Министерство образования и науки Украины
Севастопольский национальный технический университет

Радиотехнические устройства =
Radio Engineering Equipment

МЕТОДИЧЕСКИЕ УКАЗАНИЯ

к практическим занятиям по дисциплине
“Английский язык” для студентов II курса
специальности 0907 “Радиотехника”
дневной формы обучения

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Радиотехнические устройства = Radio Engineering Equipment. Методические указания к практическим занятиям по дисциплине “Английский язык” для студентов II курса специальности 0907 “Радиотехника” дневной формы обучения / Сост. Е.С. Солодова. – Севастополь: Изд-во СевНТУ, 2009. − 36 с.

Целью данных методических указаний является:

- обучение различным видам речевой деятельности (говорения, чтения, письма);
- привитие навыков понимания литературы по специальности;
- обучение активному владению языковым материалом;
- повторение и закрепление пройденного грамматического материала;
- развитие коммуникативных умений и навыков.

Методические указания рассмотрены и утверждены на заседании кафедры ПРГЯ (протокол № 8 от 18.02.2009 г.).

Допущено учебно-методическим центром и научно-методическим Советом СевНТУ в качестве методических указаний.

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СОДЕРЖАНИЕ

ВВЕДЕНИЕ

Методические указания предназначены для студентов 2-го курса факультета «Радиотехника» дневной формы обучения.

Цель методических указаний состоит в том, чтобы привить навыки чтения и понимания литературы по специальности, сформировать навыки речевой деятельности на английском языке и закрепить грамматический материал, необходимый при переводе текстов с английского языка на русский. Тексты методических указаний взяты из современной технической оригинальной литературы на английском языке, их тематика соответствует дисциплине «Радиотехника».

Методические указания состоят из 10 разделов.

Каждый раздел включает в себя:

- предтекстовые упражнения;
- текст на английском языке;
- послетекстовые упражнения.

LESSON 1. TELEGRAPHY WITHOUT WIRES

1. Read the new words:

wireless telegraphy беспроволочный телеграф, радиотелеграфия
to deliver снабжать,вырабатывать, производить
rate скорость, темп
electric wave волна электрического вектора (напряжённости)
Hertzian waves радиоволны
to project бросать, отражать
refraction преломление
telephone exchange телефонный узел
telegraphic communication/message телеграфное сообщение
induction электростатическая индукция, магнитная индукция
mainland континент, материк
by means of посредством
parallel wires двухпроводная воздушная линия передачи
insulated wire изолированный провод
to earth заземлять
running stream непрерывный поток
to skirt окружать, окаймлять, обрамлять
overhead wire воздушный провод
to dispatch посылать; отсылать
to set in motion приводить в действие, приводить в движение
inestimable value бесценность
shipping мореплавание, навигация, судоходство
lightship плавучий маяк
lighthouse маяк

2. Read the text and translate it:

An invention which promises to be of the greatest practical value in the world of telegraphy has received its first public announcement at the hands of Mr. W. H. Preece, the telegraphic expert of the London post office. During the course of a lecture on "Telegraphy Without Wires," recently delivered in London, Mr. Preece introduced to the audience a young Italian, a Mr. Marconi, who, he said, had recently come to him with a system of telegraphy without wires "which depended, not on electro-magnetic, but on electro-static effects, that is to say, on electric waves of a much higher rate of vibration, not less than 250,000,000 a second; that is, Hertzian waves." These vibrations were projected through space in straight lines and, like light, were capable of reflection and refraction, and, indeed, they exhibited all the phenomena which characterized light.

Telegraphing without wires was, of course, no new idea. Mr. Preece stated that in 1884 operators in the telephone exchange, London, were able from sounds heard to read messages that were in transit from London to Bradford by the telegraph wires. The post

office wires were underground and the telephone wires above ground, and careful experiment showed that this fact accounted for the telegraphic messages to Bradford being read by the telephone company. In 1893 telegrams were transmitted a distance of three miles across the Bristol Channel by induction, and during a break in the cable connecting the island of Mull with the mainland communication was established by means of parallel wires as follows: On the mainland an insulated wire was laid along the ground, earthed in a running stream at one end, the other end being in the sea. Skirting the coast of the island was an overhead wire suited to the purpose. In the course of four days one hundred and fifty-six messages were dispatched.

The invention of young Marconi solved the problem on entirely different principles. The post office officials had used it successfully on the roof of the general post office, and then made a successful test on Salisbury Plain at a distance of three-quarters of a mile. The great difference between the Marconi and the inductive methods of wireless telegraphy was that the former did away entirely with the wires at each end. Vibrations were set up by one apparatus and received by the other.

The apparatus consisted of two plain boxes which were placed at opposite ends of the hall. The current was set in motion in one box, and immediately a bell was rung in the other.

If the experiments were successful, it would be of inestimable value to shipping, for it would provide another easy way of communicating with lightships and lighthouses, it would make navigation infinitely easier and safer than it now was.

3. Answer the following questions:

1) Who was Mr. Marconi?
2) Did a system of telegraphy without wires depend on electro-magnetic effects?
3) What waves do we call the Hertzian waves?
4) Was the telegraphing without wires a new idea?
5) How were the telegrams transmitted in 1893?
6) What problem did the invention of young Marconi solve?
7) How did the Marconi's apparatus work?

4. Give the equivalents, using the text:

a) публичное объявление, почта, в ходе лекции, система радиотелеграфии, электрические волны, темпы вибрации, отражения и преломления, почтовые провода, индукция, изолированный провод, индуктивный метод, аппарат состоял из двух коробок, успешные эксперименты.

b) be of the greatest practical value, the telegraphic expert, public announcement, a system of telegraphy without wires, to depend on electro-static effects, in straight lines, to be capable of reflection and refraction, to exhibit all the phenomena, operators in the telephone exchange, to be transmitted a distance of three miles, to be established by means of parallel wires, the current was set in motion, inestimable value to shipping.

5. Select the correct form in parentheses in the following sentences:

1) This invention promised to be one of the (greater, greatest) discoveries in the world of telegraphy.
2) A system of wireless telegraphy depended on electric waves of a much (highest, higher) rate of vibration.
3) The experiment was (more careful, carefuller) than the previous one.
4) The invention of young Marconi showed (much successful, more successful) results.
5) Telegraphing without wires will make navigation infinitely (easier, easiest) and (safer, safest) than it is now.

6. Correct the following statements if you find them wrong:

1) Mr. W.H. Preece made the first public announcement of his invention which promised to be of the greatest practical value in the world of telegraphy.
2) A system of telegraphy without wires depended not only on electro-magnetic, but on electro-static effects.
3) Hertzian waves exhibited all the phenomena which characterized light.
4) The telephone wires were above ground, the post office wires underground.
5) The inductive methods of wireless telegraphy did away entirely with the wires at each end.

7. Choose the correct form of the verb in parentheses in the following sentences:

1) The study of the electric waves (were/was) of the greatest practical value in the world of telegraphy.
2) The quality of the boxes and bells (is/are) not very good.
3) If the duties of the telegraphic experts (isn't/aren't) reduced; there will not be enough time to finish the project.
4) Mr.Preece, accompanied by Mr. Marconi (is/are) arriving tonight.
5) The use of the inductive methods (have/has) increased in recent years.
6) Hertzian waves as well as light (were/was) capable of reflection and refraction.
7) The rates of vibration (vary/varies) from subject to subject.

8. Translate from Russian into English:

1) Мистер Прис провел в Лондоне лекцию, посвященную беспроволочному телеграфу.
2) Радиоволны обладают такими же свойствами, как и световые волны.
3) Провода почтовых отделений проходили под землей, а телефонные линии располагались над землей.
4) Раньше телеграммы передавались на далекие расстояния, либо с помощью индуктивного метода, либо посредством двухпроводной воздушной линии передачи.

