap. The rotating commutator produced a tone in the receiver, where a simple spark gap would produce a hiss, indistinguishable from static. Spark gap transmitters are now illegal, because of their wasteful transmission. The next advance was continuous wave telegraphy, or CW (Continuous Wave), in which a pure radio frequency, produced by a vacuum tube electronic oscillator was switched on and off by a key. CW uses less than 100 Hz of bandwidth. CW is still used, these days primarily by amateur radio operators. Radio teletypes usually operate on short-wave (HF) and are much loved by the military because they create written information without a skilled operator. These are still used by the military and weather services.

Communication systems that limit themselves to a fixed narrowband frequency range are vulnerable to jamming. A variety of jamming-resistant spread spectrum techniques were initially developed for military use, most famously for Global Positioning System satellite transmissions. Commercial use of spread spectrum began in the 1980s. Bluetooth, most cell phones, and the 802.11b version of Wi-Fi each use various forms of spread spectrum.

Systems that need reliability, or that share their frequency with other services, may use "coded orthogonal frequency-division multiplexing" or COFDM which breaks a digital signal into as many as several hundred slower subchannels. The digital signal is often sent as QAM on the subchannels. Modern COFDM systems use a small computer to make and decode the signal with digital signal processing, which is more flexible and far less expensive than older systems that implemented separate electronic channels. COFDM resists fading and ghosting because the narrow-channel QAM signals can be sent slowly. An adaptive system, or one that sends error-correction codes can also resist interference, because most interference can affect only a few of the QAM channels. COFDM is used for WiFi, some cell phones, Digital Radio Mondiale, Eureka 147, and many other local area network, digital TV and radio standards.

International broadcasting

International broadcasting is broadcasting that is deliberately aimed at a foreign, rather than a domestic, audience. It usually is broadcast by means of long-wave, medium-wave, or short-wave radio, but in recent years has also used direct satellite broadcasting and the Internet as means of reaching audiences.

Although radio and television programs do travel outside national borders, in many cases reception by foreigners is accidental. However, for purposes of propaganda, transmitting religious beliefs, keeping in touch with colonies or expatriates, education, improving trade, or increasing national prestige, broadcasting services have operated external services since the 1920s.

Broadcasters in one country have several reasons to reach out to an audience in other countries. One clear reason is for ideological, or propaganda reasons. Many government-owned stations portray their nation in a positive, non-threatening way.



This could be to encourage business investment and/or tourism to the nation. Another reason is to combat a negative image produced by other nations or internal dissidents, or insurgents. Radio RSA, the broadcasting arm of the apartheid South African government, is an example of this. A third reason is to promote the ideology of the broadcaster. For example, a program on Radio Moscow from the 1960s to the 1980s was **What is Communism?**

Other reasons include broadcasting news which might be censored, or at least of little interest, in a nation. The BBC World Service and the Voice of America have emphasized news broadcasts.

In the case of emergencies, a nation may broadcast special programs overseas to inform listeners what is occurring. Besides ideological reasons, many stations are run by religious broadcasters and are used to provide religious education, religious music, or worship service programs. For example, Vatican Radio, established in 1927, broadcasts such programs. Another station, such as HCJB International or Trans World Radio will carry brokered programming from evangelists. In the case of the Broadcasting Service of the Kingdom of Saudi Arabia, both governmental and religious programming is provided.

Stations also broadcast to international audiences for cultural reasons. Often a station has an official mandate to keep expatriates in touch with the home country. Many broadcasters often relay their national domestic service on short-wave for that reason. In case of major broadcasters such as the BBC World Service or Radio Australia, there is also an educational outreach.

Electronic engineering

Electronic engineering is a discipline dealing with the behavior and effects of electrons (as in electron tubes and transistors) and with electronic devices, systems, or equipment.

In many areas, electronic engineering is considered to be at the same level as electrical engineering, requiring that more general programmes be called electrical and electronic engineering. Both define a broad field that encompasses many subfields including those that deal with power, instrumentation engineering, telecommunications, and semiconductor circuit design amongst many others.

