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Η Ψηφιοποίηση έγινε βασισμένη σε παλαιότερη έκδοση
Φρέρης Πέτρος — Ψηφιοποίηση Κειμένων / Σελιδοποίηση
Λέκκας Κωνσταντίνος — Ψηφιοποίηση εικονογράφησης / Δακτυλογράφηση
Μεταξάς Δαλαμπίρας — Ορθογραφικός έλεγχος / Διορθώσεις

Λαμία 2012
Electronics

Electronics is the branch of electrical science concerned with the behaviour of free electrons and their control and applications to useful purposes. It is thus distinguished from other branches of electricity, in which the electrons are held captive in conductors or electrolytes. The subject may be said to have begun with John Ambrose Fleming’s study of Edison effect in 1904, and his use of it in the thermionic valve, for though the experiments with cathode rays by William Crooks in 1944 were electronic, their nature had not yet been organised. Fleming’s diode valve was followed by the triodes of R.von Lieben and Lee De Forest in 1905 and 1907 respectively. These valves exploited the fact that hot metals emit electrons, and employed a cathode heated by an independent circuit. They were improved later by coating them with metallic oxides, but cold cathode valves also appeared. They emit electrons by “field emission”, a high potential difference being maintained between the cathode and the region around it.

The original purpose of the valve was to provide a one-way passage for electrons, but the grid introduced in the triode enabled signals to be inserted in the current, or signals already present to be amplified. Another method of achieving these results sprang from Oliver Lodge’s wireless detector of about 1980. This consisted of a needle-point resting on an aluminium plate, but it was later improved by using a crystal of galena instead of aluminium and the needle became a wire “cat’s whisker”.

The “cat’s whisker” radio receiver was so sensitive that no supply of electricity was needed, yet the principle involved was not developed until 1948, when the transistor was invented in the United States. In the transistor the galena is replaced by other semiconductors, such as germanium or silicon, and instead of the cat’s whisker the contact is made between prepared surfaces. Since this form of electronic rectifier and amplifier can be made on a minute scale, and is sensitive to extremely weak electric currents, it has become the essential element in miniature radio sets on the one hand, and in the large computers employing thousands of elements on the other.

The release of electrons in semiconductors by exposure to light has led to other types of electronic apparatus. The silicon cell converts sunlight into electricity and it is used to maintain the supply of current to the telemetry instruments in space vehicles. It has also been applied experimentally to driving vehicles, and to the production of cheap electricity in desert regions where sunshine is continuous. The emission of electrons by certain substances when exposed to light is called “photo-electric effect” and it was first observed by A. C. Becquerel in 1839. The photo-electric virtues of the semiconductor galenium were noticed by accident by a telegraph operator named May in 1873 and the photo-electric effect with metals was exhaustively studied in 1904 and 1905 by Albert Einstein who explained the electronic emission. This led to the “electric eye” of Julius Elster and H. F. Goitel, who used a film of potassium on the inside of an exhausted tube, and finally to the sensitive “mosaic” of caisium droplets used in T.V. cameras. Another application of the photoelectric effect is the photo-multiplier used by astronomers to increase the light of faint stars.
The uses of electronic elements in suitable circuits are manifold. The detector turning and amplifying circuits in radio receivers are examples, but circuits may be designed to modify a supplied "input" current in any desired manner. For example, a direct current may be made to produce an oscillating current of predetermined frequency or to emerge as a pulsating current in which the output pulses can be controlled so that they occur only when the input has an amplitude falling between two chosen limits. Coincidence circuits give output pulses only if two or more signals are applied to the input simultaneously, and anticoincidence circuits only if they are separate. Pulse circuits and switching circuits may be used to throw valves and other electronic elements into, or out of, operation according to the state of other elements in connected circuit, and so on. These various devices have an immense field of application in computer-controlled automation.

Other departments of electronics are concerned with the direct application of cathode rays. The production of X-rays, discovered by W. C. Roentgen in 1895, results from the simple bombardment of a metal "target" by cathode rays, but in other types of apparatus the rays are made to strike an anode with a hole in the centre, when some of them shoot straight through and provide a free beam of electrons. This device is called an "electron gun" and it plays an essential part in the cathode-ray oscillograph (oscilloscope), the television tube, and the electron microscope.
SYMBOLS FOR DIAGRAMS

Link coupling  Pilot Lamp  Neon Lamp  phototube

Cathode-ray tube  Electron-ray Cathode-ray tube  klystron
electrostatic  indicator tube  electromagnetic
deflection  deflection

Diode  Duplex  Duo-diode
directly heated  diode-triode  directly heated
cathode  cathode
directly heated
cathode

Diode, Indirectly
heated cathode
Tetrode, directly
heated cathode
duo-diode, indirectly
heated cathode

Triode, directly
heated cathode
Pentode, indirectly
heated cathode
Voltage reg, cold
cathode-gaseouw

Variable/Adjustable capacitor
THERMIONIC VALVES

A thermionic valve is a device that uses thermionic emission. It consists of a set of electrodes sealed in an evacuated glass or metal container. A gas at low pressure may be used in the container. The electrodes are:

a. a cathode, heated to emit electrons,
b. an anode, at a positive potential with respect to the cathode, to attract electrons
c. one or more perforated electrodes, called grids.

The cathode can be,

a. directly heated, i.e. a filament heated by the passage of an electric current, and acting also as a cathode,
b. a metal cathode, heated indirectly by a separate filament.

Thermionic valves are described as diodes, triodes, tetrodes, or pentodes, depending on the number of electrodes they possess.

diode. A thermionic valve containing a cathode and an anode only. It is used in half-wave rectification.

A double-diode has two anode plates and is used in full-wave rectification.

triode. A thermionic valve containing an anode, a grid, and a cathode, i.e. three electrodes. The basic function of a triode is the amplification of current, voltage or power.

tetrode. A thermionic valve containing an anode, a control grid, a cathode, and a screen grid between the anode and the control grid. It is a triode with a screen grid added to reduce the capacitance between the control grid and the anode.
pentode. A thermionic valve containing an anode, screen grid, control grid, cathode, and a suppressor grid between the anode and the screen grid. Its function is to reduce the secondary emission of electrons emitted by the anode. It is usually connected directly to the cathode. Pentodes are mainly used for power amplification.

