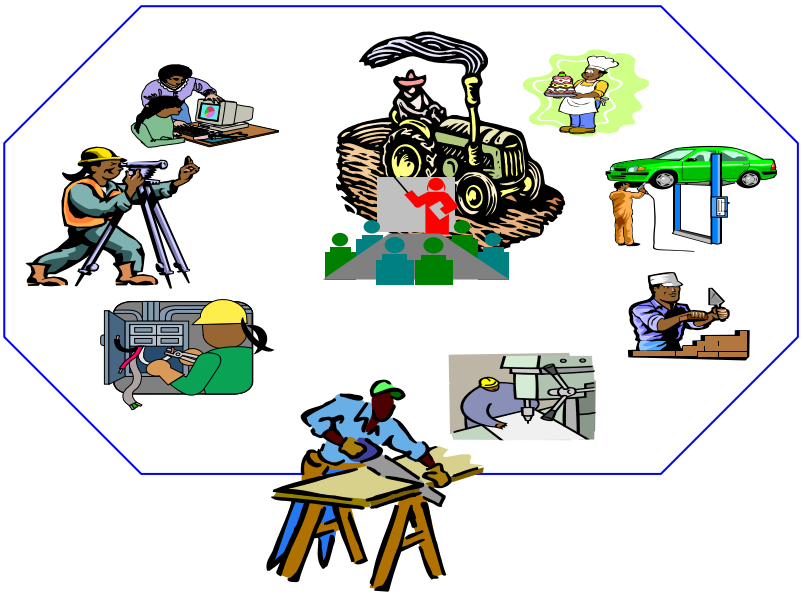
Intermediate Communication and Multimedia Equipment Servicing Level III

Based on May, 2011 V2 OS and Dec, 2020 V1 Curriculum



Module Title: Assembling and Set Up Audio/Video Components and System

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Table of Contents page

LG #15 4

LO #1 Prepare to install audio/video components and Systems 4

Instruction sheet 4

Information Sheet 1 Identifying, obtaining and understanding OHS procedures 6

Self-Check1 10

Information Sheet 2 Reporting and advising on risk control measures11

Self-Check-2 13

Information Sheet- 3 Obtaining the nature and location of the work 14

Self-Check-3 16

Information Sheet 4 Looking and coordinate Advice from the work supervisor 17

Self-Check-4 19

Information Sheet 5 Coordinating appropriate person to ensure the work effectively with others 20

Self-Check-5 22

Information Sheet 6. Establishing sources of materials……23

Self-Check-6 25

Information Sheet 7obtaining and checking tools, equipment and testing devices ...26

Self-Check-7 37

LO #2. Install audio/video components and systems..... 40

Instruction sheet 40

Information Sheet 1 Following established OHS risk control measures 42

Self-Check1 47

Information Sheet 2 Checking circuits/machines/plant..... 48

Self-Check-2 67

Information Sheet 3 Installing Audio/video components..... 68

Self-Check-3 73

Information Sheet- 4 installing accessories 75

Self-Check-4 78

Information Sheet 5.Terminate Cables and conductors 79

Self-Check-5 88

Information Sheet 6 Following procedures for referring non-routine events to immediate supervisor 89

Self-Check1 90

Information sheet 7 carrying out installation efficiently 91

Self-Check -7 93

LAP Test 97

LO # 3Complete installation work and report 98

Instruction sheet 98

Information Sheet 1 following OHS work completion risk control measures 99

Self-Check1 101

Information Sheet 2 cleaning and making work site safe 103

Self-Check 2 105

Information Sheet 3 Notifying work supervisor for completion of the installation 106

Self-Check 3 108

List of Reference Materials 109

LG #15	LO #1 Prepare to install audio/video components and Systems

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying, obtaining and understanding OHS procedures.
- Reporting and advising on risk control measures
- Obtaining the nature and location of the work.
- Looking and coordinating Advice from the work supervisor
- Coordinating appropriate person to ensure the work effectively with others.
- Establishing sources of materials
- Obtaining and checking tools, equipment and testing devices

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify, obtaining and understanding OHS procedures.
- Report and advising on risk control measures
- Obtain the nature and location of the work.
- Look and coordinating Advice from the work supervisor
- Coordinate appropriate person to ensure the work effectively with others.
- Establish sources of materials
- Obtain and checking tools, equipment and testing devices

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1 Identifying, obtaining and understanding OHS procedures

1 .1Identifying, obtaining and understanding OHS procedures

OHS procedures for a given work area are identified, obtained and understood through established routines Occupational safety and health (OSH), also commonly referred to workplace health and safety (WHS), is a multidisciplinary field concerned with of people at work.

Safety Using Hand Tools and Equipment

- All tools must be kept in good condition with regular maintenance.
- Right tool must be used for job.
- Each tool must be examined before use and damaged or defective tools not to be used.
- Tools must be operated according to manufacturer's instruction.
- The right protective equipment for the tool and activity must be used.

The following is a list of the minimum safety precautions for using a voltmeter:

- Always connect voltmeters in parallel.
- Always start with the highest range of a voltmeter.
- Reenergize and discharge the circuit completely before connecting or disconnecting the voltmeter.
- In dc voltmeters, observe the proper circuit polarity to prevent damage to the meter.
- Never use a dc voltmeter to measure ac voltage

OSH may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

Many people have been scalped in this type of accident.

- Do not wear rings or wrist watches while on the job.
- Such item can be caught by moving machinery.
- It is extremely dangerous to wear them in certain types of work.

- You may lose your fingers.
- Do not wear earrings, neck chains, pendants and bracelets.
- All items or personal jewelry worn at work have the potential to cause an accident or aggravate an injury sustained by an accident.
- Wear personal protective equipment suitable to the kind of work to be done.
- Learn the purpose of each item from the wide range of protective devices available.

The term occupational health and safety is referred to as occupational health and occupational and non-occupational safety and includes safety for activities outside of work.

- Employers have a common law duty to take reasonable care of the safety of their employees.
- Statute law may in addition impose other general duties, introduce specific duties, and create government bodies with powers to regulate workplace safety issues.

All organizations have the duty to ensure that employees and any other person who may be affected by the organization's activities remain safe at all times.

As defined by the World Health Organization (WHO) "occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards.

"The main focus in occupational health is on three different objectives:

- The maintenance and promotion of workers' health and working capacity;
- The improvement of working environment and work to become conducive to safety and health.
- Development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for

participation, training policies and quality management of the undertaking."Occupational health should aim at:

- The promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.
- the prevention amongst workers of departures from health caused by their working conditions;
- the protection of workers in their employment from risks resulting from factors adverse to health;
- the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize,
- the adaptation of work to man and of each man to his job

Arrangements of an organization or enterprise to meet their legal and ethical obligations of ensuring the workplace is safe and without risk to health. This may include:

- hazardous and risk assessment mechanisms
- implementation of safety regulations
- safety training
- safety systems incorporating,
- work clearance procedures
- isolation procedures
- gas and vapor
- monitoring/testing procedures
- use of protective equipment and clothing Ethiopia electronics code
- It is the employer’s responsibility to provide protective clothing and equipment
- Work clothes and specially designed protective clothing designed for your protection.
- Wear the correct clothing and equipment to protect you from possible serious injury.
- Do not interfere with or misuse any item provided by your employer for health and safety.

- Wear plain, tough clothes that are closefitting and keep them buttoned up.
- Loose sleeves, unbuttoned or torn shirts or sweaters, ties or loose belts can easily be caught in revolving machinery.
- Your work clothes should be cleaned regularly.
- Wear cuff less trousers.
- Trouser cuffs may cause you to trip or they may catch sparks or harmful substances.
- Wear suitable footwear and keep it in good repair.
- Wear safety shoes or boots with insulated sole for electrical work.

Burning from hot turning drops of molten metal Safety shoes and boots will reinforce toecaps to protect against heavy falling objects.

Keep long hair under a tight fitting cap or net, as required by the regulations. It is your employer's duty to ensure that machineries have guards to protect employees who work closely to the machine. More so, if your hair is long, it can be easily caught by the machinery, like the frilling machine.