Some people believe the term electrical engineer should be reserved for those having specialized in power and heavy current or high voltage engineering, while others believe that power is just one subset of electrical engineering (and indeed the term power engineering is used in that industry). Again, in recent years there has been a growth of new separate-entry degree courses such as information and communication engineering, often followed by academic departments of similar name.

The modern discipline of electronic engineering was to a large extent born out of radio and television development and from the large amount of Second World War development of defense systems and weapons. In the interior years, the subject was



known as radio engineering and it was only in the late 1950s that the term electronic engineering started to emerge.

History of electronics

Electronics is often considered to have begun when Lee De Forest invented the vacuum tube in 1907 . Within 10 years, his device was used in radio transmitters and receivers as well as systems for long distance telephone calls. Vacuum tubes remained the preferred amplifying device for 40 years, until researchers working for William Shockley at Bell Labs invented the transistor in 1947. In the following years, transistors made small portable radios, or transistor radios, possible as well as allowing more powerful mainframe computers to be built. Transistors were smaller and required lower voltages than vacuum tubes to work. In the interwar years the subject of electronics was dominated by the worldwide interest radio and to some extent telephone and telegraph communications. The terms 'wireless' and 'radio' were then used to refer anything electronic. There were indeed few non-military applications of electronics beyond radio at that time until the advent of television. The subject was not even offered as a separate university degree subject until about 1960.

Prior to the second world war, the subject was commonly known as 'radio engineering' and basically was restricted to aspects of communications and RADAR, commercial radio and early television. At this time, study of radio engineering at universities could only be undertaken as part of a physics degree. Later, in post war years, as consumer devices began to be developed, the field broadened to include modern TV, audio systems, Hi-Fi and latterly computers and microprocessors. In the mid to late 1950s, the term radio engineering gradually gave way to the name electronic engineering, which then became a stand alone university degree subject, usually taught alongside electrical engineering with which it had become associated due to some similarities.

Before the invention of the integrated circuit in 1959, electronic circuits were constructed from discrete components that could be manipulated by hand. These non-integrated circuits consumed much space and power, were prone to failure and were limited in speed although they are still common in simple applications. By contrast, integrated circuits packed a large number — often millions of tiny electrical components, mainly transistors, into a small chip around the size of a coin.

BBC Radio

BBC Radio is a service of the British Broadcasting Corporation which has operated in the United Kingdom under the terms of a Royal Charter since 1927. For a history of BBC radio prior to 1927 see British Broadcasting Company, Ltd. The BBC radio services began in 1922 with the British Broadcasting Company, Ltd., which was licensed under pressure to provide a radio service for the British public.



It was licensed by the British Government through its General Post Office which had original control of the airwaves because they had been interpreted under law as an extension of the Post Office services. Today radio broadcasting still makes up a large part of the corporation's output and this is still reflected in the title of the BBC's listings magazine called Radio Times.

The BBC today runs ten national domestic radio stations, four of which are only available in a digital format: via DAB Digital Radio, UK digital television (satellite, cable and Freeview) plus live streams and listen again on the Internet. The BBC also runs radio stations for three of the nations of the UK. These stations focus on local issues to a greater extent than their UK counterparts, organizing live phone-in debates about these issues, as well as lighter talk shows with music from different decades of the 20th Century. Compared to many advertising-funded Independent Local Radio (ILR) stations, which often broadcast contemporary popular music, BBC nations' radio stations offer a more "serious" alternative. There exist many BBC Local Radio services across England, often catering to individual counties.

BBC Radio services are broadcast on various FM and AM frequencies, digital radio or DAB, and streaming live on bbc.co.uk (giving the stations a worldwide audience).

They are also available on Digital Television sets in the UK, and archived programs are available for 7 days after broadcast on the BBC website; a number of trials are also underway of MP3 downloads and podcasting for selected show

With the increased rollout of **Digital Audio Broadcasting** (DAB) between 1995 and 2002, BBC Radio launched several new digital-only stations **IXtra**, **6 Music** and **BBC 7** in **2002** on **16 August**, **March 11** and **December 15** respectively - the first for "new black British music", the second as a source of performance-based "alternative" music, the latter specialising in archive classic comedy shows, drama and children's programmes. **BBC Asian Network** joined the national DAB network on **28 October 2002**. For some time the majority of listeners used **Freeview**, digital satellite and digital cable services to listen to these networks.