Unknown words

thermionic valve  θερμιονική λυχνία
device  συσκευή
emission  εκπομπή
seal  σφραγίζω
evacuate  εκκενώνω, αδειάζω
evacuated container  δοχείο κενού
emit  εκπέμπω
emitter  πομπός
heat  θερμότητα
cathode  κάθοδος
anode  áνοδος
potential  δυναμικό
perforate  διατρυπώ
grid  πλέγµα
filament  νήµα (λυχνίας)
indirectly  έµµεσα
separate  διαχωρίζω
describe  περιγράφω
possess  κατέχω
contain  περιέχω
half-wave  ηµικυµατοειδής
rectification  ανόρθωση
function  λειτουργία
amplification  ενίσχυση
control grid  πλέγµα ελέγχου
screen grid  προστατευτικό πλέγµα
reduce  μειώνω
capacitance  χωρητικότητα
suppressor  πλέγµα αναστολής
secondary  δευτερεύοντος
mainly  κατά κύριο λόγο
Comprehension

1. What does a thermionic valve consist of?
2. Give the names of the electrodes.
3. Why is the cathode heated?
4. What electrode is used to attract electrons?
5. What is a grid?
6. How can a cathode be heated?
7. How are thermionic valves described?
8. What does the name of thermionic valves depend on?
9. What is a diode? Where is it used?
10. What is a double diode?
11. What is a triode? What is its basic function?
12. What is a tetrode? Why is the screen grid added to the triode?
13. What is a pentode? What is its function?
14. How is a pentode usually connected to the cathode?
15. What are pentodes mainly used for?

Pay attention to the following

<table>
<thead>
<tr>
<th>consist of</th>
<th>with respect to</th>
<th>directly to</th>
<th>depend on</th>
</tr>
</thead>
</table>

Exercises

A. True or false? If false Correct it.

1. A gas at high pressure may be used in the glass or metal container.
2. A thermionic valve consists of a set of electrons, sealed in a container.
3. The electrodes are a cathode, an anode and one more grids.
4. The cathode is used to control the flow of electrons.
5. A diode is used in full wave rectification.
6. The basic function of a diode is the amplification of voltage.
7. A screen grid is placed between the anode and the control grid.
8. A screen grid is added to increase the capacitance between the control grid and the anode.
9. Pentodes are mainly used for power rectification.
10. A tetrode is used to reduce the secondary emission of electrons emitted by the anode.
B. Give the nouns of the following

1. emit 6. attract 11. describe
2. seal 7. perforate 12. rectify
3. evacuate 8. direct 13. add
4. press 9. heat 14. reduce
5. contain 10. pass 15. connect

C. Turn into Passive

1. The grid controls the passage of electrons.
2. Will it reduce capacitance between the anode and the control grid?
3. A capacitor will connect the grid to earth.
4. The passage of the electric current has heated the filament.
5. Have they connected the pentode directly to the cathode?
6. We will not place this electrode between the anode and the cathode.
7. We can use them for power amplification.
8. Does it reduce the secondary electrons emitted by the anode?
9. Have they applied it to the control grid?
10. It gradually gains an electric charge.

D. The following words are used in the passage.

electrode rectification anode filament cathode

Complete each of these definitions with a word taken from the above list.

1. An ..........is the electrode towards which the anions (negative ions) move during electrolysis.
2. A ...........is a negative electrode towards which cations (positive ions) move in electrolysis.
3. An ..........is a piece of conducting material inserted in a gas solution, or molten ionic solid, to enable an electric current to pass through.
4. .............is the transformation of alternating current to direct current.
5. A ...........is a fine wire with a high resistance which is heated by the passage of an electric current.
E. Choose the correct word a, b, c and d to each of the following sentences.

1. The electrodes are sealed in an evacuated .............
   a. vessel     b. box          c. Container  d. glass

2. A cathode is an electrode heated to ........... electrons.
   a. emit       b. send away    c. collect    d. discharge

3. The gas used in the conductor is at low............
   a. pressure   b. compression c. press       d. passage

4. The cathode can be directly..............
   a. used       b. controlled c. pressed    d. heated

5. The screen grid is added to............. capacitance between the control grid and the anode.
   a. increase   b. reduce     c. intensify   d. extend

F. Can you spell your science vocabulary?
   Choose the correct word a ,b, c and d.

1. a. Elektrod   b. electrode   c. Elektrode  d.ickle trode
2. a. Emitted   b. emmitted    c. Emitted    d. emmited
3. a. Potential b. Potensial  c. Potencial d. pot entiale
4. a. separat   b. seperate    c. separate   d. seperete
5. a. possessed b. possesed   c. poseded    d. Posessed
A computer is a complex machine, that is a computing device able to do complex calculations in a fraction of a second, to accept data in a specified form, to process the data and to supply the results in one of several specified forms. The processes include simple mathematical operations, logical processes and control of other machines and devices. They can also store information so that it is available for immediate use.

There are two types of computers. The digital computers which are complex electrically operated mechanisms and they work with numbers as numbers. Each number or digit — a number written with one symbol— fed into a digital computer becomes an electric pulse. Information fed into a computer is known as input. The summation of the input data is called the output. In practice, this may be accomplished by punching holes in a card or a tape with a special typewriter, where each hole represents a number, letter or symbol needed for the output data. As this card or tape is run through the digital number, each hole punched permits an electrical contact, to create the proper pulse to produce the total of the input data. Other methods feed the input data into magnetic tape or drum. The totals may go to a printer where the results in numbers, letters or symbols are printed on large tabulation sheets.

Another type of computer is the analog which handles symbols. It is used principally for scientific and technical problems involving actual measurements. It can also be part of a training device that makes use of simulation—imitating conditions that would occur in reality.

The recent and growing wide use of computers has resulted in a "computer language" all its own. Computers are responsible for tremendous time savings in such areas as engineering business, science, the military and space technology. However a computer cannot think for itself. It must be given the correct information and the correct instructions in an appropriate sequence.

In other words it can go no further than the human brain that programmed it.
Comprehension

1. What can a computer do?
2. How is information stored?
3. How do digital computers operate?
4. What is a digit?
5. What does the word "input" mean in the computer language?
6. What does the word "output" mean?
7. What is the typewriter used for?
8. What does each hole represent?
9. What happens as a punched card is run through the digital number?
10. How are the results printed?
11. What is the analogue computer principally used for?
12. What does the term "computer language" mean?
13. Why are computers useful?
14. In what areas can computers be used?
15. What is the difference between a computer and a human brain?
16. Can a computer replace a human brain? Why?

Pay attention to the following
The tape is run through the digital number
  instruction - instructions
  information - ...........

Exercises
A. True or false? If false, correct it.

1. Information fed into a computer is known as the output.
2. It takes a long time for a computer to do the calculations.
3. After a digit is fed into a digital computer, it becomes a digital number.
4. The summation of the input data is called the information.
5. Holes are punched in a tape with the help of a special drum.
6. Digital computers are complex electrically operated mechanisms.
7. The analogue computer is principally used for scientific problems.
8. A computer can replace human brain.
9. A computer is a very simple machine.
10. Computers are responsible for tremendous time savings.