Self-Check1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Say true if the statements is correct and say false if the statements is incorrect

1. Monitoring/testing procedures is personal protective equipment. (3 points)
2. The maintenance and promotion of workers' health and working capacity(2 points)
3. The improvement of working environment and work to become conducive to safety and health (5 points)
4. Hazardous and risk assessment mechanisms is promotion of workers.(2 points)

Note: - Satisfactory rating: 12 and above - Unsatisfactory Rating: below 12

You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet **2 Reporting and advising on risk control measures**

2.1. Reporting and advising on risk control measures

Risk control measures are the steps that are implemented by a company to reduce the chances that any of their employees will be injured on the job, or to reduce the chances that anything they make will cause harm to the community it is produced in.

Proper communication and reporting of organizational risks is important to create risk awareness; but it is even more critical to attempt to influence the sense of urgency or a demand for action among the relevant audiences. Further, it should contribute to the difficult process of solving the problems.

Reporting hazards, incidents and accidents is an essential part of maintaining a safe workplace. We complete safety reports to:

- identify and control hazards
- prevent accidents and injuries
- comply with legal requirements
- Collect evidence for workers' compensation and injury management.

Safety documentation on a construction site is usually completed:

- before work starts – risk assessment documentation
- when a hazard is identified – hazard reports
- After something happens – incident and accident reports.

It should also take responsibility for overall effective risk management and risk reporting.

When communicating and reporting organizational risks, managers should

- report on the complexities of the problem
- define the conflicting values surrounding and sometimes polarizing an issue,
- define a common ground for effective action

The procedures for risk control and risk containment

Risk management is a four step process whereby you identify hazards in the workplace, then assess the risk of those hazards and then implement control measures, which will eliminate or minimize the risk of injury from the hazards you identified.

- Acceptance
- avoidance,
- transference,
- Mitigation or exploitation.
- Accepting the risk means that while you have identified it and logged it in your risk management software, you take no action.
- Accept risk when benefits outweigh the cost. Accept no unnecessary risk.
- Anticipate and manage risk by planning. Make risk decisions in the right time at the right level.

Whenever you're working on any electronic equipment, your own safety has to come first. Every electronic technician must always take safety precautions before he or she starts work. Electricity must be handled properly, or else it can injure or cause fatalities. Here are some basic steps that show you how to avoid accidents from occurring.

Four principles of risk

- Electrical shock
- Discharging (ESD)
- Isolation transformer
- Discharging (beam)

Self-Check-2	Written Test

Directions: Choose the best answer all the questions listed below. Use the Answer sheet provided in the next page:

1. _____ is process identify hazards in the workplace.
   A. Risk management
   B. manage risk
   C. level control
   D. service personnel
2. _____is any source of potential damage
   A. Power amplifiers
   B .hazard
   C .level control

3. Which one the principles of risk.
   A. Discharging
   B. acceptance
   C. avoidance
   D. transference
4. _____ Is ways to manage risk.
   A. hazard
   B. exploitation
   C. Discharging
   D. manage risk

Note: - Satisfactory rating: 9 and above - Unsatisfactory Rating: below 9

You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet- 3 Obtaining the nature and location of the work

Location of the work

Nature of Work Under general supervision, performs full-performance level electronic and electronics communications work necessary for the installation, maintenance, and repair of electronic and electrical equipment for highway illumination, problem control, materials testing, and law enforcement. The focus of electrical engineers is on the generation and supply of power, and the focus of electronics engineers is on applications of electricity to control systems or signal processing. Engineers use basic knowledge collected to solve a wide range of electronics problems.

The nature of an employee's work is best defined as the type of work that he /she does. This can refer to the basic daily tasks carried out as part of a job and can refer to other non-routine tasks that may be required. Added together, the characteristics of these tasks comprise the nature of an employee's work .People in all cultures engage continually in a variety of acts that can be labeled as work.

Traditional societies tend to view work as commonplace, as an affirmation-put simply, as an act people perform as a consequence of living. In contrast, workers whose heritage has been forged in the smokestack economies of industrial society may identify, work in very Concrete terms and place definitive values upon it.

Explores some of the influences on attitudes towards work that exist in

The bases of these attitudes are to be found in the dominant meanings of work that have emerged throughout history. Several of these meanings are traced briefly, and then situated in a contemporary framework.

Following this, the link between ideology and conceptions of work is considered, with particular attention to three social issues that are currently prominent in education-the possible de-skilling of teachers, the impact of the information revolution that is presumed to be occurring and gender in the workplace.

The electrical and electronics industry includes a range of work activities such as using measuring instruments, soldering, using hand, power and specialist tools and constructing circuits

The 3 Kinds of Work (including 2 you should be doing less of)

First, there's work that gets immediate results.

Second, there's work that should be done by someone else.

Third, there's the work that contributes to long-term growth

The positive work

Answer. Positive work: the work done on an object is said to be positive work when force and displacement are in same direction. Example: When an object Moves on horizontal surface, force and displacement acts in forward direction. So, work done is positive.

Images of Work History

Work history of the methods by which society structures the activities and lab our necessary to its survival. Work is essential in providing the basic physical needs of food, clothing, and shelter. But work involves more than the use of tools and techniques.

Throughout history, various meanings have been attached to the notion of work.

In pre-history, for example, hunting was a major work activity. It functioned to both sustain and affirm the essence of life. Hunting myths provided society with a compact between the human and animal worlds.

The activity of hunting, its associated myth sand accompanying acts of appeasement, transposed 'work' into ritual. The world of work comprising all interactions between workers and employers, organizations, and the work environment is marked by the

constant adaptation to changes in the technological, cultural, political, and economic environments.

The study of historical changes in the organization of work can perhaps lead to a better understanding of the present problems now on a worldwide scale that accompany ongoing technical, political, and economic changes.

Self-Check-3	Written Test

Directions: Choose the best answer for questions listed below. Use the Answer sheet provided in the next page:

1. The work done on an object is _____. (6 points each)

A. positive work

B. Negative work

C. transposed

D. appeasement

2. _____Is societies tend to view work as commonplace (4 points each)

A. horizontal surface

B. Traditional

C. society provided

D. conceptions

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 4 Looking and coordinate Advice from the work supervisor

4 .1Looking and coordinate Advice from the work supervisor

Supervision is the most important function of directing and requires a suitable supervisor who can perform the following functions:

- Proper Allocation of Work
- Optimum Utilization of Resources.
- Motivating Subordinates
- Ensuring Effective Communication
- Maintaining Discipline
- Facilitating Feedback

Theprincipalemployerorregisteredmanagermustappointsufficient electrical supervisor s to ensure adequate supervision of the installation, maintenance and testing of electrical equipment. Electrical supervisors are responsible to the registered manager for electrical equipment at the mine In conclusion, an effective supervisor is one who offers leadership and brings the team together. It is someone with good communication skills, neutral, trustworthy, flexible and who knows how to

delegate effectively. The leader should also be a learner and should treat their subordinates as partners.

Supervisor responsibilities include:

- Setting goals for performance and deadlines in ways that comply with company's plans and vision.
- Organizing workflow and ensuring that employees understand their duties or delegated tasks.
- Monitoring employee productivity and providing constructive feedback and coaching.

Employee expectations

- Display a positive and respectful attitude.
- Work with honesty and integrity.
- Represent the organization in a responsible manner.
- Perform their jobs to a reasonable, acceptable standard.
- Maintain good attendance.
- Conduct them-selves in a professional manner, even when off duty.

One of a supervisor's most important responsibilities is managing a team. Often, supervisors create and oversee their team's workflow, or the tasks required to complete a job.

Supervisors must define goals, communicate objectives and monitor team performance.

Crucial Skills Supervisors Need to Have

- Communication
- Conflict Resolution
- Leadership.
- Critical Thinking.
- Interpersonal Skills.
- Time and Priority Management.
- Diversity and Generational Differences in the Workplace.
- Problem Solving.

- the most important thing a supervisor manager can do for you

Self-Check-4	Written Test

Directions: Choose the best answer for questions listed below. Use the Answer sheet provided in the next page:

1. the most important function of directing and requires a suitable supervisor. (5 points each)

A. supervisors create

B. Communication

C. Acceptable standard.

D. Leadership

2. Which one is the Crucial Skills Supervisors.(5 points each)

A. Conflict Resolution

B. Conduct Solving

C. good attendance

D. acceptable standard

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 5 Coordinating appropriate person to ensure the work effectively with others

5.1. Coordinating appropriate person to ensure the work effectively with others

Coordinating appropriate person to ensure the work effectively with other by collaborating, employees and outsourced teams will bond with each other, improving trust, accountability, idea generation, processes and sharing the success resulting from the teamwork

The following are ways that you can demonstrate your desire to work effectively with others:

- Be willing to trust others.
- Be prepared to give the benefit of the doubt when things go wrong.
- Rather than complain when things go wrong,
- offer constructive feedback

Team members motivate and encourage one another, support and give feedback to others. Working in teams enables employees to be quicker and more effective in their work, as compared to people who work on projects on their own. Collaborating also makes employees more responsible, which goes a long way in raising their motivation levels, especially when teams work virtually

Effective teamwork won't happen without a common ground established among all members. Rules and goals that everyone agree to respect are key to a successful cooperation in any kind of project

Conduct them-selves in a professional manner, even when off duty.