5) Один аппарат отправлял сигналы, в то время как второй их получал.

9. Sum up the information about the wireless telegraphy.

LESSON 2. RADIO DIRECTION FINDERS

1. Read the new words:

radio direction finder радиопеленгатор
the Allies Антанта; Тройственный союз (Англия, Франция и Россия)
to track следить, прослеживать; выслеживать
U-boat немецкая подводная лодка
to sense опознавать; воспринимать, измерять; контролировать
radiogoniometer радиопеленгатор
loop aerial рамочная антенна
to wire соединять [монтировать] проволокой
field coil катушка возбуждения; обмотка возбуждения
search coil измерительная катушка
to rotate вращать(ся)
to resonate резонировать
aerial circuit антенный контур , воздушная линия (электропередачи)
to diminish уменьшать(ся), сокращать(ся)
magnetic flux магнитный поток, поток магнитной индукции
automatic direction finder автоматический радиопеленгатор
solenoid соленоид
to spin крутить(ся), вертеть(ся)
peak высшая точка, максимум , пик
trough самая глубокая точка, низшая точка
compass rose девиационный круг компаса
a string ряд, цепочка
VOR (very-high-frequency omnidirectional range) всенаправленный курсовой радиомаяк УКВ-диапазона
GPS (Global Positioning System) глобальная система навигации и определения положения
user-friendly ориентированный на пользователя, удобный для пользователя

2. Read the text and translate it:

Due to radio's ability to travel very long distances "over the horizon", it makes a particularly good navigation system for ships and aircraft that might be flying at long distances from land.

High frequency radio direction finders (known as HF/DF or huff-duff) were employed by the Allies to track German U-boats during WWII.

The earliest radio direction finder was the radiogoniometer invented by Bellini and Tosi in 1907. In the BT radiogoniometer, two loop aerials (one positioned North-South and the other East-West, or Fore-Aft and Port-Starboard on a boat) were each wired to a

field coil (which were mounted at right angles to each other). A rotating 'search coil' (which was attached to the receiver) was then placed between the two field coils. A loop aerial resonates best when the radio wave approaches it from the side, and so the degree to which an electric current is induced in the aerial circuit diminishes as the wave's angle of approach increases. Each field coil will then produce a magnetic field proportional to the current induced in the aerial. The search coil receives a proportion of the magnetic flux from each field coil depending on the direction it faces. The search coil achieves maximum magnetic flux when it favors the coil with the greater magnetic field, and it is at this position that the search coil points in the direction of the radio transmission.

In more recent times the task of finding the signal has been automated in the automatic direction finder, or ADF. In this system the antenna consists of a small cylinder of wire, a solenoid that is highly directional, which is spun by a motor. The electronics listen either for the repeated "peak" in the signal, or just as commonly, the "trough" when the signal drops to zero when the antenna is at right angles to the signal. A small lamp attached to a disk is timed to spin at the same speed as the antenna, so when the peak or trough is detected the lamp flashes briefly. To the human eye it appears to be a single spot of light on top of a compass rose.

RDF was once the primary form of aircraft navigation, and strings of beacons were used to form "airways" from airport to airport. In the 1950s these systems were generally being replaced by the VHF omni range (VOR) system, in which the angle to the beacon can be measured from the signal itself, with no moving parts.

Today all such systems are being generally removed in favour of the much more accurate and user-friendly GPS system. However the low cost of ADF systems today has meant something of a comeback, whereas the expensive VOR systems will likely all be switched off before 2010.

3. Answer the following questions:

1) What are the radio direction finders used for?
2) Who was the inventor of the earliest radio direction finder?
3) What elements did the radiogoniometer consist of?
4) How did the radiogoniometer work?
5) What is ADF?
6) Why did GPS system remove ADF and VOR systems?

4. Give the equivalents, using the text:

a) путешествовать на далекие расстояния, навигационная система, направление передачи, нос, корма, левый борт , правый борт, вращающаяся измерительная катушка, прикреплять к приемнику, электрический ток уменьшается, создавать магнитное поле, зависеть от направления, максимальный магнитный поток, сигнал понижается до нуля, человеческий глаз, воздушная навигация, заменить систему, более точный и удобный для пользователя.

b) to travel very long distances, navigation system for ships and aircraft, two loop aerials, to be wired to a field coil, rotating 'search coil', electric current is induced, to produce a magnetic field, a proportion of the magnetic flux, direction of the radio transmission, signal drops to zero, to spin at the same speed as the antenna, the lamp flashes briefly, a single spot of light, more accurate and user-friendly GPS system.

5. Put the questions to the underlined words:

1) High frequency radio direction finders are known as HF/DF or huff-duff.
2) The earliest radio direction finder was the radiogoniometer.
3) Two loop aerials were each wired to a field coil.
4) The degree to which an electric current is induced in the aerial circuit diminishes.
5) The search coil receives a proportion of the magnetic flux from each field coil.
6) In the ADF system the antenna consists of a small cylinder of wire.

6. Translate from English into Russian, paying special attention to the "Complex Subject" construction:

1) Radio direction finders are assumed to be good navigation devices for ships and aircraft.
2) RDF was known as a primary form of aircraft navigation.
3) RDF system is likely to be widely used in the 1930's and 1940's.
4) In WWII, ship-based huff-duff was found to be implemented with a number of changes to the original BT radiogoniometer design.
5) True direction was found either by incorporating an antenna into the huff-duff unit.
6) Wires from each dipole seem to be looped together into a single field coil.
7) For a long time the general concept of the original radiogoniometer was thought to be unchangeable.
8) The above mentioned text is certain to be very interesting.

7. Translate from Russian into English:

1) Любой прибор, излучающий электромагнитные волны, можно не только легко обнаружить, но и зафиксировать его координаты.
2) Во времена ВМВ радиопеленгация служила для выявления местоположения вражеских радиомаяков.
3) Радиопеленгатор представляет собой систему, состоящую из радиопередатчика и антенны.
4) Радиопеленгаторы применялись для отслеживания немецких подводных лодок.
5) Первый радиопеленгатор был изобретен в 1907 году.
6) Две рамочные антенны прикреплялись к катушке возбуждения.
7) На сегодняшний день система GPS связи является наиболее точной и удобной для пользователей, поэтому она вытесняет своих предшественников.

8. Sum up the information about radio direction finders.

LESSON 3. RADIO BEACONS

1. Read the new words:

radio beacon радиомаяк
aid помощь
overcast сплошная облачность, облачный, пасмурный
to distract отвлекать
urban sprawl неконтролируемая застройка прилегающих к городу территорий
handicap помеха, препятствие
to hasten ускорять (какой-л. процесс)
to space располагать с промежутками
Morse-code signal сигнал кода Морзе
beam луч света, луч
to merge сливать(ся), соединять(ся)
steady равномерный, ровный
drift смещение, отклонение
to stray сбиться с пути, отклониться
ILS (instrument landing system) система посадки по приборам
compass locator радиостанция приводная
to orient ориентировать, выравнивать, определять местонахождение
glideslope глиссада, наклон (склонение) глиссады
to guide вести, регулировать, направлять курс
homing beacon приводной радиомаяк
homing aids средства самонаведения
VFR (visual flight rules) правила визуального полёта
voice circuit цепь передачи речевых сигналов
preflight предполётный
homing signal сигнал самонаведения
obsolete устарелый
backup вспомогательные средства, резервное устройство
artefact (любой) продукт, сделанный человеком, артефакты, памятники материальной культуры

2. Read the text and translate it:

While early flashing beacons were economical and a great aid for night-time navigation in clear weather, they were of no value in overcast conditions, or during the day when they weren't even turned on. And they were sometimes difficult to locate in the distracting light of urban sprawl. These handicaps hastened the development of the LF (low frequency) navigation system.