-14-
B. Choose the correct tense a,b,c and d to each of the following sentences

1. If the core...........it can serve as a transformer.
   a. has not be magnetized       b. has not been magnetize
   c. has not been magnetized    d. Has been not magnetized

2. .........................into the store?
   a. must the program be first   b. must be the program first
      inserted                   inserted
   c. must be first the program  d. must the program been first
      inserted                   inserted

3. The results............in the output unit until the final instruction stop is read.
   a. will been placed           c. will be placed
   b. will not be placed        d. will place

4. We ........... to prepare the special program by the Professor.
   a. were helped               b. had be helped
   c. were been helped          d. shall had been helped

5. The cable ............ to break by the earthquake.
   a. shall be caused           b. was caused
   c. had caused                d. were caused

C. Contextual ference

1. In line 5 the Word they refers to
   a. processes    b. computers    c. operations    d. forms

2. In line 11 the word input refers to
   a. information   b. pulse        c. digit         d. symbol

3. In line 20 the word handles refers to
   a. analogue      b. type          c. problem      d. symbol

4. In line 21 the word involving refers to
   a. measurements b. scientific    c. problems      d. Principally

5. In line 30 the word it refers to
   a. computer      b. human brain  c. sequence     d. information
D. Give the adjectives of the following

1. complexity          6. digit                11. scientist
2. ability             7. symbol               12. width
3. result              8. practice             13. use
4. simplicity          9. create               14. reality
5. operation           10. responsibility     15. magnet

E. Complete the unfinished words in the following sentences.

1. Semiconduct.... are mater..... with electrical proper.....between good conduct.... and insulat..... .
2. The role of the store is to hold the instruct.... and data of the prog....... until the appropriate moment during the source of comput...
3. To opera... a dig..... compu.... the program must first be insert... into the store.
4. Then after the circ... have been activat... , the control unit reads the first instruct.... of the prog.... and prepares the circuits accordin...
5. Usual... these are tape record.... capa..... of record.... and reproduc... the digit. wavefor. represent... the instruc.... and data of the program
Radio

Radio is the use of certain frequencies of electromagnetic radiation to communicate electrical signals. As no wires are employed in the communication it is also known as wireless transmission. Radio includes radio telephony, radio telegraphy and broadcasting.

The two principal parts of a radio system are the radio transmitter and the radio receiver.

Radio Transmitter In broadcasting and radio telephony, the transmitter generates a carrier wave which is modulated by a microphone circuit. The modulated carrier wave is fed to an aerial and emitted. The term transmitter is a misnomer, as it should be a radio emitter, the carrier wave being transmitted by space. In radio telegraphy, the carrier wave is interrupted to form a series of long and short impulses based on the Morse code.

Radio Receiver A device for receiving radio transmissions. The receiver has an aerial circuit adjusted to resonate to the carrier wave. The carrier wave is demodulated by rectification using a crystal rectifier, a thermionic valve, or a transistor. The audiofrequencies are either amplified by an amplifying circuit or fed directly to an earphone of loudspeaker with a by-pass condenser to remove any radio frequencies. In the diagram an aerial circuit resonates to the carrier wave. This wave is rectified by the crystal diode. The capacitor, C, and the resistor, R, have values such that the time constant for the combination is about $5 \times 10^{-2}$ second. This period is long compared with the period of oscillation of radio frequencies, but short compared with that of audiofrequencies. The plates of the capacitor have a variation in p.d. which follows that of the audiofrequency. The audiofrequencies reproduce sound in the high-resistance earphones.

Radio Set or Wireless Set are alternative terms, for radio receiver.

Simple crystal diode radio receiver
Unknown words

certain  ορισμένος, βέβαιος
frequency  συχνότητα
radiation  ακτινοβολία
communicate  επικοινωνώ
signal  σήμα
wireless  ασύρματος
transmission  εκπομπή
data
include  περιλαμβάνω
broadcasting  εκπομπή προγράμματος
principal  κυριότερος
carrier wave  φέρον κύμα
modulate  διαμορφώνω
aerial  κεραία
mismomer  λανθασμένη ονομασία
space  διάστημα
interrupt  διακόπτω
series  σειρά
impulse  ύθηση
adjust  τακτοποιώ
resonate  συντονίζω
demodulate  αποδιαμορφώ
rectification  ανόρθωση
rectifier  ανορθωτής
amplify  ενισχύω
loudspeaker  µεγάφωνο
by-pass  παρακαµπτήριος οδός
condenser  πυκνωτής/συµπυκνωτής
time constant  σταθερά χρόνου
combination  συνδυασµός
compare  συγκρίνω
oscillation  ταλάντωση
variation  ποικιλία
reproduce  αναπαράγω
alternative  εναλλακτικός
by-pass condenser  πυκνωτής διαρροής

Pay attention to the following

Singular -> datum    plural -> data

data

base on
Comprehension
1. What is radio?
2. Why is radio also known as wireless transmission?
3. What does radio include?
4. Which are the two principal parts of a radio system?
5. What wave does the transmitter generate in radio telephony?
6. Why is the carrier wave interrupted in radio telegraphy?
7. On what code are the impulses based?
8. What is a radio receiver?
9. What is the used of a by-pass condenser?
10. What do the audiofrequencies reproduce?
11. Are there any alternative terms for radio receiver? If any, name them.

Exercises
A. True or false? If false, correct it
1. Radio communication is also known as wireless communication.
2. Radio includes radio telephony-radio telegraphy and radio receiver.
3. The radio transmitter and the radio emitter are the two parts of a radio system.
4. A transmitter generates a carrier wave, which is modulated by a microphone circuit.
5. A radio receiver is a device for receiving radio transmissions.
6. The carrier wave is demodulated by rectification using a crystal rectifier, a thermionic valve, or a tube.
7. The by-pass capacitor is used to remove any radio frequencies.
8. Wireless radio is an alternative term for radio receiver.
9. The audiofrequencies are amplified by an aerial circuit.
10. The plates of the capacitor have a variation in p.d which follows that of the audiofrequency.

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B. Contextual reference

1. In line 8 the verb is modulated refers to
   a. broadcasting  b. transmitter  c. carrier wave  d. microphone circuit

2. In line 10 the word misnomer refers to
   a. term  b. transmitter  c. radio  d. emitter

3. In line 12 the verb based refers to
   a. carrier wave  b. impulses  c. series  d. radio telegraph

4. In line 15 the participle using refers to
   a. carrier wave  b. rectification  c. rectifier  d. transistor

5. In line 24 the word that refers to
   a. capacitor  b. variation  c. plates  d. Audiofrequency

C. Give the verbs of the following.

1. use  6. transmission  11. combination
2. radiation  7. receiver  12. oscillation
3. signal  8. generator  13. reproduction
4. communication  9. rectification  14. short
5. knowledge  10. resistor  15. long

D. Put the following words or phrases in order so as to construct meaningful sentences

1. is used, electric waves, to send, a connecting wire, radio, and, receive, without, signals, using, by means of
2. means of communication, used for, an important, radio, is, entertainment, commercial, and for, public broadcasting
3. transmitting antennas, radiated, voltages, set up, the waves, from, so that, in a receiving antenna, function of a receiving set, the signal desired, is, the first, to select
4. of a carrier wave, a radio transmitter, in the form, is, a device, radiofrequency power, for producing, for transmission.
5. the radio transmitter, and, the two, radio receiver, principal, of, parts, a, are, radio system, the
E. Can you spell your science vocabulary?  
Choose the correct word a, b, c and d

a. oscillator  b. oscillator  c. oscilatto  d. oscillattor
a. computer  b. computor  c. computer  d. computer
a. device  b. devise  c. divise  d. devaice
a. calculation  b. calculation  c. calculeition  d. calkulation
a. receiver  b. reciever  c. reseiver  d. riceiver

F. Complete the unfinished words in the following sentences.

1. The other princip.... function.. of a radio recei.... are to amplify the radio-frequen... signal select...., to detect the signal, thereby produc... an audio frequen.... signal, to amplify this signal and to produce it audibl.. by means of a loudspeak.....