One of a supervisor's most important responsibilities is managing a team. Often, supervisors create and oversee their team's workflow, or the tasks required to complete a job.

Self-Check-5	Written Test

Directions: choose best answer for the questions listed below. Use the Answer sheet provided in the next page:

1. _____is teams enables employees to be quicker and more effective (6 points)

   A. Working
   B. Optimum Utilization of Resources
   C. good attendance

2. Which one is the terminology of OSH (4 points)
   A. A hazard is something that can cause harm
   B. OHS safety
   C. Maintaining Discipline
   D. Facilitating Feedback

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 6. Establishing sources of materials

6 .1Establishing sources of materials

Resource materials are publications that contain details of materials, usually on a specific subject.

The main sources are: producers and distributors.

The definition of a primary source may vary depending upon the discipline or context.

- Audio recordings (e.g. radio or internet broadcasts)
- Diaries, Journals, Notes, Autobiographies & Memoirs
- Internet Communications (e.g. email, chat transcripts)
- Interviews (e.g., oral histories, telephone, e-mail);
- Letters, Postcards, & other forms of correspondence
  Newspaper and Magazine articles with eyewitness accounts, original reporting or analysis
- Original Documents
- User Manuals • Video recordings (e.g. television or internet broadcasts)Works of art, architecture, literature

Primary sources are original materials.

They are from the time period involved and have not been filtered through interpretation or evaluation. Primary sources are original materials on which other research is based.

They are usually the first formal appearance of results in physical, print or electronic format. They present original thinking, report a discovery, or share new information.

Bibliographic sources.

Local information sources

- Colleagues in the same organization.
- Resource centre users.
- Other organizations.
- Research and development projects.

- Training programmers.
- Book fairs, exhibitions and conferences.

Definition of a Primary Source: More broadly, reference sources can also include bibliographies, manuals, handbooks, and gazetteers. You can find these resources in print and online

Written sources are those which are in the form of written text. They are used by historians to reconstruct ancient, medieval and modern history. Some examples of written sources that give us information about history are Government are newspapers, reference books and official correspondences

Tools are often classified as hand tools and power tools. Hand tools include all non-powered tools, such as hammers and pliers

Equipment refers to tangible and durable assets that help in the production of other goods and services. Examples of equipment are things like machinery, tools, devices, etc. Materials, on the other hand, form the base of the product.

Self-Check-6	Written Test

Directions: Choose the best answer for questions listed below. Use the Answer sheet provided in the next page:

1. Which one is type of reference sources? (4 points each)

A. dictionaries

B. vehicles

C. machinery

D. printer

1 ._____ is Local information sources. (2 points)

A. network

B. materials

C. other organizations

D. dictionaries

3. _____are particularly important in construction work. (4 points)

A. Tools

B. Interviews

C. non-powered

D. modem

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 7obtaining and checking tools, equipment and testing devices

7.1 Obtaining and checking tools, equipment and testing devices.

Tools and equipment are measuring instruments used in electrical and electronic work.

Checking tools

- Cleaning
- Lubricating
- Tightening
- Simple tool repairs
- Hand sharpening
- Adjustment using correct procedures
- Store Tools safely in appropriate locations

The following items are used for basic measurement of voltages, currents, and components in the circuit under test.

Meter Section

The meter section consists of scales and a pointer enable the voltage value, current value and resistance value to be read. There are various kinds of scales. Check the position of the range selector described below and read the scale that matches the position of the position of the range selector.

DC V: Direct current voltage

AC V: Alternating current voltage

DC A: Direct current current

Ω: Resistance

Range Selector

Select one of the measuring ranges of DC voltage (DC V), AC voltage (AC V), DC current (DC A) or resistance (Ω) by rotating this selector. In each of the ranges a finer range more suitable for measuring the desired value can be selected.

Zero Position Adjuster

If the is not at the zero position, before a measurement it can be adjusted to the zero position using the zero position adjuster.

0Ω Adjuster

After selection of any of the positions (x1, x100, x1K, etc) of the resistance range by the selector for measurement of a resistance, put both test leads in contact with each other and adjust the power to the 0Ω position at this time.

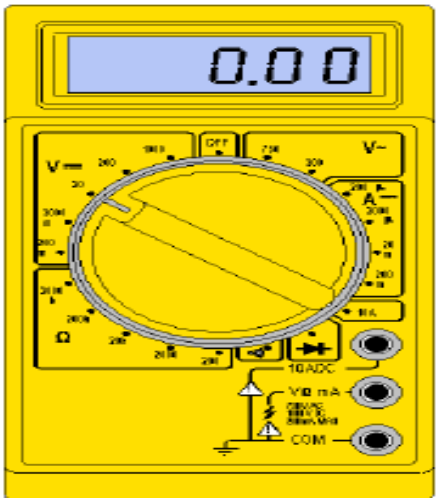
Measuring terminals

The measuring terminals are the + and – (COM) terminals.

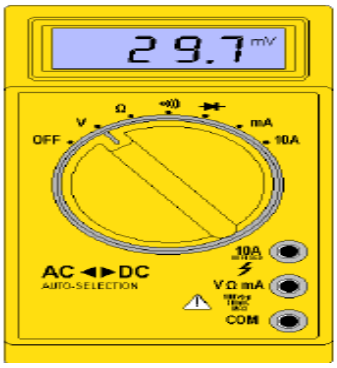
Connect the red test lead to the + terminal and connect black test lead to the – (COM) terminal.

There are 2 styles of digital multi meter

Switched Manually: switch between ranges to get most accurate reading.



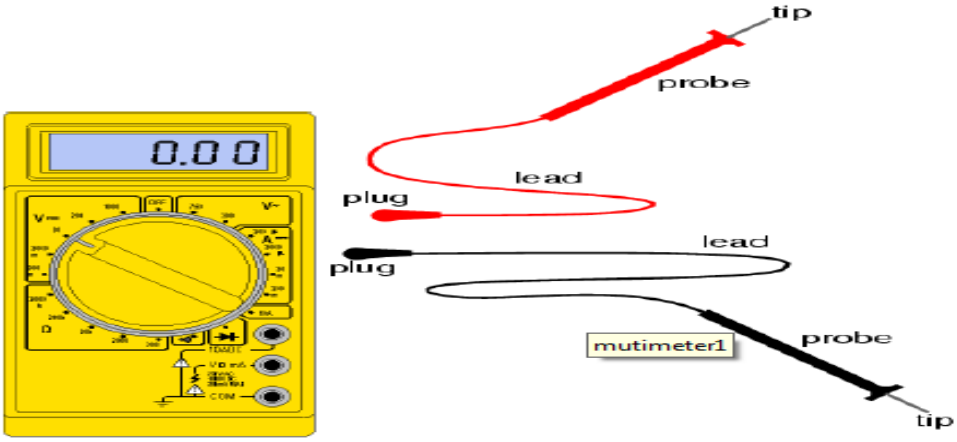
Auto Range: Switches between ranges automatically for best reading.