TESTS

Unit 1

Complete the sentences using the correct variant:

1. Radio is the transmission of signals, by modulation of electromagnetic waves
 - a) with frequencies below those of visible light;
 - b) with frequencies over those of visible light;
 - c) with ultra high frequencies.

2. Early speculation that this required a medium of transport, called luminiferous aether, ...
 - a) were made in the middle of the 13th century;
 - b) were found to be false;
 - c) were proven by Heinrich Hertz.

3. When radio waves pass an electrical conductor, ...
 - a) magnetic fields can couple together to form electromagnetic waves;
 - b) the oscillating fields induce an alternating current in the conductor;
 - c) the information is carried by systematically changing some property of the radiated waves.

4. James Clerk Maxwell, a Scottish scientist, developed ...
 - a) the feasibility of wireless communications;
 - b) commercial workable radio communication;
 - c) the theoretical basis for explaining electromagnetism.

5. Heinrich Hertz, a German scientist, is credited with being the first to produce and detect such waves at radio frequencies, in 1888, using a ...
 - a) term radio engineering;
 - b) spark gap transmitter in the Ultra High Frequency range;
 - c) an FM signal.

Unit 2

Complete the sentences using the correct variant:

1. Originally, radio or radiotelegraphy was called 'wireless telegraphy', which was...
 - a) used to pass on orders and communications between armies and navies on both sides in World War I;
 - b) to a large extent born out of radio and television development;
 - c) shortened to 'wireless'.

2. The word appears in a 1907 article by Lee de Forest, was adopted by the United States Navy in 1912 and became
 - a) widely known as 'device for receiving sounds';
 - b) widely spread all over the world by the middle of the XX century;
 - c) common by the time of the first commercial broadcasts in the United States in the 1920s.

3. The noun 'broadcasting' itself came from
 - a) an agricultural term, meaning 'scattering seeds';
 - b) a latin phrase 'scattering spectrum';
 - c) the well-known notion 'scattering effect'.

4. In Japanese, the term 'wireless' is the basis for the term 'radio wave' although... .
 - a) it refers to the system and/or method used for radio communication;
 - b) the term for the device that listens to radio waves is literally 'device for receiving sounds';
 - c) the term 'radio' often refers to the actual transceiver device or chip.

5. In recent years the term 'wireless' has gained renewed popularity through
 - a) the widely distribution of mobile telephony;
 - b) a great number of wireless devices and wireless sensor networks;
 - c) the rapid growth of short range networking.

Unit 3

Complete the sentences using the correct variant:

1. The earliest users included the Japanese Navy scouting
 - a) sinking of the RMS Titanic in 1912;
 - b) the Russian fleet during the Battle of Tsushima in 1905;
 - c) armies and navies on both sides in World War I.

2. One of the most memorable uses of marine telegraphy was during
 - a) the Russian - Japanese War in the beginning of the XX century;
 - b) the sinking of the RMS Titanic in 1912;
 - c) the World War I.

3. Broadcasting began from San Jose in 1909, and became feasible in the 1920s, with the
 - a) widespread introduction of radio receivers, particularly in Europe and the United States;
 - b) rapid growth of short range networking;
 - c) spark gap telegraphy, used by Marconi.

4. Another use of radio in the pre-war years was
 - a) a simple spark gap transmitter which could produce a hiss, indistinguishable from static;
 - b) the advent of commercial radio and early television;
 - c) the development of detecting and locating aircraft and ships by the use of radar.
5. Today, radio takes many forms, including
 - a) WiFi and Bluetooth as well as mobile telephony, e.g., GSM and UMTS;
 - b) Global Positioning System satellite transmissions;
 - c) wireless networks and mobile communications of all types, as well as radio broadcasting.