2. Radio broadcast... is radio transmit.... inten... for general recept....
3. Radio frequen... is a frequen... use.. for radio transmit....

G. The following words are used in the passage.  
Transistor  rectifier  loudspeaker  amplifier  transmitter  
Complete each of these- definitions with a word taken from the above list

1. A(n)...........is an electro-acoustic transducer normally intended to radiate acoustic power into the air so that it is elective at a distance.

2. A(n)...........is a device for converting an alternating or oscillating current into an unidirectional currently by the inversion of suppression of alternate half-waves.

3. A(n)...........is a device whose output is a magnified function of its input and which draws its power from sources other than the input signal.

4. A(n)...........is a device which converts audio, video, or coded signals into modulated radio-frequency signals which can be propagated by electromagnetic waves.

5. A(n)...........is an active semiconductor device with three or more electrodes.
MODULATION DEMODULATION

Modulation is the process of varying the characteristics of a wave motion by superimposing on it the characteristics of a second wave motion. The term is usually applied to a carrier wave, which has superimposed on it the characteristics of an audio frequency wave. A carrier wave does not transmit a radio signal by itself; the signal (speech or vision) is carried by the modulated wave.

There are three main types of modulation, amplitude modulation, frequency modulation, and phase modulation.

In amplitude modulation, the amplitude of the carrier wave is changed by the wave characteristics of the audio frequency signal. (see diagram). Modulation is carried out by the circuit shown. This consists of a oscillatory circuit powered by the high tension through the triode. The microphone circuit imposes a fluctuating p.d. on the control grid, and this alters the amplitude of the oscillations in the aerial circuit. This is the simplest method of modulation.

In frequency modulation the amplitude of the carrier wave remains constant and the wave characteristics of the audio frequency wave are translated into changes of frequency of the carrier wave. The frequency of the carrier wave fluctuates above and below its nominal value. The number of fluctuations per second corresponds to the frequency of the audio frequency wave and the magnitude of the fluctuation corresponds to the amplitude of the audio frequency wave. Frequency modulation can only be used with VHF radio carrier waves.

amplitude modulated transmitter

AMPLITUDE MODULATION

In frequency modulation the amplitude of the carrier wave remains constant and the wave characteristics of the audio frequency wave are translated into changes of frequency of the carrier wave. The frequency of the carrier wave fluctuates above and below its nominal value. The number of fluctuations per second corresponds to the frequency of the audio frequency wave and the magnitude of the fluctuation corresponds to the amplitude of the audio frequency wave. Frequency modulation can only be used with VHF radio carrier waves.
In phase modulation the amplitude and frequency of the carrier wave remain constant and the phase angle of the carrier wave is altered by an amount proportional to the instantaneous amplitude of the audiofrequency wave.

Demodulation is the separation and extraction of audio frequency waves from a modulated carrier wave. The device or circuit used for demodulation is called a detector or demodulator.

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Unknown words

- modulation
- process
- superimpose
- motion
- apply
- carrier wave
- audiofrequency wave
- transmit
- vision
- modulated wave
- amplitude modulation
- frequency modulation
- phase modulation
- tension
- impose
- fluctuating p.d.
- alter
- amplitude
- aerial circuit
- remain
- constant
- translate
- nominal value
- correspond
- magnitude
- phase angle
Comprehension

1. What does the term modulation mean?
2. What characteristics does the carrier wave have, superimposed on it?
3. Does a carrier wave transmit a radio signal by itself?
4. What kind of wave carries the signal?
5. How many types of modulation are there?
6. What does the microphone circuit impose on the control grid?
7. What does the imposed fluctuating p.d. alter?
8. How does the amplitude of the carrier wave remain in frequency modulation?
9. What kind of waves can frequency modulation only be used with?
10. What does the term demodulation mean?
11. How is the circuit used for demodulation?

Pay attention to the following

apply to  correspond to
carry out  VHF=very high frequency
translate into  proportional to
Exercises
A. True or false? If false, correct it.

1. The term modulation is usually applied to a carrier wave, which has superimposed on it the characteristics of a frequency wave.
2. There are (two types of modulation, amplitude modulation, frequency modulation and wave modulation.
3. The number of fluctuations per second corresponds to the frequency of the carrier wave.
4. The frequency of the fluctuation corresponds to the amplitude of the audiofrequency wave.
5. Amplitude modulation can only be used with VHF radio carrier waves.
6. Phase modulation is the separation and extraction of audiofrequency waves from a modulated carrier wave.
7. The device used for modulation is called a detector.
8. In frequency modulation the amplitude of the carrier wave remains constant.
9. The frequency of the carrier wave fluctuates above and below its nominal value.
10. A carrier wave does not transmit a radio signal by itself.

B. Complete the unfinished words in the following sentences.

1. Modulation is the process by which we make the ampli.... or frequency of a sine-wave volt.... to vary with time accord..... to the volt..... or current variat.... of another sign.....
2. The carr.... is usual... of a high.... frequen..... than the modulat.... sign.....
3. Because an AM wave has side bands on each side of the carrier, the transmis.... of inform..... by ampli..... modulat.... requir.... the use of a band of frequenc....

C. Fill the bland spaces with the correct word.

1. ..... order ..... send ... message .... means ... radio waves .... is necessary .... vary some features .... these waves .... accordance ..... ..... information .... be transmitted.
2. ..... first wave, usually ..... single frequency wave ...... constant amplitude, ...... known ...... the carrier wave ...... ...... second ...... the modulating wave.
D. The following words are used in the passage.

fluctuation   tension   frequency   amplitude   value

Complete each of these definitions with a word, taken from the above list.

1. ............... is the highest value reached by voltage current, or power during a complete cycle.
2. ............... is the number of complete oscillations performed in a second.
3. ............... is a force which tends to stretch a string, a rope, a wire, a spring, a rod or a bar.
4. ............... is the numerical part of a measurement of a quantity.
5. ............... is one of a number of uneven and irregular variations above and below an expected value of a physical quantity as measured by an instrument.