Both of these styles work the same

Meter leads

- Red meter lead Is connected to Voltage/Resistance or amperage port Is considered the positive connection
- Black meter lead Is always connected to the common port Is considered the negative connection
- Probes Are the handles used to hold tip on the tested connection
- Tips Are at the end of the probe and provides a connection point

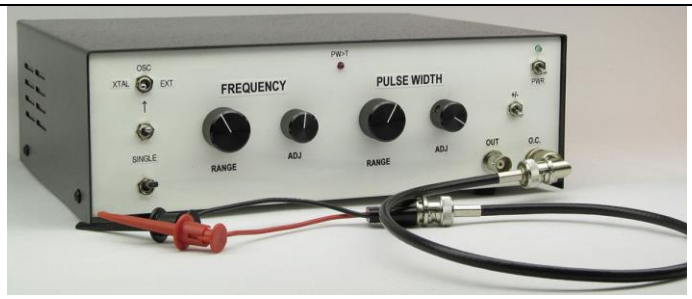


• Voltmeter (Measures voltage)	
• Ohmmeter (Measures resistance)	
• Ammeter, e.g. Galvanometer or Mill Ammeter (Measures current)	

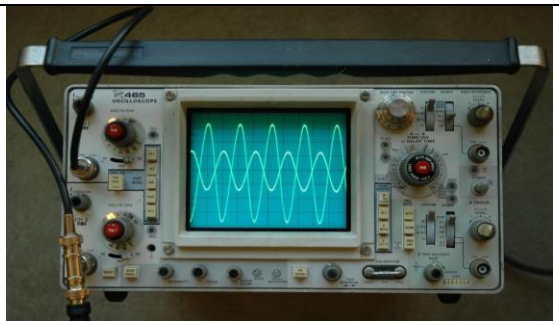
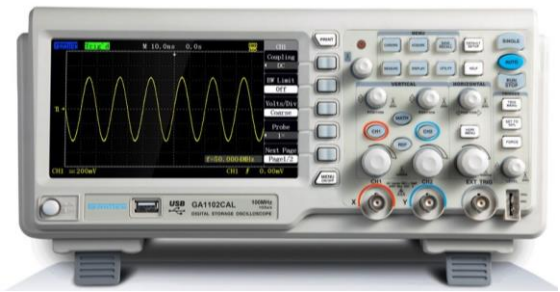
• Multi meter e.g., VOM (Volt-Ohm-Millimeter) or DMM (Digital Multi meter) (Measures all of the above)	• 
• LCR Meter e.g., LCR meter or Resistance, Inductance and capacitance meter (measure LCR values)	

The following are used for stimulus of the circuit under test

• Power supplies	• 

• Signal generator	• 
• Digital pattern generator	• 
• Pulse generator	• 

The following analyze the response of the circuit under test:

• Oscilloscope (Displays voltage as it changes over time)	 

• Frequency counter (Measures frequency) and connecting it all together	
• Test probes	

Advanced or less commonly used equipment **Meters**

Solenoid voltmeter (Wiggly)	

Clamp meter (current transducer)	
Wheatstone bridge (Precisely measures resistance)	
Capacitance meter (Measures capacitance)	
EMF Meter (Measures Electric and Magnetic Fields)	

Electrometer (Measures charge)	

Fig 7.1 **Series Measurement Resistor**

Magnifying Glass It is a convex lens which is used to produce a magnified image of an object. The lens is usually mounted in a frame with a handle (see image). Roger Bacon is the original inventor of the magnifying glass. A magnifying glass works by creating a magnified virtual image of an object behind the lens.

The distance between the lens and the object must be shorter than the focal length of the lens for this to occur. Otherwise, the image appears smaller and inverted, and can be used to project images onto surfaces. The framed lens may be mounted on a stand, keeping the lens at the right distance from the table, and therefore at the right distance from the object on the table. The latter applies if the object is small and also if the height is adjustable. Some magnifying glasses are foldable with built-in light

Fig 7.2 magnifying glass

Anti-Static Brush. It is made of bristles set in handle used for cleaning dirty parts of a circuit or an object.

Fig 7.2. Anti-static brus

Tweezers

Small tweezers is used to hold small components especially when doing soldering and de-soldering of surface mount components.

Fig 7. 4 Tweezers

Selecting testing instrument

Below are the lists of measuring instruments used in electrical and electronic work.

The following items are used for basic measurement of voltages, currents, and components in the circuit under test

Self-Check-7	Written Test

Directions: Answer all the questions listed below. Choose the best answer in the following question. Write the letter on a separate provided.

1._____Is used to hold small components especially when doing soldering and de-soldering of surface mount components.(3point)

A. Long Nose Pliers
B. De soldering Sucker
C. Portable Electric Drill
D. Tweezers

2._____handle used for cleaning dirty parts of a circuit or an object.(2point)

A. Wire Splicer
B. cutting wires
C. Anti-Static Brush
D. Soldering Stand

3._____ Is a convex lens which is used to produce a magnified image of an object(3point).

A. Magnifying Glass
B. Electrometer
C. For soldering
D. Anti-Static Brush

4._____ Frequency counter (Measures frequency) and connecting it all together.2 3point)

A. Electrometer
B. Wire Splicer
C. Clamp meter
D. Oscilloscope

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating:

Name: _____ Date: _____

Operation Sheet 1	**Obtaining and checking tools, equipment and testing devices**

1. Identify each tools, equipment and knowing their function

PROCEDURE:-

Step 1: Follow safety procedure and rule
Step 2: Select the appropriate tool and equipment
Step 3: Identify the appropriate tools and equipment
Step 4: Write their function of each selected tools equipment

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:

- **Did the learner wear PPE?**
- **Did the learner identify required material?**

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools, materials and equipments you are required to perform the following tasks within 5 hour.

Task 1: identify each tools, equipment and knowing their function

LG #16	LO #2. Install audio/video components and systems

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Following established OHS risk control measures
- Checking circuits/machines/plant
- Installing Audio/video components
- Installing accessories
- Terminating cables and conductors.
- Following procedures for referring non-routine events to immediate supervisor
- Carrying out the installation efficiently
- The surrounding environment and using sustainable energy practices

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Follow established OHS risk control measures
- Check circuits/machines/plant
- Install Audio/video components
- Terminate cables and conductors.
- Follow procedures for referring non-routine events to immediate supervisor
- Carry out the installation efficiently
- The surround environment and using sustainable energy practices

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1 Following established OHS risk control measures

1.1 Following established OHS risk control measures

Safety: Relative freedom from danger, risk, or threat of harm, injury, or loss to personnel and/or property, whether caused deliberately or by accident.

Hazards may occur due to improper handling of tools and equipments, unsafe work areas, operating machines without knowing how to operate and using materials out of their intended purpose etc.

Safe Work Practices

- A safe work environment is not enough to control all electric hazards.
- You must also work safely.
- Safe work practices help you control your risk of death from workplace hazards.
- If you are working on electrical circuits or with electrical tools and equipment, you need to use safe work practices.
- All workers should be very familiar with the safety procedures for their jobs.
- You must know how to use specific controls that help keep you safe.
- You must also use good judgment and common sense.
- Safety Procedures in Using Equipment
- We are already familiar with the different Equipment and their proper use.
- Know we need to know how to be safe in using these.
- What are the safety precautions in using hand tools and equipment? What are it's do's and don'ts.

Safety Precautions in Using Equipment

- All Equipment must be kept in good condition with regular maintenance.
- Right tool must be used for job.
- Each tool must be examined before use and damaged or defective tools not to be used.
- Tools must be operated according to manufacturer's instruction.
- The right protective equipment for the tool and activity must be used.

- Procedures in Cleaning, Tightening and Simple Repair for Hand tools and Equipment
- Cleaning the tools after use is highly recommended.
- All tools and equipment must be placed in a clean and dry place.
- The work area must always be kept neat and tidy.
- Lubricants must also be applied after tightening to reduce the friction.
- Before cleaning any tool, be sure to wear the proper personal protective equipment (PPE). Gloves, masks and goggles are usually worn when cleaning tools since most cleaning agents and solutions are harmful to the human body.
- Only use cleaning agents as prescribed by the tool or equipment's manufacturer. Follow the cleaning procedures as well to make sure that no damage will be inflicted on the tools.

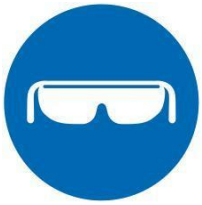
Personal Protective Equipment

Personal Protective Equipment (PPE) is anything used or worn by a person to minimize risk to the person's health or safety and includes a wide range of clothing and safety equipment. PPE includes boots (safety shoes, face masks, hard hats (helmet), ear plugs, respirators, gloves, safety harnesses and high visibility clothing.

Safety For The Head

Wearing a helmet offers protection and can prevent head injuries. Select a sturdy helmet that is adapted to the working conditions. These days you can find many elegant designs and you can choose extra options such as an adjustable interior harness and comfortable sweatbands.

Protect Your Eyes



The eyes are the most complex and fragile parts of our body. Each day, more than 600 people worldwide sustain eye injuries during their work. Thanks to a good pair of safety glasses, these injuries could be prevented. Do you come into contact with bright light or infrared radiation? Then welding goggles or a shield offer the ideal protection!