Radio beacons in the 190 to 535 kHz radio band had formed the earliest LF navigation system. These powerful, 1500-watt beacons were spaced about 200 miles apart and defined electronic airways.

The beacons transmitted two Morse-code signals: the letter "A," • – , and its opposite, the letter "N," – • . When the aircraft was centered on the airway, or electrical beam, these two opposite Morse-code signals merged into a steady tone.

If the aircraft drifted off course to one side, the Morse code for the letter "A" could be faintly heard. The greater the drift, the stronger the "A" Morse code signal. Straying to the opposite side produced the "N" Morse code signal.

The low frequency beacon system developed the early 1950's, still in use today, consists of four main types of beacons, listed below in the order of lowest to highest transmitter power:

A) ILS APPROACH BEACONS

Sometimes called compass locators, these beacons are generally 25 watts or less.

The beacons help the pilot find and orient himself to the ILS course, so the localizer and glideslope transmissions can then take over and guide the pilot into the airport. They can be distinguished from other beacons on the air because they have 2 letter Morse code identifiers.

B) AIRPORT HOMING BEACONS

These beacons are used at airports that do not have a ILS system to serve as a general homing aid to that airport. As such they are primarily a benefit to small plane pilots, and can only be used under VFR conditions. They are most commonly also 25 watts, but some airport beacons can be up to 100 watts.

C) CROSS COUNTRY/WEATHER BROADCAST BEACONS

These beacons were put about 200 miles apart, and had a transmitter power of up to 400 watts typically. They had voice circuits to broadcast weather, usually with continuous tapes. Being on low frequencies, they could be heard on the ground, for preflight use.

D) LONG RANGE WATER CROSSING BEACONS

Most powerful and rare type of beacon. They are generally of 2000 watts and were established mainly on coastlines and islands to provide a homing signal for planes flying in from a transoceanic crossing or crossing a body of water for a few hundred miles.

All forms of low frequency homing beacons are technically obsolete in relation to VOR's and now GPS, and are largely no longer used by most pilots.

In any case, because low frequency beacons are so cheap and easy to operate as a backup, they may never completely disappear. Perhaps, similar to lighthouses, which have also been obsoleted by GPS, we should preserve a few radiobeacons for the future as historical artifacts, coming as they do from the earliest days of radio.

3. Give the equivalents, using the text:

a) проблесковый маяк, навигация в ночное время, отвлекающий свет, ускорить развитие, располагаться на расстоянии 200 миль друг от друга, передавать сигналы кода Морзе, сливаться в один звук, сбиться с курса в сторону, помочь пилоту определить свое местоположение, основное средство самонаведения, цепи передачи речевых сигналов, предполетное использование, пересечение водоемов, технически устаревшие, полностью исчезнуть.

b) flashing beacon, great aid for night-time navigation, to be of no value, to be turned on/off, to locate in the distracting light, to define electronic airways, merged into a

steady tone, to drift off course, straying to the opposite side, compass locators, to be distinguished from, to serve as a general homing aid, continuous tapes, in relation to, to be no longer used by, to preserve radio beacons for the future.

4. Answer the following questions:

1) What are the advantages and disadvantages of the early flashing beacons?
2) What beacons does the earliest LF navigation system include?
3) How were the Morse-code signals transmitted?
4) When was the low frequency beacon system developed?
5) What is the main function of the ILS approach beacon?
6) What kind of beacons can serve as a general homing aid to the airport, which doesn't have a ILS system?
7) Long Rang Water Crossing Beacons were established mainly on coastlines and islands to broadcast weather, weren't they?
8) Will low frequency beacons disappear soon?

5. Match each word in the left-hand column with the best meaning in the right-hand column.

1. The beacons were economical and of great value in clear weather in night-time.	a) Long Range Water Crossing Beacons
2. The beacons had the lowest transmitter power they had 2 letter Morse code identifiers.	b) Flashing Beacons
3. The beacons helped small plane pilots and often had "T" type antennas.	c) ILS Approach Beacons
4. The most interesting class of beacons being on low frequencies, people were able to tune the beacon band on their portable radios just to get the weather.	d) Cross Country/Weather Broadcast Beacons
5. These powerful beacons could provide a homing signal for planes flying too far for a VHF range.	e) Airport Homing Beacons

6. Translate from Russian into English:

1) Первые маяки были не только экономичны, но и необходимы для навигации в темное время суток.
2) Радиомаяки мощностью от 190 до 535 кГц образовали первую навигационную систему на низких частотах.
3) Маяки системы ILS отличаются самой низкой мощностью до 25 кГц.
4) Некоторые маяки используют в аэропортах, где они служат основным средством самонаведению
5) Хотя низкочастотные системы радиомаяков уже достаточно устарели и практически не используются пилотами, следует все же сохранить их в качестве памятников материальной культуры для последующих поколений.

7. Sum up the information about radio beacons.

LESSON 4. RADIO COMPASS

1. Read the new words:

radio compass радиокомпас
glimmer мерцание, слабый проблеск
to determine определять устанавливать
bearing направление; азимут, пеленг, месторасположение
fixed loop antenna стационарная рамочная антенна
needle стрелка (прибора)
heading курс, линия курса, маршрут
deflection отклонение стрелки (приборов)
to mount монтировать, устанавливать
cancel out сокращать, уравновесить, свести на нет
null нулевой
amplifier усилитель
homing device приводное устройство; радиокомпас
rotatable вращаемый
to eliminate устранять, исключать
cumbersome громоздкий
fuselage корпус, обшивка, фюзеляж
cockpit кокпит, кабина экипажа
triangulation триангуляция
dial циферблат, круговая шкала, градуированный диск
flight chart карта полета

2. Read the text and translate it:

The Radio Compass was the first glimmer of hope in determining bearings to a radio station. It added a fixed loop antenna and visual indicator to the receiver system. With this system, as long as the aircraft was headed directly toward a radio station the needle of the

indicator remained centered; headings to the right or left of the station resulted in a corresponding deflection of the needle.

A loop antenna was mounted on the back of an aircraft. If the plane of this antenna pointed to a radio beacon, the signal strength was a maximum, while a signal facing the loop induced voltages that cancelled each other out, resulting in a weak or null signal. The loop antenna was connected to an amplifier, which drove an indicator on the cockpit's control panel.

The radio compass was chiefly used as a "homing" device, and bearings of radio stations off the line of flight could be obtained only by turning the aircraft toward the station and noting the magnetic compass heading when the needle was centered.

Replacing the fixed loop antenna with a rotatable loop eliminated this cumbersome maneuver. With the rotatable loop, bearings could now be obtained without turning the airplane itself. The pilot or navigator would rotate the loop, usually mounted on the fuselage below the cockpit, to the position of minimum signal strength, or "null." The bearing to the radio station was then read from a graduated, mechanical dial.

By repeating this procedure with a second beacon an aircraft's position could be determined by triangulation after locating the two stations on the flight chart.

3. Answer the following questions:

1) What does the radio compass determine?
2) The radio compass is basically a radio receiver fitted with a loop antenna, isn't it?
3) Where was a loop antenna mounted?
4) How could bearings of radio stations off the line of flight be obtained?
5) What did a rotatable loop dominate?