E. Give in full the words for which the following abbreviations and symbols are used.

FM and PM  2. C
3. dB or db  4. d.c.
5. VHF  6. kVA
7. a.c.  8. r.m.s.
9. R  10. I

F. Place the following words and phrases in their correct order to form sentences

1. radio waves, the information to be transmitted, of these waves, In order to, by means of, in accordance with, it is necessary to, send a message, vary some feature
2. the signal, demodulation, information, The process, carrier wave, of extracting, from a modulated, is called detection or
3. amplitude of, the modulating signal, the carrier wave, the instantaneous, proportion to, In amplitude modulation, is varied in
4. proportional to the instantaneous, the phase angle, that its magnitude is the value of, amplitude of the modulating signal, is varied so, of the sine-wave carrier, In phase modulation

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GRID

A grid is an electrode in a thermionic valve placed between the anode and the cathode. It is usually perforated, or made of wire, so that electrons can readily pass through it. The grid is used to control the flow of electrons.

A control grid is a grid in a thermionic valve that controls the passage of electrons between the cathode and the anode. The greater the negative potential of the grid, the greater the positive potential of the anode to maintain the same flow of electrons, i.e. to maintain the same anode current.

A screen grid is a grid placed between the anode and the control grid. It is maintained at a fixed positive potential, slightly less than the positive potential of the anode. Its function is to reduce capacitance between the anode and the control grid. This makes it useful for amplification of radio-frequency a.c., i.e. more efficient for high-frequency applications. The grid is usually connected to earth by a capacitor.

A suppressor grid is a grid placed between the anode and the screen grid in a pentode valve. It is often connected to the cathode. The suppressor grid reduces the secondary electrons emitted by the anode.

Grid bias. A fixed voltage applied to make the grid at a negative potential compared to the cathode. An alternating or fluctuating, p.d. applied at the input operates the valve under conditions determined by the grid bias, which ensures the average p.d. of the grid, with reference to the cathode, is negative. A grid bias is applied to a control grid.
grid
place
perforate
readily
flow
passage
potential
maintain
screen grid
fixed
slightly
function
reduce
control grid
amplification
efficient
application
connect
capacitor
capacity/capacitance
suppressor grid
secondary
grid bias
compare
operate
condition
determine
ensure
average
reference
Comprehension

1. What is a grid?
2. Where is the grid placed?
3. What material is a grid usually made of?
4. What can readily pass through a grid?
5. What flow does the grid control?
6. Where is a control grid found?
7. What does the control grid control?
8. What happens to the positive potential of the anode when the negative potential of the grid is greater?
9. Where is the screen grid placed?
10. At what potential is the screen grid maintained?
11. What is its function?
12. For what applications is a screen grid more efficient?
13. How is the screen grid usually connected to earth?
14. What is a suppressor grid?
15. What is it often connected to?
16. What does the suppressor grid reduce?
17. What, is the grid bias applied to?

Exercises

A. True or false? If false, correct it.

1. A grid is an electron in a thermionic valve.
2. A grid is usually made of wire.
3. The screen grid controls the passage of electrons, between the cathode and the anode.
4. The greater the positive potential of the grid, the greater the negative potential of the anode to maintain the same flow of electrons.
5. The suppresses grid is placed between the anode and the control grid.
6. The function of a screen grid is to increase the capacitance between the anode and the control grid.
7. The suppressor grid reduces the secondary electrons emitted by the anode.

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B. Turn the following sentences into the Passive Voice.

1. A capacitor connects the grid to earth.
2. Does the suppressor grid reduce the secondary electrons emitted by the anode?
3. The frequency determines the properties and effects of electromagnetic waves
4. We use radio waves to communicate information by means of wireless telegraphy and telephony, broadcasting and radar
5. If the electrical lines are parallel to the earth we refer to the radio wave as horizontally polarized.
6. If we had -tested, the oscillator more completely we should have found the defect over two months ago

C. Complete the unfinished words in the following sentences.

1. The effects of secondary emis... in the tetro... may be elimin..... by the addit..... of a third grid
2. Ampli.... modulat..... is the variat...... of the stren.... of the rf output of a transmit..... accord..... to the audiofrequen.....
3. The analog.... comput.... handle.. symbols and is use.. for scient.... and technic... problems.
4. Computer.. are responsib... for tremend.... time sav..... in such area.. as space technolo... .
5. This may be accompl..... by punc..... hole.. in a card or tape with a spec.... typewrit... .

D. Choose the correct word a ,b, c and  d to each of the following sentences.

1. A grid is a ............... electrode in a thermionic valve.
   a. punched     b. perforated   c. pushed      d. placed
2. We can use this ........ to make, a grid.
   a. rope        b. wire         c. string      d.cable
3. The suppressor grid ........ the secondary electrons emitted by the anode.
   a. reduces     b. increases    c. controls    d. determines
4. A grid bias is............. to a control grid.
   a. connected   b.applied       c. joined      d.used
5. A screen grid is very ............ for high-frequency applications
   a. constant     b.simple       c. important   d. Effecient
E. The following verbs are used in the passage
apply, maintain, perforate, compare, determine, emit, reduce
Complete each of these definitions with a verb taken from the above list

1. To.............means to make a row of tiny holes (in paper) So that part may be torn easily.
2. To.............means just to what extent persons or things are similar or not similar.
3. To.............means to keep in a certain condition.
4. To.............means to make smaller in size, appearance, price etc.
5. To.............means to send out.
6. To.............means to be the fact that decides.
7. To.............means to put something into use or into position to serve its purpose.

F. Can you spell your science vocabulary?
Choose the correct word a, b, c and d

1. a. supressor b. suppressor c. suppresser d. suppressor
2. a. secondery b. sekondary c. secondary d. secondary
3. a. maintain b. meintein c. maintain d. maintain
4. a. supplied b. suplied c. supplyed d. supplied
5. a. potential b. potensial c. potencial d. potentiel

G. Contextual reference
1. In line 2 the verb made refers to
   a. valve b. anode c. cathode d. Electrode
2. In line 4 the word that refers to
   a. control b. passage c. control grid d. controls
3. In line 7 the verb maintain refers to
   a. anode b. potential c. grid d. flow
4. In line 10 the word function refers to
   a. potential b. screen grid c. capacitance d. Anode
5. In line 16 the word emitted refers to
   a. reduces b. electrons c. cathode d. suppressor grid
AMPLIFIER

An amplifier is an electronic circuit containing thermionic valves, or transistors, which increases the voltage of a signal fed into it by obtaining power from an external supply.

**Voltage amplifier.** A single stage voltage amplifier is shown in the diagram. The alternating p.d. fed in at the output changes the anode current. The anode current passes through the anode load resistor \((R_1)\) and the p.d. across the resistor changes.

Let an input signal increase the grid potential by 0.15 V (grid becomes more positive). Under the conditions of working this increases the anode current by 1 mA. If the anode load resistor has a resistance of 20 k\(\Omega\), the p.d. across it increases by 20 V. The p.d. supplied to the output decreases by 20 V, i.e. the amplification is negative. The blocking capacitor filters out the d.c. from the H.T. supply.