- Hearing Protection

Do you work in an environment with high sound levels? In that case it is very important to consider hearing protection. Earplugs are very comfortable, but earmuffs are convenient on the work floor as you can quickly put these on or take them off.

- Maintain A Good Respiration

Wearing a mask at work is no luxury, definitely not when coming into contact with hazardous materials. 15% of the employees within the EU inhale vapors, smoke, powder or dusk while performing their job. Dust masks offer protection against fine dust and other dangerous particles. If the materials are truly toxic, use a full-face mask. This adheres tightly to the face, to protect the nose and mouth against harmful pollution.

- Protect Your Hands With The Right Gloves

Hands and fingers are often injured, so it is vital to protect them properly. Depending on the sector you work in, you can choose from gloves for different applications:

- protection against vibrations
- protection against cuts by sharp materials
- protection against cold or heat
- protection against bacteriological risks
- Protection against splashes from diluted chemicals.

Protection For The Feet

Even your feet need solid protection. Safety shoes (type Sb, S1, S2 or S3) and boots (type S4 or S5) are the ideal solution to protect the feet against heavy weights. An antiskid sole is useful when working in a damp environment, definitely if you know that 16,2% of all industrial accidents are caused by tripping or sliding. On slippery surfaces, such as snow and ice, shoe claws are recommended. Special socks can provide extra comfort.

Wear The Correct Work Clothing

Preventing accidents is crucial in a crowded workshop. That is why a good visibility at work is a must: a high-visibility jacket and pants made of a strong fabric can help prevent accidents. Just like the hand protection, there are versions for different applications.

PPE is one of the least effective ways of controlling risks to work health and safety and should only be used:

- when there are no other practical control measures available (as a last resort)
- As an interim measure until a more effective way of controlling the risk can be used, or
- To supplement higher level control measures (as a back-up).

PPE used at a workplace must be:

- selected to minimize risk to work health and safety
- suitable for the nature of the work and any hazard associated with the work
- a suitable size and fit and reasonably comfortable for the person wearing it
- Maintained, repaired or replaced so it continues to minimize the worker's health and safety risk, and Used or worn by the worker, so far as is reasonably practicable.

Selection processes for choosing the right PPE must involve consultation with workers and their representatives and should include:

- a detailed evaluation of the risk and performance requirements for the PPE
- compatibility of PPE items where more than one type of PPE is required (for example ear muffs with a hard hat)
- Consultation with the supplier to ensure PPE is suitable for the work and workplace conditions, and
- Preference for PPE that complies with the relevant Australian Standard or equivalent standard.

Self-Check1	Written Test

Directions: Answer the questions listed below. Use the Answer sheet provided in the next page.

Match the different PPEs with their uses. Write the letter on a separate provided. (5 points)

A	B.
1. Helmet	A Protect the feet against heavy weights
2. Safety glasses	B Protect Hands and fingers against cuts by sharp materials
3. Mask	C. Protect eyes from eye injuries
3. Gloves	D Protect head from head injuries
5. Safety shoes	E Protect workers from inhale vapors, smoke, powder or dusk

Note: - Satisfactory rating: 13 and above - Unsatisfactory Rating: below 13

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 2 Checking circuits/machines/plant

2.1 Checking circuits/machines/plant

An electronic circuit is composed of various types of components. Some of Semiconductor Devices: Semiconductor diode, zener diode, and varactor diode etc.

If the components look fine, you'll need to power up the circuit board. Measure the voltage of the power rails with the multi meter. Both the input and output of the voltage regulator need to show the expected values. Check the fuse if the input voltage measured at the voltage regulator is 0V

Diodes are used in power supplies, for rectification, and in pulse shaping.

Testing (measuring) resistors

- Adjust the meter in resistance range which is greater than the expected value
- Turn a circuit off before measuring resistance.
- Hold the leads of the meter across the resistor leg
- Read the values of the resistor

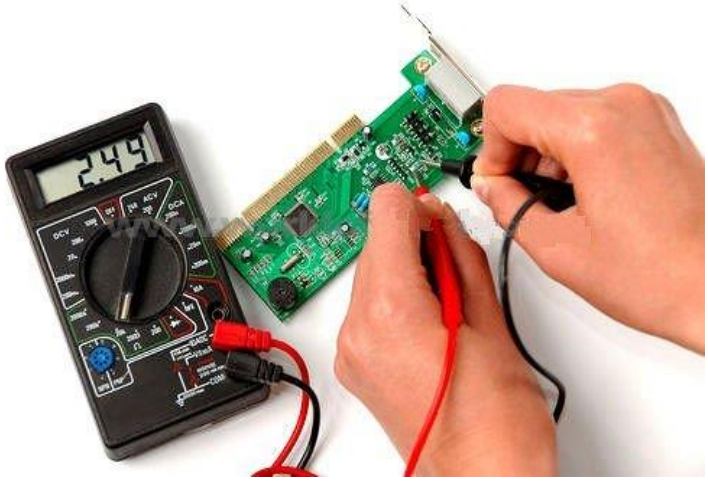


Fig 2,1 testing resistor

Amplifier is the generic term used to describe a circuit which produces and increased version of its input signal. However, not all amplifier circuits are the same as they are classified according to their circuit configurations and modes of operation.

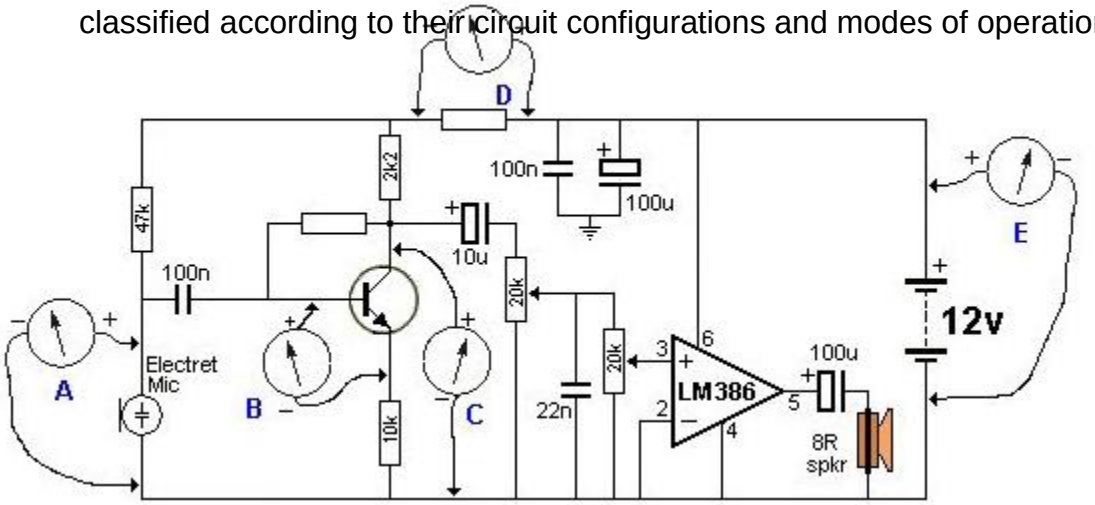


Fig 2.2 measuring voltage of amplifier circuit

in “Electronics”, small signal amplifiers are commonly used devices as they have the ability to amplify a relatively small input signal, for example from a Sensor such as a photo-device, into a much larger output signal to drive a relay, lamp or loudspeaker for example.

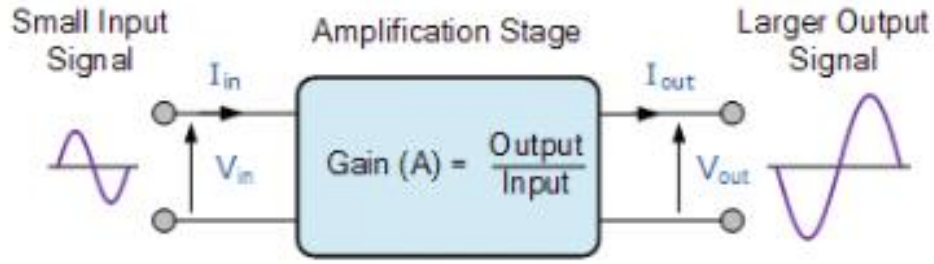


Fig 2.3 amplifier block diagram

There are many forms of electronic circuits classed as amplifiers, from Operational Amplifiers and Small Signal Amplifiers up to Large Signal and Power Amplifiers. The classification of an amplifier depends upon the size of the signal, large or small, its

physical configuration and how it processes the input signal, that is the relationship between input signal and current flowing in the load.