4. Paraphrase the following sentences, using the following words and word combinations: to head, deflection of the needle, to determine bearings, antenna, dial, fuselage

1) The radio compass helped to find out the direction or angle to a radio station.
2) The aircraft traveled towards a radio station.
3) Headings to the right of left of the station resulted in a corresponding degree to which the needle on a measuring instrument moved away from zero.
3) The loop aerial itself is very directional.
4) The loop is usually mounted on the main part of a plane, in which people sit or goods are carried.
5) The bearing to the station was read from a graduated round part that showed you the measurements.

5. Translate from English into Russian, paying special attention to the "Complex Object" construction:

1) Everybody knows the radio compass to be basically a radio receiver fitted with a loop aerial.
2) We heard the loop aerial be very directional.

3) We want the research to be continued.
4) Scientists found the replacing the fixed loop antenna with a rotatable loop to have eliminated the cumbersome maneuver.
5) Observations show the bearing to the radio station to be read from a dial.

6. Find the equivalents:

луч надежды, определение местоположения, рамочная антенна, визуальный индикатор, соответствующее отклонение стрелки, устанавливать антенну, указывать на радиомаяк, силы сигнала, сводить друг друга на нет, повернуть самолет к станции, магнитный компасный курс, вращать антенну, градуированная механическая круговая шкала.

7. Sum up the information about the Radio Compass.

LESSON 5. RADAR

1. Read the new words:

radar радиолокатор, радар; радиолокационная установка
to coin создавать неологизмы (новые слова и выражения)
electromagnetic radiation электромагнитное излучение, ЭМИ
to bounce off отскакивать рикошетом от чего-л.
path путь, траектория
echo эхо, эхо-сигнал
return возврат, замыкание, эхо
to detect обнаруживать, выявлять, детектировать
tiny очень маленький, крошечный
resolution разрешающая способность; разрешение
target цель, мишень
beam луч, пучок лучей, испускаемое излучение
transmitter (радио)передатчик
receiver радиоприемник
oscillator осциллятор, излучатель
modulator модулятор
to vary менять(ся); изменяться
to modulate понижать частоту, регулировать, модулировать
incoming входящий; поступающий
return signal (= **returned signal**) отраженный сигнал
duplexer антенный переключатель, дуплексер
to perform исполнять, выполнять
to maximize увеличивать до предела; максимизировать
to eliminate устранять, исключать
noise шум,помеха
interfering signal помеха

to convey передавать
pulse radar импульсная РЛС
regular intervals строго соблюдаемые интервалы, постоянный интервал
continuous-wave radar РЛС непрерывного излучения
continuous signal непрерывный сигнал; аналоговый сигнал

2. Read the text and translate it:

Radar is an electronic system that measures the position, speed, or other characteristics of a far-off object. It was first suggested as a "ship finder" coined in 1941 as an acronym for Radio Detection and Ranging.

A radar system starts by sending out electromagnetic radiation, called the signal. The signal bounces off objects in its path. When the radiation bounces back, part of the signal returns to the radar system; this echo is called the return. The radar system detects the return and analyzes the signal for more information. Even though radio waves and microwaves reflect better than electromagnetic waves of other lengths, only a tiny portion—about a billionth of a billionth—of the radar signal gets reflected back. Therefore, a radar system must be able to transmit high amounts of energy in the signal and to detect tiny amounts of energy in the return.

Most radar systems operate in frequencies ranging from the Very High Frequency (VHF) band, at about 150 MHz (150 million Hz), to the Extra High Frequency band, which may go as high as 95 GHz (95 billion Hz). The frequency of the radar system is related to the resolution of the system. Resolution determines how close two objects may be and still be distinguished by the radar, and how accurately the system can determine the target's position. Higher frequencies provide better resolution than lower frequencies because the beam formed by the antenna is sharper.

A radar system is composed of four basic components: a transmitter, an antenna, a receiver, and a display.

The transmitter produces the electrical signals in the correct form for the type of radar system. The system surrounding the transmitter is made up of three main elements: *the oscillator* (which produces a pure electrical signal at the desired frequency), *the modulator* (which rapidly varies, or modulates, the signal from the oscillator), and *the transmitter* (which increases the power of the oscillator signal) .

The antenna sends these signals out as electromagnetic radiation. The antenna also collects incoming return signals and passes them to the receiver, which analyzes the return and passes it to a display.

Because a radar antenna may both transmit and receive signals, *the duplexer* determines whether the antenna is connected to the receiver or the transmitter.

The receiver determines whether the signal should be reported and often performs other functions to maximize the strength of the return signal and to eliminate noise and other interfering signals before sending the results to the display.

The display conveys the results to the human operator through a visual display or an audible signal.

All radar systems perform the same basic tasks, but the way systems carry out their tasks has some effect on the system's parts. A type of radar called pulse radar sends out bursts of radar at regular intervals. Pulse radar requires a method of timing the bursts from

its transmitter, so this part is more complicated than the transmitter in other radar systems. Another type of radar called continuous-wave radar sends out a continuous signal. Continuous-wave radar gets much of its information about the target from subtle changes in the return, or the echo of the signal. The receiver in continuous-wave radar is therefore more complicated than in other system

3. Answer the following questions:

1) Is the word "Radar" a contraction?
2) How does radar system start?
3) Why must a radar system be able to transmit high amounts of energy in the signal?
4) What frequencies do most radar systems operate in?
5) What is the resolution of the radar system?
6) Why do higher frequencies provide better resolution than lower frequencies?
7) How many components does the radar system include? What are they?
8) What function does the transmitter system produce?
9) What is the main function of the antenna?
10) Is it necessary to use the receiver and the display in the radar system and why?
11) What types of radar do you know?

4. Correct the wrong statements:

1) Radar is a system used to defect, range and map objects such as aircraft, ships and others.
2) Radar is a contraction of Radio Direction and Ragging.
3) Radar relies on sending and receiving magnetic fields.
4) A radar system should transmit only a tiny portion of energy in the signal.
5) A radar system is composed of the following components: a transmitter, an oscillator, a modulator, an antenna, a duplexer, a receiver, a display.
6) The transmitter in the transmitter system is used to decrease the power of the oscillator signal.
7) A continuous – wave radar sends out bursts of continuous signals at regular intervals.

5. Change the sentences according to the pattern, using the Passive constructions instead of Active Voice ones:

Model: The Radar system transmits high amounts of energy.
High amounts of energy *are transmitted* by the Radar system.

1) Radar can pierce any atmospheric disturbance.
2) The modulator should vary the signal, but not distort it.
3) The antenna gathers the weak returning radar signals and converts them into an electric current.
4) Most modern radar systems use digital equipment.
5) Early radar systems used a display of received signal amplitude.

6) Advanced radar can detect individual features of the target.
7) Rain, snow and the surface of the earth reflect energy.
8) Bats and dolphins are able to emit high – frequency sounds.
9) Meteorologists use a continuous – wave version called Doppler radar to track storms and hurricanes.
10) A radio transmitter oscillates an electrical current.

6. Match each word in the right-hand column with the best meaning in the left-hand column.

1. The device acts as a gate between the antenna, the receiver and transmitter. It determines whether the antenna is connected to the receiver or the transmitter.	a) The Oscillator
2. The following device serves to convert the received radar signals into visual or audible data.	b) The Antenna
3. Energy in the form of heat or light that is sent out as waves that you cannot see.	c) The Receiver
4. A device that produces a pure electrical signal at the desired frequency.	d) The Duplexer
5. This device varies the signal from the oscillator, but not distorts it.	e) Radiation
6. Piece of metal that directs the radiation by reflecting it from parabolic or concave shaped metal dish.	f) The Transmitter
7. This unit amplifies the power of the oscillator signal.	g) The Modulator
8. It determines whether the signal should be reported and often does further analysis.	h) The Display

7. Translate from Russian into English:

1) Радар представляет собой электронную систему для определения различных характеристик отдаленных предметов.
2) Радар отправляет и получает электромагнитные излучения обычно в виде радиоволн или микроволн.
3) Хотя радиоволны обладают лучшей отражающей способностью, в отличие от других электромагнитных волн, возвращается обратно лишь незначительная часть этого сигнала.
4) Система состоит из четырех основных компонентов: передатчика, антенны, приемника и дисплея.
5) Система передачи сигнала включает излучатель, модулятор и сам передатчик.