![Diagram of Voltage amplifier and Power amplifier](image)

**Power amplifier** A circuit for a power amplifier is shown in the diagram. The anode load is the primary of a transformer. The valve passes relatively large current. The grid bias is supplied by a bias resistor \((R_2)\) through which the anode current flows. No current flows through \(R_1\) when there is no input, so the bias resistor supplies the p.d. to the control grid. The by-pass capacitor prevents the grid bias fluctuating with the anode current, as the a.c. component of the anode current is by-passed through the capacitor. It has a large capacitance.
Comprehension
1. What does an amplifier contain?
2. What changes the anode current in a voltage amplifier?
3. Through what does the anode current pass?
4. What does the blocking capacitor do?
5. What is the anode load?
6. What is the function of the valve?
7. What flows through the bias resistor?
8. What current flows through \( ri \) when there is no input?
9. What do the by-pass capacitor do?
10. What capacitance does an amplifier have?

Pay attention to the following
filters out
A. True or false? If false Correct it (look at the diagram carefully)

1. An amplifier increases the power, of a signal, fed into it.
2. The alternating p.d. fed in at the output, changes the cathode current.
3. The anode current passes through the anode load resistance ($R_1$).
4. The blocking capacitor reduces the d.c. from the H.T. supply.
5. In a power amplifier the anode load is the primary of a transformer.
6. The valve passes relatively large power.
7. The grid bias is supplied by a bias resistor through which the anode current flows.
8. No current flows through $R_1$ when there is no input, so the bias resistor supplies the p.d. to the screen grid.

B. Place the following words or phrases in their correct order to form sentences

1. of the input signal, the most, of an electron tube, is its ability, important function, to amplify, the amplitude, or increase.
2. are, to whether, tuned, they are, amplifiers, or untuned, also classified.
3. transmitters, are, of radio used as, the output stage, power amplifiers, receivers and.
4. at the input, by a number of stages, in the receiver, is amplified, a loudspeaker, necessary, a very small, to operate, amount of power, of a broadcast, receiver to the level.
5. the most important, voltmeter, one of, of a. d.c amplifier, is, its, use, applications, in a d.c., electron tube.

C. Can you spell your science vocabulary?
Choose the correct word a, b, c and d.

<table>
<thead>
<tr>
<th>a. diagram</th>
<th>b. diagramme</th>
<th>c. diaggram</th>
<th>d. dia Greame</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ressistor</td>
<td>b. resistor</td>
<td>c. resister</td>
<td>d. resistore</td>
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<tr>
<td>a. resistance</td>
<td>b. resistence</td>
<td>c. resistance</td>
<td>d. ressistance</td>
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<td>a. primery</td>
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<td>c. primary</td>
<td>d. primary</td>
</tr>
<tr>
<td>a. transformmer</td>
<td>b. treansformer</td>
<td>c. transformmer</td>
<td>d. transformer</td>
</tr>
</tbody>
</table>
D. Contextual reference.

1. In line 2 the word it refers to
   a. voltage    b. signal    c. amplifier    d. power
2. In line 11 the word it refers to
   a. anode     b. resistor    c. load     d. p.d.
3. In line 11 the word increases refers to
   a. anode     b. resistor    c. load     d. p.d.
4. In line 16 the word which refers to
   a. grid bias  b. bias resistor  c. is supplied d. anode current
5. In line 21 the word has refers to
   a. amplifier b. power amplifier c. current d. by-pass capacitor

E. The following word are used in the passage.
   Amplification, input, capacitor, current, output

Complete each of these definitions with a word taken from the above list

1. .......... is a general expression applied to the increase of the magnitude of any kind of signal by an electronic device.
2. A .......... of one or more pairs of conductors separated by insulators
3. ..........is the flow of electricity through something or along a wire or cable
4. ..........is the terminal where the power, voltage or current may be delivered.
5. .......... is the terminal where current, voltage or power may be applied to a circuit.

F. Give as many derived words as you can.

1. amplify
2. alternate
3. resist
4. transform
5. pass
6. relative
G. Complete the unfinished words in the following sentences.
1. An amplif.... is a piece of electric... equipment for mak.... sign.... big.....
2. In an out.... signal is perfect.... reproduc.... at the out..... of the amplif...., change.... only by be.... big.... in some way, then the amplif.... is "linear".
3. A volt..... amplifier is an amplifier design.... to amplif.... volt.... waveforms in applicat.... where very little pow.... is tak.... from the load.
4. The rat.... of the ampli..... of the output sign.... to that of the in..... sign.... is call.... the gain.
5. Demodulat.... is the separat.... and extract.... of audiofrequen.... waves from a modulat.... carrier wave.

H. Choose the correct synonym a,b,c and d'to each of the following underlined words.

1. A thermionic valve is a device that uses thermionic amession.
   a. invention b. Design c. Type d. plan
2. The electrodes are sealed in a glass container.
   a. fastened b. Closed c. Left d. Pressed
3. It must be given the correct information in an appropriate sequence.
   a. order b. Way c. Manner d. arrangement
4. The two principal parts of a radio system are........
   a. first b. Main c. Usual d. Important
5. In FM the amplitude of the carrier wave remains constant.
   a. stays b. Rests c. Stands d. tend to be

I. Find the opposite words.

1. anode 7. sequence
2. negative 8. correct
3. connect 9. input
4. complex 10. useful
5. reduce 11. usually
6. able 12. high-frequency
Control can be as simple as flicking the switch which turns the electric light on or off, or it can be as complex as the inertial guidance systems which keep the large satellite rockets on their predetermined course. In the driveway of a home, a light on a pole operated by a time clock in the basement is analogous to what is called open-loop control. Here on and off is the only process one may wish to exercise with a control. One of the most important advantages of the open-loop system is that the control itself, which in the case of the pole light was the time clock, may be placed at a great distance from the object or machine which it controls.

There are, however, many disadvantages to the open-loop system which make the exclusive use of this system difficult in most applications of automation. Since the open-loop system has no methods of correcting errors which have been made in control, a system which could correct errors, had to be devised. There is, in automation, a system called closed-loop control that extends far beyond the limitations of the open-loop control. An example of the closed-loop control is a thermostat, used to regulate temperatures.

When a very efficient system of control is desired, both the open-loop and the close-loop systems must be employed, in the complete system of control. The entire process of steering an AUTOMOBILE can be considered a combination of the two systems.

The principles of control by automation are extended to automatic control operations and processes in many of our largest industries, such as iron and steel, and automobile manufacturing. In the textile mills, hundreds of operations are now performed by fully automated machines, directed by complicated, automatic and electronic controls.

There is also a wide use of automation in agriculture, railroad, communications and printing.
Comprehension
1. How can satellite rockets be kept on the predetermined course?
2. How is called the control of a light operated by a time clock?
3. What is one of the most important advantages of the open-loop system?
4. Why is the exclusive use of the open-loop control system difficult, in most applications of automation?
5. What is the advantage of the closed-loop control system?
6. Give an example of the close-loop control system.
7. What is the use of a thermostat?
8. What system must be employed, when a very efficient system of control is desired?
9. Which of the two systems of automatic control must be used in the process of steering an automobile?
10. Mention some areas in which automation is widely used

Pay attention to the following.