The type or classification of an Amplifier is given in the following table.

Table 2.1. Classification of Signal Amplifier

Type of Signal	Type of Configuration	Classification	Frequency of Operation
Small Signal	Common Emitter	Class A Amplifier	Direct Current (DC)
Large Signal	Common Base	Class B Amplifier	Audio Frequencies (AF)
	Common Collector	Class AB Amplifier	Radio Frequencies (RF)
		Class C Amplifier	VHF, UHF and SHF Frequencies

Amplifiers can be thought of as a simple box or block containing the amplifying device, such as a Bipolar Transistor, Field Effect Transistor or Operational Amplifier, which has two input terminals and two output terminals (ground being common) with the output signal being much greater than that of the input signal as it has been “Amplified”.

An ideal signal amplifier will have three main properties: Input Resistance or (R_{IN}), Output Resistance or (R_{OUT}) and of course amplification known commonly as Gain or (A). No matter how complicated an amplifier circuit is, a general amplifier model can still be used to show the relationship of these three properties.

Ideal Amplifier Model

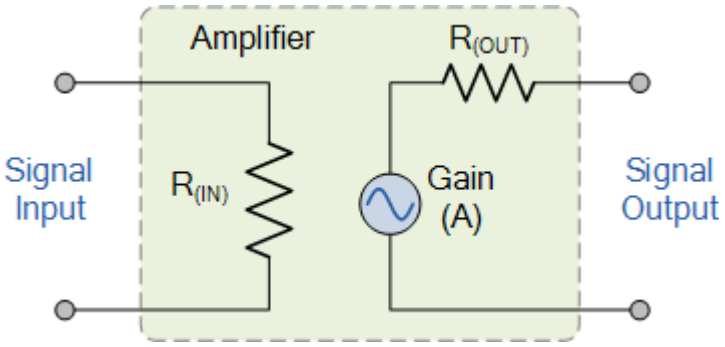


Fig 2.4 Simple representation of ideal amplifier

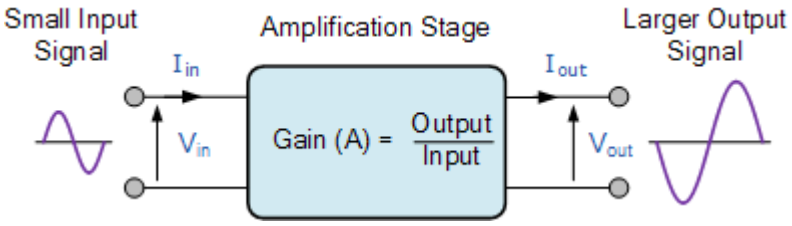
The amplified difference between the input and output signals is known as the Gain of the amplifier. Gain is basically a measure of how much an amplifier “amplifies” the input signal. For example, if we have an input signal of 1 volt and an output of 50 volts, then the gain of the amplifier would be “50”. In other words, the input signal has been increased by a factor of 50. This increase is called Gain.

Amplifier gain is simply the ratio of the output divided-by the input. Gain has no units as its a ratio, but in Electronics it is commonly given the symbol “A”, for Amplification. Then the gain of an amplifier is simply calculated as the “output signal divided by the input signal”.

Amplifier Gain

The introduction to the amplifier gain can be said to be the relationship that exists between the signal measured at the output with the signal measured at the input. There are three different kinds of amplifier gain which can be measured and these are: Voltage Gain (Av), Current Gain (Ai) and Power Gain (Ap) depending upon the quantity being measured with examples of these different types of gains are given below.

Amplifier Gain of the Input Signal



Voltage Amplifier Gain

$$Voltage\,Gain\,(A_v) = \frac{Output\ Voltage}{Input\ Voltage} = \frac{Vout}{Vin}$$

Current Amplifier Gain

$$Current\,Gain\,(A_i) = \frac{Output\ Current}{Input\ Current} = \frac{Iout}{Iin}$$

Power Amplifier Gain

$$Power\,Gain\,(A_p) = A_v\ x\ A_i$$

Note that for the Power Gain you can also divide the power obtained at the output with the power obtained at the input. Also when calculating the gain of an amplifier, the subscripts v, i and p are used to denote the type of signal gain being used.

Ideal Amplifier

We can know specify the characteristics for an ideal amplifier from our discussion above with regards to its Gain, meaning voltage gain:

- The amplifiers gain, (A) should remain constant for varying values of input signal.
- Gain is not be affected by frequency. Signals of all frequencies must be amplified by exactly the same amount.
- The amplifiers gain must not add noise to the output signal. It should remove any noise that is already exists in the input signal.

- The amplifiers gain should not be affected by changes in temperature giving good temperature stability.
- The gain of the amplifier must remain stable over long periods of time.

Electronic Amplifier Classes

The classification of an amplifier as either a voltage or a power amplifier is made by comparing the characteristics of the input and output signals by measuring the amount of time in relation to the input signal that the current flows in the output circuit.

- Class A Amplifier – has low efficiency of less than 40% but good signal reproduction and linearity.
- Class B Amplifier – is twice as efficient as class A amplifiers with a maximum theoretical efficiency of about 70% because the amplifying device only conducts (and uses power) for half of the input signal.
- Class AB Amplifier – has an efficiency rating between that of Class A and Class B but poorer signal reproduction than Class A amplifiers.
- Class C Amplifier – is the most efficient amplifier class but distortion is very high as only a small portion of the input signal is amplified therefore the output signal bears very little resemblance to the input signal. Class C amplifiers have the worst signal reproduction.

Voltage amplifier

A voltage amplifier in simplest form is any circuit that puts out a higher voltage than the input voltage. When you are forced to work with a set amount of voltage, these amplifiers are commonly used to increase the voltage and thus the amount of power coming out of a circuit. This is useful for reading and adapting small signals such as boosting an audio signal before sending it on its way to speakers. The voltage amplifier is a form of the common emitter amplifier, which relies on the transistor; the amplification of voltage is dependent on the ratio of resistors on the collector and emitter of this transistor.

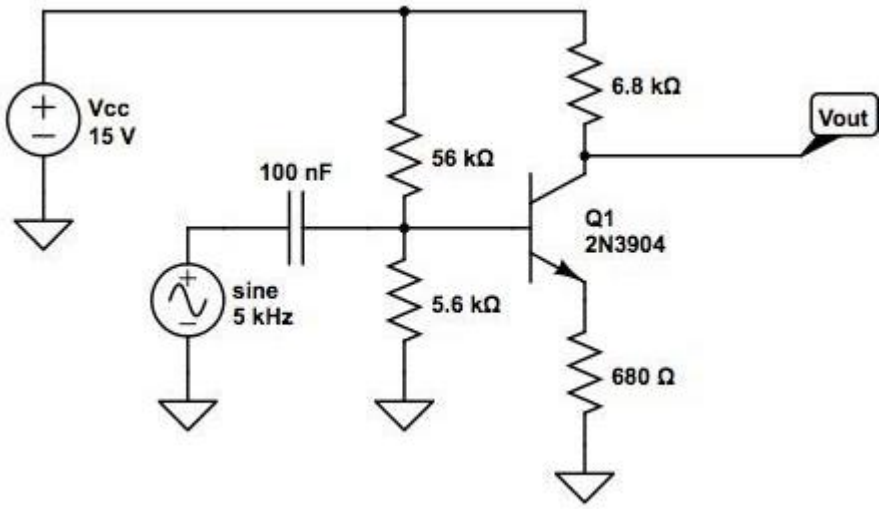


Fig 4.5 Voltage amplifier circuit schematic diagram

Current Amplifiers and Buffers

A Current amplifier is an electronic circuit that increases the magnitude of current of an input signal by a fixed multiple, and feeds it to the succeeding circuit/device. This process is termed as current amplification of an input signal.

The input can either be a constant signal or a time varying waveform. Ideally, during this process of current amplification, the current amplifier will keep the voltage component of the input signal unchanged.

Below is the circuit diagram of a simple 2-stage current amplifier circuit that uses npn and pnp transistors as the amplifying element.