6) Радиопередатчик увеличивает мощность сигнала от 1 Вт до 1 МВт.
7) Большинство антенн направляет излучение, отражая его от металлической тарелки параболической формы. Такая антенна называется зеркальной.
8) Радиоприемник обычно обнаруживает и анализирует слабый сигнал, отраженный от отдаленных предметов и вернувшийся снова в систему радиолокационной установки.
9) Традиционно радиолокационные установки использовались исключительно в военных целях (определяя расстояние от оружия до цели).
10) Сегодня радары постепенно входят в повседневное использование и находят себе достойное применение.

8. Sum up the information about the radar system.

LESSON 6. RADAR GUNS

1. Read the new words:

to combine соединяться, объединять(ся)
unit устройство; узел; блок; прибор;
to emit излучать, испускать, выделять
electromagnetic energy электромагнитная энергия, энергия электромагнитного поля
to bounce back отскакивать назад
Doppler effect эффект Доплера, доплеровский эффект, доплеровская частота
Doppler shift доплеровский сдвиг (частоты)
sound wave звуковая волна
oscillation колебания, осцилляция, вибрация, генерация
wave pattern волновая картина, волновой спектр
to mirror отражать, показывать
segment доля, часть; составная часть
peak высшая точка, пик, амплитуда
valley точка минимума, понижение
speeder водитель, превышающий разрешенную правилами движения скорость

2. Read the text and translate it:

A basic speed gun is just a radio transmitter and receiver combined into one unit.

The simplest function of radar is to tell you how far away an object is. To do this, the radar device emits a concentrated radio wave and listens for any echo. If there is an object in the path of the radio wave, it will reflect some of the electromagnetic energy, and the radio wave will bounce back to the radar device. Radio waves move through the air at a constant speed (the speed of light), so the radar device can calculate how far away the object is based on how long it takes the radio signal to return.

Radar can also be used to measure the speed of an object, due to a phenomenon called Doppler shift. Like sound waves, radio waves have a certain frequency, the number of oscillations per unit of time. When the radar gun and the car are both standing still, the

echo will have the same wave frequency as the original signal. Each part of the signal is reflected when it reaches the car, mirroring the original signal exactly.

But when the car is moving, each part of the radio signal is reflected at a different point in space, which changes the wave pattern. When the car is moving away from the radar gun, the second segment of the signal has to travel a greater distance to reach the car than the first segment of the signal. If the car is moving toward the radar gun, the second segment of the wave travels a shorter distance than the first segment before being reflected. As a result, the peaks and valleys of the wave get squeezed together: The frequency increases.

Based on how much the frequency changes, a radar gun can calculate how quickly a car is moving toward it or away from it. If the radar gun is used inside a moving police car, its own movement must also be factored in.

Police officers have been catching speeders this way for more than 50 years. Recently, many police departments have added a new sort of speed detector, one that uses light instead of radio waves, also called a lidar gun (for light detection and ranging).

3. Answer the following questions:

1) Can radar be used to measure the speed of an object.
2) What will happen if the radar gun and the car are standing still.
3) What can be observed when the car is moving.
4) Is there any difference in the signal motion when the car is moving either away from the radar gun or toward the gun.
5) Is a radar gun based on how much the frequency changes?
6) Policemen have been using conventional radar guns since the 1950's, haven't they?
7) What a new sort of speed detector do you know?

4. Supply prepositions or adverbs where necessary.

To understand how radar detectors work, you first have to know what they're detecting. A basic speed gun is just a radio transmitter and receiver combined … one unit. A radio transmitter is a device that oscillates an electrical current so the voltage goes up and down … a certain frequency. A radio receiver is just the reverse … the transmitter. It picks up electromagnetic waves … an antenna and converts them back … an electrical current.

To tell you how far … an object is, the radar device emits a concentrated radio wave and listens … any echo. Radio waves move … the air … a constant speed.

If the radar gun is used … a moving police car is used, its own movement must also be factored … . … example, if the police car is going 50 miles per hour and the gun detects that the target is moving away … 20 miles per hour, the target must be driving … 70 miles per hour. If the radar gun determines that the target is not moving toward or away … the police car, than the target is driving … exactly 50 miles per hour.

5. Supply the correct form of the verb in parentheses for each of the following sentences. Review the Conditional Mood if you have trouble.

1) If I had seen the speed gun, I _____ (tell) you to take it.
2) If you combine a radio transmitter and receiver into one unit, you _____(have) a basic radar gun.

3) When the current is oscillated, the energy _____ (travel) through the air as an electromagnetic wave.
4) If there were an object in the path of the radio wave, it _____ (reflect) some of the electromagnetic energy.
5) The echo would have the same wave frequency if the radar gun and the car _____ (stand) still.
6) If the car _____ (move), each part of the radio signal will be reflected at a different point in space.
7) If you _____ (use) the radar gun inside a moving police car, you _____ (factor) its own movement.
8) If the policeman had not shined the laser beam of the speed gun at an angle across the road, he _____ (register, negative) the speed of my car.
9) When a speeding car is detected, a small camera _____ (take) a picture of the car's license and the driver's face.
10) If the automated system had collected all of the evidence, the central office simply _____ (issue) a ticket and _____ (send) it to the speeder in the mail.
11) A basic radar detector _____ (do, negative) you much good, if the police _____ (drive up) behind you and _____ (turn on) the radar gun.

6. Read and mark on your paper the false sentences with "-" and the right sentences with "+". Give your variants of the wrong sentences:

1) A Conventional radar gun is used only if the police car is standing still.
2) The basic element in a conventional speed gun is concentrated light.
3) Radar can't be used to measure the speed of an object.
4) Radar gun is used for catching speeders.

7. Give the equivalents, using the text:

a) радиоприемник и радиопередатчик, объединенные в одно устройство; вырабатывать эклектический ток; прибор излучает радиоволны; отражать электромагнитные волны; возвращается к устройству; радиоволны распространяются с постоянной скоростью; сигнал отражается, когда достигает автомобиля; когда автомобиль движется, волновая картина меняется; радар может установить, с какой скоростью движется автомобиль; если радар находится в движущейся машине, то следует также учитывать её скорость; в радарах нового поколения используется инфракрасный свет, вместо традиционных радиоволн.

b) to combine into one unit, to emit a concentrated radio wave, radio wave will bounce back to the radar device, to move through the air at a constant speed, to calculate how far away the object is, to measure the speed of an object, to have a certain frequency, the original signal, at a different point in space, to get squeezed together, a new sort of speed detector, to be factored in.

8. Sum up the information about Radar Guns.

LESSON 7. RADIO TELESCOPE

1. Read the new words:

radio telescope радиотелескоп
extraterrestrial внеземной
to emit излучать, испускать, выделять
photon фотон,
reflector отражатель, рефлектор , зеркальный телескоп
wavelength длина волны
light wave световая волна
to focus собирать, сосредоточивать, помещать в фокусе; фокусировать
steerable paraboloid управляемая параболическая антенна
to dub копировать
pickup antenna приёмная антенна
feed питающий механизм, (электро) снабжение, облучатель (антенны)
broad bandwidth широкий диапазон
continuum континуум, сплошная среда
spectroscopic спектроскопический
radio spectrum спектр радиочастот
frequency range частотный диапазон
time-consuming отнимающий много времени, связанный с тратой времени; трудоемкий
to restrict ограничивать
frequency channel частотный канал
radiometer радиометр, радиометрический приемник; измерительный приемник
weak source источник малой интенсивности
radio emission излучение радиоволн
to amplify усиливать, увеличивать
performance работа; функционирование, эффективность
to limit ограничивать, служить границей, пределом
to depart отклоняться, уклоняться; отступать
wind load ветровая нагрузка

2. Read the text and translate it:

Radio telescope is an astronomical instrument which is used to detect radio-frequency radiation emitted by extraterrestrial sources.