- turn on
- turn off
- a switch, the radio, the light
- extend to

Exercises

A. True or false? If false, correct it.

1. It is very dark here. Could you turn the switch off please?
2. Simple automatic control guidance systems keep the large satellite rockets on their course.
3. An open-loop control system is a complicated system.
4. An open-loop control system can be placed at a great distance from the object it controls.
5. The open-loop system cannot be used in all applications of automation.
6. The open-loop system can/correct errors which have been made in control.
7. The closed-loop control system is much more convenient than the open loop control.
8. A thermostat is used to raise the temperature.
9. A combination of both systems is ideal for best results.
10. Fully automatic machines are directed by electronic controls.
B. Supply the correct tense.

3. If you turn the switch, the light (be) on.
4. Satellite rockets would be kept on their course, if automatic control systems (use).
5. Had they adopted the open-loop control system, they (meet) many difficulties.
6. If a very efficient system (desire) both systems must (employ).
7. What device you (use), if you wanted to regulate that temperature?
8. Lately there (be) a very wide use of automation.
9. He can (tell) them some methods, of (correct) errors.
10. The pentode usually (connect) directly to the cathode.
11. The processes (include) mathematical operations?
12. Information (feed) into the computer (know) as input.

C. Give the nouns of the following.

| 2. Simple      | 7. employ      | 12. extend   |
| 3. Complex     | 8. place       | 13. desire   |
| 4. efficient   | 9. control     | 14. direct   |
| 5. combine     | 10. turn       | 15. make     |

D. Contextual reference.

In line 2 the word **complex** refers to
a. switch       b. Control       c. Light       d. turns
In line 4 the word **operated** refers to
a. driveway     b. Flight        c. pole       d. house
In line 9 the word **it** refers to
a. control      b. distance      c. object     d. machine
In line 16 the word **regulate** refers to
a. example      b. control       c. thermostat d. temperatures
In line 25 the word **directed** refers to
a. mills        b. operations    c. machines   d. controls
E. The following words are used in the passage.
satellite, switch, pole, basement, thermostat

1. A ...... is a device for making or breaking an electric circuits
2. A ...... is a spacecraft which travels in an orbit round the earth.
3. A ...... is device for automatically regulating and maintaining a
   constant temperature.
4. A ...... is the lowest part of a building, partly or wholly below
   ground level
5. A ...... is a long slender rounded piece of wood or metal.

G. Complete the unfinished words in the following sentences.
1. If the thermo.... has be... set, a fall in tempera..... causes it to
   activa.... the heat..... source
2. Electron.... has be.... defin.... as the scien... deal...with the
   contr.... of electr... flow, especial... by mean... of electr... or
   vacu... tubes.
3. The oscillat... is an electron... circ.... which generat.... radi..
   frequen... energ... at the desir... frequen....
4. One sect..... of a radio transmit.... generate... radio frequen...
   waves and amplif..... these wav.... so that they give sufficie....
   out... pow... and the oth... modulat... the radio-frequen... waves
   with the desir... inform..... to be transmit.... .
A radar is an electronic system that permits man to see objects at great distances, regardless of darkness or bad weather.

The word radar is an acronym for Radio Detection and Ranging. Microwaves, of wavelengths in the range of centimetres, are generated and emitted in pulses modulated at a radio frequency.

A movable aerial radiates a beam of the microwaves. An object, at a distance, in the path of the beam, reflects the waves. The transmitter also acts as a receiver and detects the reflected beam. The received signal is displayed on a cathode-ray tube, which is in the correct time sequence so that the time is measured between emission and reception. The distance of the object is thus known, and its direction is determined from the direction of the aerial.

The system allows objects to be located accurately, whatever the weather conditions. It is used extensively for air and sea navigation, for detection and identification of unknown ships and aircrafts, for tracking satellites and missiles, and is now used for automatic guidance whereby the received signal is not displayed, but used to control an aircraft.

Most radar sets have six important parts,

The modulator, which turns the transmitter on to send a pulse and off to receive an echo.

The transmitter, which sends the very short, or microwave pulses.

The antenna, which focuses the pulses into a narrow beam and also receives the echoing signals.

The duplexer, which, as a switching device, connects first the transmitter then the receiver to the antenna.

The receiver, which is a listening and amplifying device to strengthen weak echoes so that they will show on the radar screen and

The indicator, which displays the blips to the operator on this screen.
<table>
<thead>
<tr>
<th>English</th>
<th>Greek</th>
</tr>
</thead>
<tbody>
<tr>
<td>permit</td>
<td>επιτρέπω</td>
</tr>
<tr>
<td>distance</td>
<td>απόσταση</td>
</tr>
<tr>
<td>regardless</td>
<td>άσχετα</td>
</tr>
<tr>
<td>acronym</td>
<td>ακρονυµία</td>
</tr>
<tr>
<td>detection</td>
<td>καταγραφή, ανίχνευση</td>
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<tr>
<td>ranging</td>
<td>προσδιορισµός απόστασης</td>
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<tr>
<td>wavelength</td>
<td>µήκος κύµατος</td>
</tr>
<tr>
<td>generate</td>
<td>παράγω</td>
</tr>
<tr>
<td>radiate</td>
<td>ακτινοβολώ</td>
</tr>
<tr>
<td>reflect</td>
<td>αντανακλώ</td>
</tr>
<tr>
<td>display</td>
<td>αποτυπώνω</td>
</tr>
<tr>
<td>locate</td>
<td>εντοπίζω</td>
</tr>
<tr>
<td>accurately</td>
<td>ακριβώς</td>
</tr>
<tr>
<td>extensively</td>
<td>εκτεταµένα</td>
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<td>missiles</td>
<td>βλήµα</td>
</tr>
<tr>
<td>guidance</td>
<td>καθοδήγηση</td>
</tr>
<tr>
<td>whereby</td>
<td>όπου</td>
</tr>
<tr>
<td>focuse</td>
<td>εστιάζω</td>
</tr>
<tr>
<td>narrow</td>
<td>στενός</td>
</tr>
<tr>
<td>Duplexer</td>
<td>µίκτης</td>
</tr>
<tr>
<td>strengthen</td>
<td>ενισχύω</td>
</tr>
<tr>
<td>blip</td>
<td>στίγµα (επί οθόνης ραντάρ)</td>
</tr>
<tr>
<td>Operator</td>
<td>χειριστής</td>
</tr>
<tr>
<td>cathode ray tube</td>
<td>καθοδικός σωλήνας</td>
</tr>
<tr>
<td>Time sequence</td>
<td>χρονική συνέχεια</td>
</tr>
</tbody>
</table>
Comprehension

1. What is a radar?
2. What words are hidden under the acronym "radar"?
3. How are microwaves emitted?
4. What does a movable aerial radiate?
5. What does the transmitter detect?
6. What part of the radar acts also, as a receiver?
7. Where is the received signal displayed?
8. Do the weather conditions influence the objects to be located accurately?
9. What is the radar used extensively for?
10. What are the six important parts of a radar?
11. Why does the modulator sum the transmitter off?
12. What pulses does the transmitter send?
13. Where does the antenna focus the pulses?
14. What does the duplexer connect to the antenna?
15. What is the device used to strengthen weak echoes, so that they will show on the radar screen?
16. What does the indicator do?