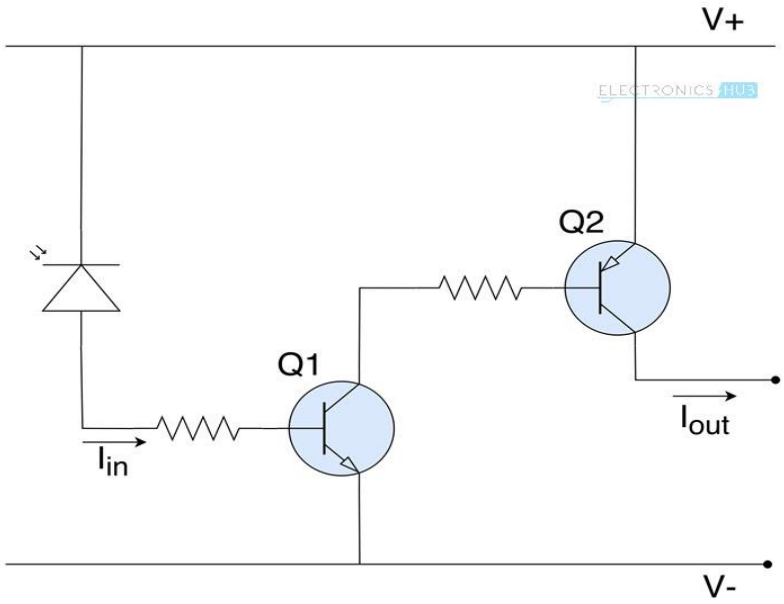


Fig 2.6 current amplifier circuit

The photodiode absorbs energy from light and releases electrons, thereby acting as an input current source. This current from the photodiode is first amplified by the transistor Q1 and is further amplified by the transistor Q2. The resistors at the bases of both the transistors are used to adjust the gain. The number of times a signal is amplified is same as stages in an amplifier. Here the current is amplified twice, so this is a 2-stage current amplifier.

Following are some of the practical applications of current amplifiers:

- In amplifier systems, current amplifiers are used to obtain a better bass output, by increasing the intensity with which the speakers are driven.
- Current amplifiers with variable gain are used in many industrial manufacturing systems like laser and water jet cutting machines to control the intensity with which the fabrication is done
- In sensor systems, current amplifiers are used to strengthen weak input signals, for use in subsequent circuits

Current Buffer

Current buffer is an electronic circuit that is used to transfer electric current from input source having very less impedance (effective resistance) to output loads with high impedance. It is designed to prevent signal sources from getting affected because of any differences in the amount of current drawn by output loads.In most scenarios it acts as a bridge between weak input signals (like signals from sensors) and output loads that might draw larger currents. Below is the diagram of an ideal current buffer.

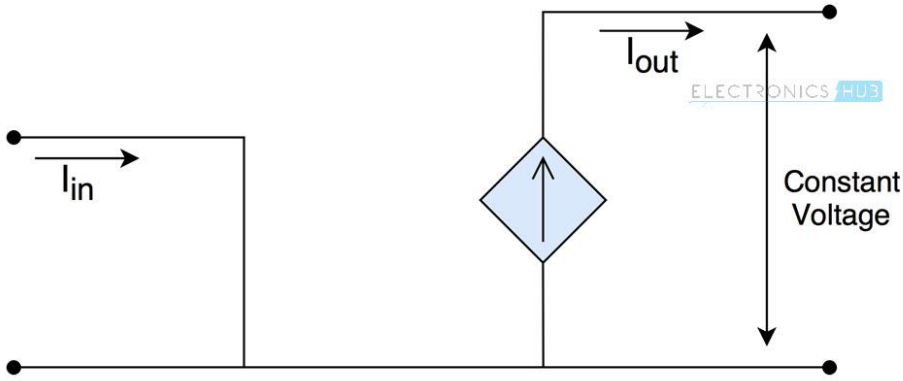


Fig 2. 7 Ideal current buffer

It is primarily designed to remove the influence of output load on the input source. So you can think of current buffer as a circuit that isolates input and output circuitries while allowing the required flow of current to the output load in order to maintain a constant voltage across it.

Practical Use of a Current Buffer

Consider a circuit that uses an LDR sensor to drive a robot. The current consumed by the motors of robot is not constant and depends on the surface inclination or roughness i.e load on the motors.

Therefore, if the motors are directly coupled with the temperature sensor using a current amplifier or other similar drivers, the motors might sometimes draw more current, which affects the accuracy of the sensor. The voltage across the motors will change as well, which in turn changes speed of the robot.

In order to prevent that from happening, current buffers are used. They can provide desired current to the motors without affecting accuracy of the sensor, while maintaining a constant voltage across the terminals of motors i.e. output loads.

Current Follower

A current buffer circuit with a Gain of 1 (i.e. the input and output currents are the same) is named as a current follower. It means that a current follower circuit does not provide any amplification of current to the input signal.

You might be wondering why a current follower circuit is used as the input and output currents from the current follower are the same.

The reason is that a current follower not used to increase the output current.

But it is used to isolate input and output terminals while allowing the same amount of current flow into the input, and from the output. This is the reason why current follower circuits are also called as isolation buffers.

Below is the circuit diagram of a simple MOSFET current buffer.

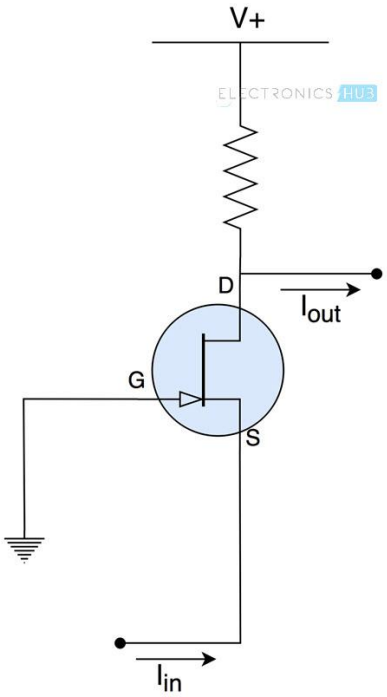


Fig 2.8 A simple MOSFET current buffer circuit

This arrangement provides very less impedance to the input signal and high impedance at the output terminal, making it a near ideal current buffer.

Applications of Current Buffers

Following are some of the practical applications of current buffers:

- In digital logic gates, current buffers are used to isolate input signals from the succeeding circuits
- Current buffers are used in high precise sensor systems in order to reduce the influence of voltage/current fluctuations because of varying output impedances
- In motor drivers and other electrical actuator systems

Power Amplifier

A power amplifier is an electronic amplifier designed to increase the magnitude of power of a given input signal. The power of the input signal is increased to a level high enough to drive loads of output devices like speakers, headphones, RF transmitters etc. Unlike voltage/current amplifiers, a power amplifier is designed to drive loads directly and is used as a final block in an amplifier chain.

The input signal to a power amplifier needs to be above a certain threshold. So instead of directly passing the raw audio/RF signal to the power amplifier, it is first pre-amplified using current/voltage amplifiers and is sent as input to the power amp after making necessary modifications. You can observe the block diagram of an audio amplifier and the usage of power amplifier below.

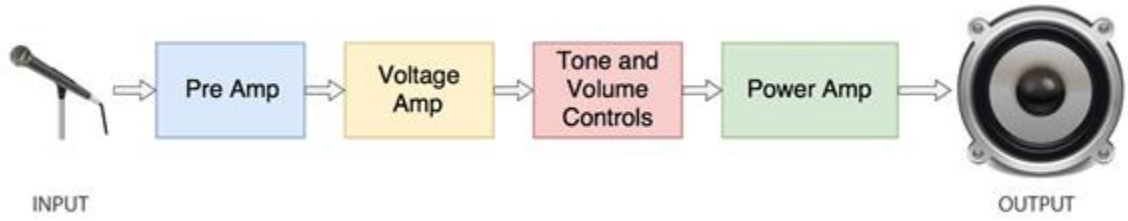


Fig 2.9 Block diagram of an audio amplifier

In this case a microphone is used as an input source. The magnitude of signal from the microphone is not enough for the power amplifier. So first it is pre-amplified where its voltage and current are increased slightly. Then the signal is passed through tone and volume controls circuit which makes aesthetic adjustments to the audio waveform. Finally the signal is passed through a power amplifier and the output from power amp is fed to a speaker.

Types of Power Amplifiers

Depending on the type of output device that is connected, power amplifiers are divided into the following three types.