Radio telescopes are much larger than optical telescopes because radio wavelengths are much longer than optical wavelengths. The longer wavelengths mean that the radio waves have lower energy than optical light waves. In order to collect enough radio photons to detect a signal, the radio dishes must be very large. Both optical and radio telescope reflectors use a parabolic shape to perfectly focus the light to a point.

The first radio telescope, built in 1937 by Grote Reber of Wheaton, Ill., U.S., was a steerable paraboloid--i.e., a device with a parabolically shaped reflector, dubbed the "dish," that focuses the incoming radio waves onto a small pickup antenna, or "feed."

Radio telescopes are used to measure broad-bandwidth continuum radiation as well as spectroscopic features due to atomic and molecular lines found in the radio spectrum of astronomical objects. In early radio telescopes, spectroscopic observations were made by tuning a receiver across a sufficiently large frequency range to cover the various frequencies of interest. This procedure, however, was extremely time-consuming and greatly restricted observations. Modern radio telescopes observe simultaneously at a large number of frequencies by dividing the signals up into as many as several thousand separate frequency channels that may range over a total bandwidth of tens to hundreds of megahertz.

Radio telescopes vary widely, but they all have two basic components: a large radio antenna and a radiometer or radio receiver. The sensitivity of a radio telescope, i.e., the ability to measure weak sources of radio emission--depends on the area and efficiency of the antenna, the sensitivity of the radio receiver used to amplify and detect the signals, and the duration of the observation.

The performance of a radio telescope is limited by various factors: the accuracy of a reflecting surface that may depart from the ideal shape because of manufacturing irregularities; the effect of wind load; thermal deformations that cause differential expansion and contraction; and deflections due to changes in gravitational forces as the antenna is pointed to different parts of the sky.

3. Answer the following questions:

1) Is the radio telescope used to detect radio-frequency radiation?
2) Are radio telescopes larger than optical telescopes?
   How can you explain it?
3) When was the first radio telescope built?
4) What do you know about spectroscopic observations in early radio telescopes?
5) How do modern radio telescopes observe?
6) What are the basic components of a radio telescope?
7) What is the sensitivity of a radio telescope?
8) What factors limit the performance of a radio telescope?

4. Correct the wrong statements:

1) Radio telescopes allow astronomers to observe radio waves which have much longer wavelengths than does visible light coming from space.
2) Radio telescopes are smaller than optical telescopes.
3) A radio telescope typically consists of a bowl-shaped antenna similar to a modern satellite dish.
4) The first radio telescope was built in 1973 by Grote Wheaton.
5) In early radio telescopes spectroscopic observations were energy – efficient and time – consuming.
6) The sensitivity of a radio telescope is the ability to restrict observations.

7) Thermal deformations cause differential expansion and make the antenna point to different parts of the sky.

5. Supply the missing connectors (not only … but also, both … and, as well as) in the following sentences:

Astronomers gain a much more complete understanding of the universe studying in the sky with _____ radio and optical telescopes.

Radio telescopes are used to measure broad-bandwidth continuum radiation _____ spectroscopic features.

As the name suggests, radio telescopes allow astronomers to observe _____ radio waves, but also microwaves coming from space.

Some radio telescopes are placed in protective radomes that can nearly eliminate the effect of _____ wind loading and temperature differences throughout the structure.

There have been developed special materials that _____ exhibit very low absorption, but also reflection of radio waves.

The sensitivity of a radio telescope depends _____ on the area and efficiency of the antenna.

Radio reflector consists a parabolic antenna which operates _____ a television-satellite receiving antenna.

_____ optical and radio telescope reflectors use a parabolic shape to perfectly focus the light to a point.

Radio telescope antenna not only gathers the minute amount of radio frequency energy from the sky _____ transforms it to a tiny electrical current.

Pulsars _____ quasars produce radio-frequency radiation and so are only visible in the radio region of electromagnetic spectrum.

6. Translate from Russian into English, paying particular attention to the Passive Voice:

1) Оптический телескоп используется астрономами для получения визуальных световых изображений.
2) Радиоволны, излучаемые внеземными радиоисточниками, обычно улавливаются радиотелескопами.
3) Первый радиотелескоп был изобретен Гратом Ребером в 1937 году.
4) Работа радиотелескопа ограничивается рядом факторов.
5) Обычно в радиотелескопах используют отражающую антенну параболической формы.

7. Paraphrase the following sentences using the words and word combinations from the text:

1) In the laboratory one can see a piece of equipment that collects radio waves from space and is used to find stars and others objects in space.
2) A great number of extraterrestrial sources can send out radiation.
3) Radio telescopes are larger than optical telescopes because the size of a radio wave

used to broadcast a radio signal is much longer than optical one.

5) If we collect enough units of energy that carry light and have zero mass, we shall be able to detect a signal.
6) A radio telescope typically consists of a bowl-shaped antenna similar to a modern satellite dish.
7) I early radio telescopes the procedure of spectroscopic observations took a long time to be done.
8) Radio telescopes are different from each other, but they all have two basic components.
9) The performance of a radio telescope is limited by various factors (for example, a change in the usual shape caused by heat).

8. Find the equivalents from the text:

астрономический прибор, излучение, внеземной оптический телескоп, длина радиоволны, оптическая световая волна, фотон, параболическая форма, фокусировать свет, управляемая входящая радиоволна, приемная антенна, измерить излучение, широкий диапазон, спектроскопические характеристики, молекулярный строй, астрономический объект, настройка, современный радиотелескоп, разделить сигнал на несколько тысяч отдельных каналов, основной компонент, измерять источники малой интенсивности радиопередачи, усиливать сигнал, продолжительность наблюдения, ограничивать разными факторами, температурная деформация, отклонение магнитной стрелки, указывать на что-либо.

9. Sum up the information about radio telescopes.

LESSON 8. ANTENNAS

1. Read the words:

whip antenna (гибкая) штыревая антенна
wire antenna проволочная антенна
dish antenna зеркальная антенна
rigid негнущийся
plastic rod пластиковый стержень
to be mounted быть установленным
range диапазон, радиус действия
height высота
to suspend подвешивать
omnidirectional ненаправленный, действующий по всем направлениям
tuner unit настроечный механизм
maintenance обслуживание
insulator изолятор
to reduce сокращать
shackle соединительная скоба, кольцо
assembly сборка

to grease смазывать
glass fibre стекловолокно

2. Read the text and translate it:

Antenna Types

There are three basic types of antennas which are used for radio communication on board vessels.

(1) *Whip antenna* This type is the rigid, usually white, plastic rod, which is mounted vertically. Whip antennas are just about universally used for Very High Frequency radio transmission and reception. As the range of a VHF signal is pretty much dependent on the height of the antenna, so any VHF antenna should be mounted as high as possible. Whip antennas are also sometimes used for Medium Frequency and High Frequency transmission and reception.

(2) *Wire Antenna* If it is suspended vertically, and the signal is fed at one end, then it behaves exactly like a whip. More often though, a wire antenna is suspended horizontally. The signal can be fed from one end of the wire, but sometimes it is fed from the centre, to make what is called a dipole.