Exercises

A. True or false? If false, correct it.

1. A radar permits man to see objects only during the day.
2. Radar is the acronym for Radio Deflection and Ranging.
3. The direction of the object is determined from the length of the aerial.
4. Radar is used extensively for air and sea navigation.
5. The modulator turns the transmitter on to receive an echo and off to send a pulse.
6. The duplexer connects the transmitter to the receiver.
7. The antenna receives the echoing signals.
8. The six important parts of a radar set are the aerial, the modulator, the duplexer, the receiver, the transmitter and the antenna.
9. The indicator is a switching device.
10. The receiver is a listening and amplifying device.
AERIALS

An aerial is the portion of a radio system that emits electromagnetic (radiofrequency) waves into space, or receives these waves from space.

The word antenna is an alternative term for the word aerial.
When an antenna is used for wave radiation, energy is fed into it by a transmission line connected to a transmitter.
When it is used as a receiver, the antenna is placed so as to intercept a portion of the energy radiated by the transmitting antenna, which is then fed into a transmission line leading to a receiver.
To be an efficient radiator, an antenna must have-physical dimensions comparable with the signal wavelength. So many types of antenna are in use. The most popular type is the vertical radiator. For low frequencies inverted L or T antennas may be used.

Frame aerial, is a wire wound round a frame (see diagram). It forms a directional aerial. When the horizontal wires on the frame point to the direction of the transmitting station, reception is stronger. At right angles to this position, reception is weaker. When used to find direction, the position of minimum strength of reception is used.

Frame aerial

Bipole aerial, is an aerial that consists of two rods of wire in a straight line with a gap in the middle. Leads from the two rods go straight to the demodulator circuit. The greatest flow of current occurs in the middle, especially when the aerial has a total length of one half of the wavelength of the incoming carrier wave.

Bipole aerial
<table>
<thead>
<tr>
<th>English</th>
<th>Greek</th>
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<tbody>
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<td>portion</td>
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<td>ορθή γωνία</td>
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<td>ράβδος</td>
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<td>ειδικά</td>
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<td>total</td>
<td>συνολικός</td>
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<td>incoming carrier wave</td>
<td>προσπίπτον φέρον κύμα</td>
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Antenna: (latin term) nautical term for yard
and common term for pole, of unknown origin. plural: Antennae
Comprehension

1. What waves does an aerial emit?
2. Where does an aerial receive waves from?
3. Give an alternative term for the term aerial.
4. What radiation can an antenna be used for?
5. Why is a transmission line connected to a transmitter?
6. What is the most popular type of antenna?
7. What types of antennas are used for low frequencies?
8. What is a frame aerial?
9. When is reception stronger?
10. When is reception weaker?
11. What is a dipole aerial?
12. In what part of the aerial does the greatest flow occur?

-----------------------------------------------------------------

Exercises

A. True or false? If false, correct it.

1. An aerial emits radio frequency electromagnetic waves from space.
2. An antenna must have physical dimensions comparable with the transmitted wavelength signal.
3. The number of types of antenna is restricted.
4. The most popular type is the frame aerial.
5. For high frequencies T antennas can be used.
6. The vertical radiator is a wire wound round a frame.
7. A frame aerial forms a directional aerial.
8. Reception is weaker when the horizontal wires, on the frame point to the direction of the transmitting station.
9. A frame aerial consists of two rods of wire in a straight line with a gap in the middle.
10. Leads from the two rods of a dipole aerial go straight to the demodulator circuit.
B. In each space, put in one of the verbs from the list below. Use each verb once only.

amplify, allow, be, connect, cost, damage,
disturb, exist, operate separate, take

1. The receiving aerials for radio signals can ...... many different forms.
2. When you listen to a radio through an earphone, you do not ........ other people.
3. Stereohponic loudspeakers can ...... a lot of money.
4. Stereohponic loudspeakers ...... people to listen to sound broadcasts which .... more real than those from a single loudspeaker.
5. So that we do not ........ the diaphragm, the front of a loudspeaker is covered with a piece of strong material.
6. In order to ........ the components for amplifiers and other electronic circuits, a printed circuit board is used.
7. Some very simple radio sets can ........ without amplifiers.
8. Ampliers ........ the strength of a radio signal.
9. Demodulators are used to ........ the intermediate frequency part of a IF signal.
10. We ........ the pointer in a radio set to the tuning knob by means of a cord and pulley wheels.

C. Rewrite the following sentences using the Passive. Begin each answer with the underlined item.

1. We can sent messages over long distances by radio.
2. With television, we broadcast information in the form of a picture.
3. Newspapers have used the telegraph for many purposes.
4. Broadcasting companies often record programmes.
5. They sold many programmes abroad last year.
6. Ships at sea use radio so that they know exactly where they are.
7. Can you send electrical signals along metal wires, in a telegraph system?
8. We cannot broadcast information over very long distances, without using radio.
9. Do we use radio as a means of communication?
10. What devices will you use to send a code over distances of several hundred kilometers?
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<th>NAME</th>
</tr>
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<td>plus; and</td>
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<tr>
<td>-</td>
<td>a) minus</td>
<td>a) minus sign; negative sign</td>
</tr>
<tr>
<td></td>
<td>b) divided by</td>
<td>b) fraction bar</td>
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<tr>
<td>±</td>
<td>plus or minus</td>
<td>plus or minus sign; positive or negative sign</td>
</tr>
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<td>multiplied by; times</td>
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<tr>
<td>÷ ; :</td>
<td>divided by</td>
<td>division sign</td>
</tr>
<tr>
<td>/</td>
<td>a) per</td>
<td>a) slash sign; slant sign; diagonal stroke</td>
</tr>
<tr>
<td></td>
<td>b) divided by</td>
<td>b) division sign; slash sign; slant sign; diagonal stroke</td>
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<td>an eighth; one eighth</td>
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<td>five-sixths; five sixths; five over six</td>
<td>4 = denominator</td>
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<td>$n^2$</td>
<td>$n$ squared</td>
<td>2 exponent; superscript</td>
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<td>$n$ cubed; $n$ to the power (of)three</td>
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<td>$n$ to the power (of) four; $n$ to the fourth; $n$ raised to the power of four; $n$ to the fourth power</td>
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<td>$n^{rac{1}{2}}$</td>
<td>$n$ to half power</td>
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<td>$n^{rac{2}{3}}$</td>
<td>$n$ to the power two thirds</td>
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<td>′</td>
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<td></td>
<td>b) foot: feet</td>
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<td>′′</td>
<td>a) seconds of an arc</td>
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<tr>
<td></td>
<td>b) inch(es)</td>
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<td>$n$ double dash; $n$ double prime</td>
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<td>$f$ of $x$: function of $x$</td>
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<td>limit of the function of $x$</td>
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<td>angle brackets</td>
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CURRICULUM VITAE

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