Unit 4

Complete the sentences using the correct variant:

1. AM radio uses amplitude modulation, in which the amplitude of the transmitted signal is made proportional to
 - a) the sound amplitude captured (transduced) by the microphone while the transmitted frequency remains unchanged;
 - b) the position, and the time of the transmission;
 - c) the coded orthogonal frequency-division multiplexing.
2. Because the audio signal modulates the frequency and not the amplitude, an FM Signal
 - a) is made proportional to the sound amplitude captured (transduced) by the microphone;
 - b) is transmitted in the Very High Frequency radio spectrum;
 - c) is not subject to static and interference in the same way as AM signals.
3. High power is useful in
 - a) politics for ideological, or propaganda reasons;
 - b) penetrating buildings, diffracting around hills, and refracting for some distance beyond the horizon;
 - c) the digital cell phone system for military, police and ambulances.
4. During unusual upper atmospheric conditions, FM signals are occasionally
 - a) affected by static and interference because lightning and other sources of radio that are transmitting at the same frequency add their amplitudes to the original transmitted amplitude;
 - b) carried by systematically changing (modulating) some property of the radiated waves, such as their amplitude or their frequency

c) reflected back towards the Earth by the ionosphere, resulting in Long distance FM reception.

5. FM receivers are subject to the capture effect, which

- a) causes the radio to only receive the strongest signal when multiple signals appear on the same frequency;
- b) takes many forms, including wireless networks and mobile communications of all types, as well as radio broadcasting;
- c) means that they can distinguish the rain of heavy storms, as well as land and vehicles.

Unit 5

Complete the sentences using the correct variant:

1. AM in aviation radio is used so that
 - a) the transmitters can be received hundreds of miles away;
 - b) multiple stations on the same channel can be received;
 - c) only the single station on the channel can be received.
2. Civil and military HF (high frequency) voice services use shortwave radio to
 - a) detect and identify the aircrafts and ships;
 - b) receive multiple stations on the same channel;
 - c) contact ships at sea, aircraft and isolated settlements.
3. TETRA, Terrestrial Trunked Radio is
 - a) a digital cell phone system for military, police and ambulances;
 - b) an extra radiostation for emergency cases;
 - c) a navigational system for searching satellites.
4. An AM signal shows power where the frequencies of the voice
 - a) multiply and divide with the main radio frequency;
 - b) is the same with the main radio frequency;
 - c) add and subtract with the main radio frequency.
5. Use of FM would result in stronger stations blocking out reception of weaker stations... .
 - a) inspite of FM's capture effect;
 - b) due to FM's capture effect;
 - c) as a result of received radio signals.

Unit 6

Complete the sentences using the correct variant:

1. The receiver listens to four satellites, and can figure its position as being on a line that is tangent to a spherical shell around
 - a) marine radiolocation beacons, which share a range of frequencies just above AM radio with amateur radio operators;
 - b) each satellite, determined by the time-of-flight of the radio signals from the satellite;
 - c) the aircraft, which can determine its bearing and range from the station.

2. Before 1960 navigators used movable loop antennas
 - a) for measuring the difference in phase of the signals;
 - b) to transmit the satellites' position;
 - c) to locate commercial AM stations near cities.

3. An aircraft can get readings from two VORs and locate its position
 - a) at the intersection of the two radials, known as a "fix";
 - b) thus providing a fix from only one ground station;
 - c) from the station, thus establishing a line of position.

4. The military operates a similar system of nav aids, called
 - a) Loran systems, which also used time-of-flight radio signals, but from radio stations on the ground;
 - b) DME (Distance Measuring Equipment);
 - c) TACANs, which are often built into VOR stations.

5. When the VOR station is collocated with DME (Distance Measuring Equipment),
 - a) the aircraft can get readings from two VORs and locate its position at the intersection of the two radials;
 - b) the aircraft can determine its bearing and range from the station, thus providing a fix from only one ground station;
 - c) an aircraft can determine its bearing or radial from the station, thus establishing a line of position.

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Заказ № от
Изд-во СевНТУ

Тираж экз.