(3) *Dish Antenna* Whips and wire antennas are more or less omnidirectional. That is, they can transmit and receive equally well in all directions. Some satellite communication systems operate at very low power, and they need a very directional antenna to focus the signal into a beam. Such a system uses a dish antenna. The dish itself is not unlike the receiving dish for domestic satellite television, and indeed, if the ship was fixed firmly in one position, virtually the same antenna could be used. However, ships move around, so a dish antenna must be fitted with motors and sensors to keep the dish pointed at the satellite while the ship moves. To protect the mechanism and to prevent the wind moving the dish, the antenna is encased in a plastic dome.

Antenna Tuning

Antennas which are not the optimum length can be made to operate on a particular band, or on several bands, by adding various coils and capacitors to the end of the antenna. In this way the radio can be fooled into thinking that the antenna is a perfect length for the frequency on which it is being asked to transmit. A tuner unit is used to do this, and it may require manual operation, usually by means of three rotary switches, or it may be automatic, needing just a push of a button to select the best combination of coils and capacitors for a particular frequency.

Antenna Maintenance

On wire antennas, the insulators must be kept clean. A build-up of salt or dirt on the insulators will reduce their ability to insulate, and cause a significant loss of signal. Great care must be taken that the transmitter cannot be activated while anybody is near the ends of the antenna. Extremely high voltages are generated at the ends, and they can cause severe injury, or possibly even death.

Any shackles used in the assembly of the antenna should be kept well greased, so that the antenna can be disassembled if there is a problem without having to fight wish seized shackles.

Whip antennas too should be kept clean. They are made of glass fibre, which is transparent to the radio frequencies.

3. Answer the following questions:

1) Whip antennas are used only for Very High Frequency radio transmission and reception, aren't they?
2) Do lower frequency signals need longer antennas?
3) How can a wire antenna be suspended?
4) What is a dipole?
5) What is the main difference between whips or wire antennas and dish antennas?
6) Could the antenna for domestic satellite television be used in the ship?
7) What makes the dish point at the satellite while the ship moves?
8) Why is the antenna encased in a plastic dome?
9) Is it important to keep the insulators on wire antennas clean?
10) How can the problem of seized shackles be solved?

4. Give the English equivalents from the text:

прием и передача радиоволн, диапазон высокочастотного сигнала, зависит от чего-либо, высота антенны, длина провода, подвешивать горизонтально и вертикально, сфокусировать сигнал в один луч, домашнее спутниковое телевидение, защищать механизм, предотвращать, большие яхты, торговые суда, рамки и конденсаторы, ручное управление, автоматическое управление, посредством, нажать кнопку, содержать в чистоте, накопление соли или грязи, значительная потеря сигнала, регулярно чистить, вызывать серьезное повреждение (травму), проницаемый.

5. Supply either <u>because</u> or <u>because of</u> as appropriate.

1) Any VHF antenna should be mounted as high as possible, _____ the range of a VHF signal depends on the height of the antenna.
2) Wire antenna behaves exactly like a whip _____its vertical suspension.
3) Whips and wire antennas are omnidirectional _____ they can transmit and receive equally well in all directions.
4) Some satellites communication systems need a very directional antenna _____ their very low power.
5) A dish antenna must be fitted with motors and sensors, _____ wild moving of the ships.
6) We often encase the antenna in a plastic dome, _____ we want to protect the mechanism.
7) Some antennas can't operate on a particular band _____ their length.
8) We call the system automatic _____ it makes us just push a button to select the best combination.
9) On wire antennas, the insulators must be kept clean, _____ salt or dirt will reduce their ability to insulate and cause a loss of signals.
10) The ends of the antenna can cause severe injury _____ extremely high voltages which are generated there.

6. Translate from Russian into English:

1) Чем ниже частота сигнала, тем выше требуется антенна.
2) Все соединительные скобы при сборке должны быть хорошо смазаны.
3) Антенны служат для приема и передачи радиоволн.
4) Антенну следует устанавливать на большой высоте.
5) Всенаправленная антенна – это антенна, которая передает и получает сигналы одинаково хорошо во всех направлениях.
6) Отражающая антенна должна быть оборудована двигателями и сенсорами.
7) Обычно на больших яхтах и коммерческих кораблях антенна заключается в пластиковый купол.
8) Этот купол антенны служит для защиты механизма.
9) Для того чтобы заставить антенну работать на определенной полосе частот, вам следует добавить конденсаторы и катушки.
10) Автоматическая настройка требует от вас лишь нажатия одной кнопки для выбора наилучшей комбинации.
11) Накопление соли и грязи на изоляторах ухудшит их изолирующую способность.
12) Слишком высокое напряжение может привести к серьезной травме или даже смерти.
13) Штыревая антенна сделана из стекловолокна.

7. Sum up the information about antenna types.

LESSON 9. FACSIMILE (FAX)

1. Read the new words:

FAX (fax facsimile) факсимиле, точная копия, факсимильная связь
to refer относить, говорить, упоминать
duplicate дубликат, аналогичный; идентичный
to scan сканировать; осуществлять поиск
to digitize преобразовывать в цифровую форму, оцифровывать
to conceive задумывать, дать начало чему-л.
apprentice подмастерье, начинающий
pendulum маятник, маятниковый
altered измененный, переработанный
milestone промежуточный этап разработки, веха
telephotography телефотография, телефотографирование
to resemble иметь сходство, походить
modern-day новый, современный
light beam луч света, пучок света
photoelectric cell фотоэлемент
to convert превращать, преобразовывать, конвертировать
pulse импульс, вибрация

outgoing исходящий
bitmap растр, растровое отображение графического объекта, битовая карта
graphic диаграмма, рисунок, чертеж, график
grid сетка
dot точка
receiving end приёмный конец (линии), приёмная сторона
Optical Character Recognition оптическое распознавание символов

2. Read the text and translate it:

The fax (sometimes referred to as telecopying) is a commonly used technology that lets users send a complete duplicate of a printed document from one location to another over a phone line. A fax machine scans and digitizes an original document, transmits it over a telephone line, and prints incoming documents.

The idea behind faxing was conceived in England in 1842, when Scotsman Alexander Bain, an apprentice clockmaker, developed a device that could translate telegraph signals into images on paper. Bain's idea was to transmit metallic letters chemically. The electrified letters were scanned by a pendulum device and reproduced at the other end of the telegraph wire by a synchronized pendulum contacting chemically altered paper.

In 1862, Italian physicist Giovanni Caselli developed a device based on Bain's invention. It was called a pantelegraph. It was commercially used by the French Post & Telegraph agency to communicate between Paris and Marseilles. Another milestone was in 1902, when a fellow named Arthur Korn invented telephotography, a way to send still photographs by electrical wires.

Edouard Belin invented a device in France in 1925 that most closely resembled the modern-day fax machine. His Belinograph used a powerful light beam to scan an image on a cylinder. A photoelectric cell converted light, or the absence of light, into transmittable electrical pulses.

Although the technology was developed in earlier years, fax machines only became popular after 1983.

Today's fax machines use a scanner to digitize the outgoing document into a bitmap graphic, whether the original information is text or an image. This bitmap graphic is a grid of dots. A dot is either on or off, depending on whether its area of the graphic is black or white. The fax machine translates the on/off signals as a series of 0s and 1s over a phone line, just as all electronic computer data travels. On the receiving side, a fax machine accepts the incoming 0s and 1s, translates them back into dots, and reprints the document as a bitmap picture.

Because the document is received as a graphic, fax technology is best for documents that do not need modification at the receiving end. You can convert a fax back into a text document if you use OCR (optical character recognition) software to translate it.

These days the Internet provides inexpensive fax services. A number of ISPs (Internet service providers) let users send and receive fax messages over Internet lines instead of public telephone lines.

3. Answer the following questions:

1) What is the fax designed for?
2) Where was the idea behind faxing conceived?
3) What was the Bain's invention?
4) Did the pantelegraph differ from telephotography?
5) How did the Belinograph work?
6) What does "a bitmap graphic" mean?
7) Is it possible to receive fax messages over Internet lines?
8) Why do today's fax machines use a scanner?

4. Give the equivalents, using the text:

a) отправлять дубликат печатного документа; сканировать документ; передавать по телефонной линии; печатать поступающие документы; разработать устройство; металлические буквы; маятниковый прибор; отправлять фотографии по электрическим проводам; напоминать современный факс; пучок света; программа по оптическому распознаванию символов.

b) to send a complete duplicate, an original document, the idea behind faxing, to print incoming documents, to translate telegraph signals into images, the electrified letters, a pendulum device, another milestone, a way to send still photographs, to resemble the modern-day fax machine, a photoelectric cell, the absence of light, transmittable electrical pulse, a bitmap graphic, a grid of dots, on the receiving side, to convert a fax back into a text document, fax services.

5. Correct the wrong statements:

1) The Fax is used to make a complete duplicate of an original document.
2) The idea behind faxing came to French clockmaker Alexander Bain, who developed a device for printing photographs.
3) The French Post and Telegraph agency used a powerful light beam to scan an image.
4) In Behinograph light was converted into transmittable electrical pulses.
5) The bitmap graphic is the document that does not need modification at the receiving end.

6. Finish these sentences by adding a tag questions with the correct form of the verb and the subject pronoun and translate into English:

Model: Fax machines became popular after 1983.
Fax machines became poplar after 1983, <u>didn't they</u>?

1) The Fax is a commonly used technology.
2) A Fax machine doesn't transmit an original document over a telephone line.

3) There is an idea to transmit letters.
4) The electrified letters will be scanned by a device.
5) French Post and Telegraph agency can use it to communicate between Paris and Marseilles.
6) We've seen a device that most closely resembles the modern-day fax machine.
7) A Fax machine doesn't reprint the document as a bitmap picture.
8) Fax technology is the best for documents that do not need modification at the receiving end.
9) A Fax switch is a device that listens for a fax signal on a phone line.
10) Some computer networks provide users with a fax server.

7. Supply the simple form or [verb+ing] as required in the following sentences. Notice the difference in meaning as well as in grammar:

1) The program director used to _____ (send) documents from one location to another over a phone line.
2) Don't worry. Some day you will get used to _____ (scan and digitize) of these original documents.
3) When I was young, I used to _____ (send) photographs from Munich to Berlin.
4) The man was used to _____ (receive) fax message over Internet lines.
5) The message used to _____ (travel) partly or almost completely over the Internet.
6) Some mass marketing companies are used to _____ (send) unsolicited fax message.
7) Companies were used to _____ (employ) automated fax-on-demand technology.
8) Computer hardware and software companies user to _____ (provide) frequently requested documentation to customers.
9) Like a fax machine, the fax/modem used to _____ (convert) text and graphics to bitmap image in order to transmit them.

8. Translate from Russian into English:

1) С помощью факса вы можете отправить копию печатного документа из одного места в другое по телефонной линии.
2) Идея Александра Бейна заключалась в том, чтобы преобразовать сигнал в изображение на бумаге.
3) Изобретение А. Бейна было запатентовано в 1843 году.
4) В течении XX столетия технология продолжала развиваться.
5) Сегодня можно отправлять факс по Интернету.
6) Некоторые компьютерные сети обеспечивают своих пользователей факс-сервером, который позволяет отправлять и получать факс с помощью модема.

9. Sum up the information about the FAX.

LESSON 10. PAGER

1. Read the new words:

lightweight легковесный; лёгкий
coded кодированный
to get in touch with smb. связаться с кем-л.
to alert предупреждать
subscriber абонент; пользователь
to trigger запускать; инициировать
brief короткий
to rely on зависеть от
recipient получатель
transmitting tower радиобашня
dialing набор номера
paging terminal вызывной терминал , пейджинговый терминал
to encode кодировать, шифровать
party абонент

2. Read the text and translate it:

Pager, portable, lightweight receiver of coded radio signals that indicates to its user that a message is waiting or someone is trying to get in touch. When people want to page someone—that is, contact a person via the person's pager—they telephone a paging service company, which then sends wireless radio signals to the pager. These signals, in turn, alert the pager's user by triggering a tone or a vibration. Most pagers can also deliver brief messages on liquid crystal displays. Because pagers do not rely on telephone wires, a page can be transmitted from a central location and received anywhere within the range of the transmitting tower. Pagers make their users easy to contact, even if the user is away from a telephone.

A page is the coded radio signal sent from a transmitter to the pager. Pages usually begin with the dialing of a telephone number to the user's paging service provider, a company that maintains the paging transmitters and radio equipment. Placing a telephone call to the service provider enables the caller to access a computerized terminal. The caller hears a tone or receives instructions on how to page a subscriber. Pressing the telephone's pound (#) or star (*) key informs the paging terminal that the message is complete.

The area can vary; some services are local, while others are networked together via satellite to cover larger regions. The transmission of the page is encoded so that only the intended recipient of the page can receive and decode the message. If the pager is switched on and is within range of the radio tower, the pager will recognize the coded signal. The pager then converts the signal to data, alerting the owner that a page has been sent with a beep, tone, or vibration. Most pagers have liquid-crystal displays that can show the

number of the calling party, or short messages. The owner of the pager can telephone the paging party, or call the paging company to retrieve other messages.

Modern pagers have screens that can display numbers or short message, and they can store those messages for future referral. Pagers users can subscribe to special services that broadcast information such as stock market quotations and up-to-the minute sports scores. The next generation of pagers will include the ability to acknowledge reception of a page and respond with a short, predetermined message.

3. Answer the following questions:

1) What is pager?
2) What does the phrase “to page someone” mean?
3) What should people do if they want to page someone?
4) What is page?
5) How does the page function?
6) In what way is the transmission of the page encoded?
7) What happens if the page is switched on?
8) What do modern pagers have?
9) What will the next generation of pagers include?

4. Explain in English the following words and phrases:

To get in touch
To retrieve
Up-to-the minute
Portable
To rely on telephone wire
Subscriber
To maintain
To alert
Recipient
Range

5. Give the English equivalents to the following Russian words:

Жидкокристаллический дисплей, указывать, гудок, клавиша, абонент, изменять(ся), преобразовать, в свою очередь, беспроволочный, спутник, приводить в действие, включить, дальность передачи, получатель, команда, радиобашня, передавать (по радио), отвечать, в пределах, короткое сообщение, местный, восстанавливать (данные), экран, набирать номер, узнавать, хранить, оборудование, легкий, через, телефонный провод, счет (спорт.), покрывать, сеть, самый последний (имеющийся на данный момент), котировка (курс), завершить, фондовая биржа.

6. Give synonyms to the following English words:

to respond, to convert, subscriber, up-to-the minute, recipient, referral, to vary, to maintain, to send ,to get in touch, radio.

7. Translate from Russian into English:

1) Большинство пейджеров имеют жидкокристаллический дисплей, который показывает номер звонящего.
2) Пейджер – это портативный получатель кодированного радиосигнала.
3) Пейджер преобразует сигнал в цифровые данные, извещая владельца специальным гудком или вибросигналом о получении сообщения.
4) Владелец пейджера может позвонить в пейджинговую компанию с целью восстановления сообщений.

8. Sum up what the text said about the pager.

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