Audio Power Amplifiers

This type of power amplifiers are used for increasing the magnitude of power of a weaker audio Signal. The amplifiers used in speaker driving circuitries of televisions, mobile phones etc. come under this category.

The output of an audio power amplifier ranges from a few mill watts (like in headphone amplifiers) to thousands of watts (like power amplifiers in Home theatre systems).

Radio Frequency Power Amplifiers

Wireless transmissions require modulated waves to be sent over long distances via air. The signals are transmitted using antennas and the range of transmission depends on the magnitude of power of signals fed to the antenna.

For wireless transmissions like FM broadcasting, antennas require input signals at thousands of kilowatts of power. Here, Radio Frequency Power amplifiers are employed to increase the magnitude of power of modulated waves to a level high enough for reaching required transmission distance.

DC Power Amplifiers

DC power amplifiers are used to amplify the power of a PWM(Pulse Width Modulated) signals. They are used in electronic control systems which need high power signals to drive motors or actuators. They take input from microcontroller systems, increase its power and feed the amplified signal to DC motors or Actuators.

Power Amplifier Classes

There are multiple ways of designing a power amplifier circuit.

The operation and output characteristics of each of the circuit configurations differ from each other.

To differentiate the characteristics and behavior of different power amplifier circuits, Power Amplifier Classes are used in which letter symbols are assigned to identify the method of operation.

They are broadly classified into two categories. Power amplifiers designed to amplify analog signals come under A, B, AB or C category. Power amplifiers designed to amplify Pulse Width Modulated (PWM) digital signals come under D, E, F etc.

The most commonly used power amplifiers are the ones that are used in audio amplifier circuits and they come under classes A, B, AB or C. So let's take a look at them in detail.

Class A Power Amplifier

Analog waveforms are made up of positive highs and negative lows. In this class of amplifiers, the entire input waveform is used in the amplification process.

A single transistor is used to amplify both the positive and negative halves of the waveform. This makes their design simple and makes class A amplifiers the most commonly used type of power amplifiers. Although these classes of power amplifiers are superseded by better designs, they are still popular among hobbyists.

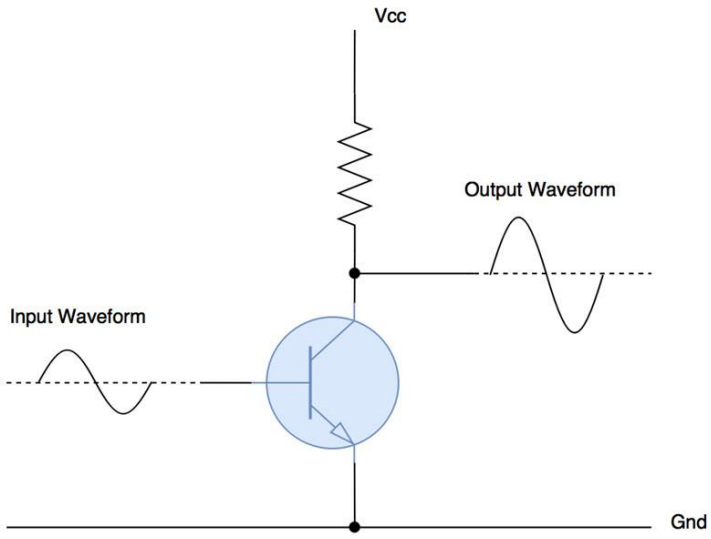


Fig 2.10 Class a Power Amplifier

In this class of amplifiers, the active element (the electronic component used for amplifying, which is transistor in this case) is in use all the time even if there is no input signal. This generates lot of heat and reduces the efficiency of class A amplifiers to 25% in normal configuration and 50% in a transformer coupled configuration.

The conduction angle (the portion of waveform used for amplification, out of 360°) for class A amplifiers is 360°. So the signal distortion levels are very less allowing better high frequency performance.

Class B Power Amplifier

Class B power amplifiers are designed to reduce the efficiency and heating problems present in the class A amplifiers. Instead of a single transistor to amplify the entire waveform, this class of amplifiers uses two complementary transistors.

One transistor amplifies positive half of the waveform and the other amplifies negative half of the waveform. So each active device conducts for one half (180°) of the waveform and two of them when combined amplify the entire signal.

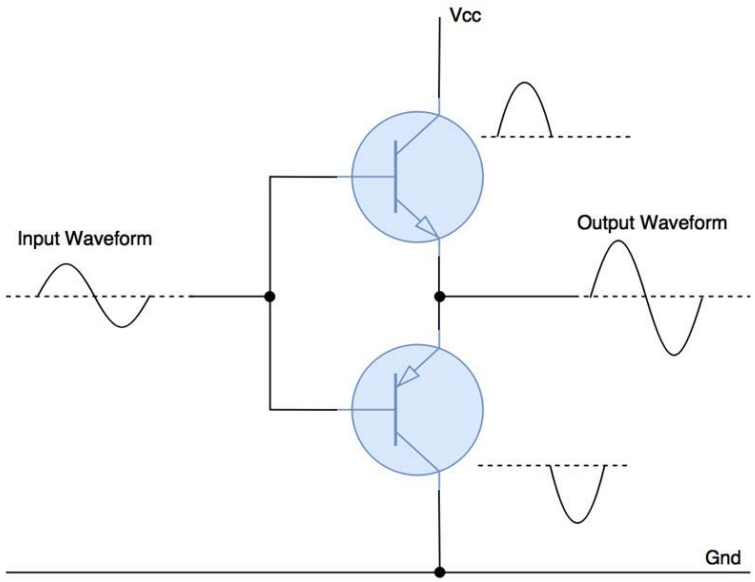


Fig 2.11Class B Power Amplifier

The efficiency of class B amplifiers is improved a lot over class A amplifiers because of two transistor design. They can reach at AAQ theoretical efficiency of about 75%. Power amplifiers of this class are used in battery operated devices like FM radios and transistor radios.

Because of superposition of two halves of the waveform, there exists a small distortion at the crossover region. To reduce this signal distortion, class AB amplifiers are designed.

Class AB Power Amplifier

Class AB amplifiers are a combination of class A and class B amplifiers.

These classes of amplifiers are designed to reduce the less efficiency problem of class A amplifiers and distortion of signal at crossover region in class B amplifiers.

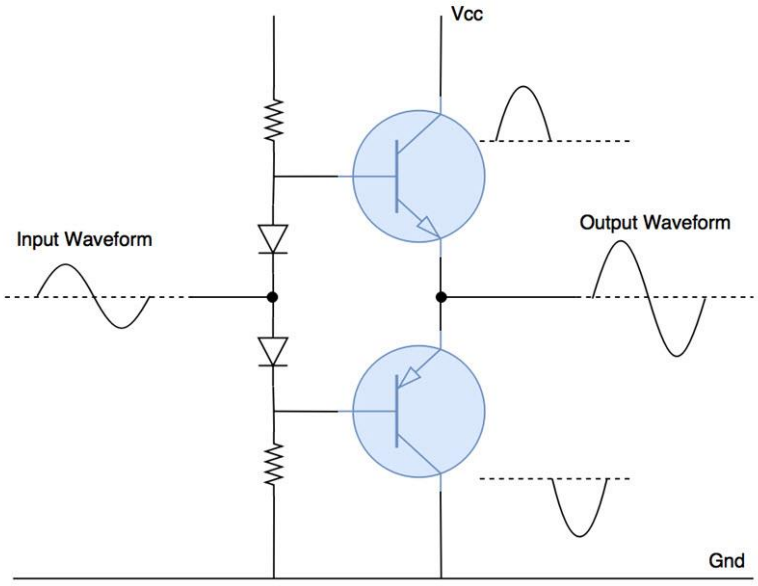


Fig 2.12 Class AB Power Amplifier

It maintains high frequency response like in class A amplifiers and good efficiency as in class B amplifiers. A combination of diodes and resistors are used to provide little bias voltage which reduces the distortion of waveform near the crossover region. There is a little drop in efficiency (60%) because of this.

Class C Power Amplifier

The design of class C power amplifiers allows greater efficiencies but reduces the linearity/conduction angle, which is under 90°. In other words, it sacrifices quality of amplification for increase in efficiency.

Lesser conduction angle implies greater distortion and so these classes of amplifiers are not suited for audio amplification. They are used in high frequency oscillators and amplification of Radio Frequency signals.

Class C amplifiers generally contain a tuned load which filters and amplifies input signals of certain frequency, and the waveforms of other frequencies are suppressed.

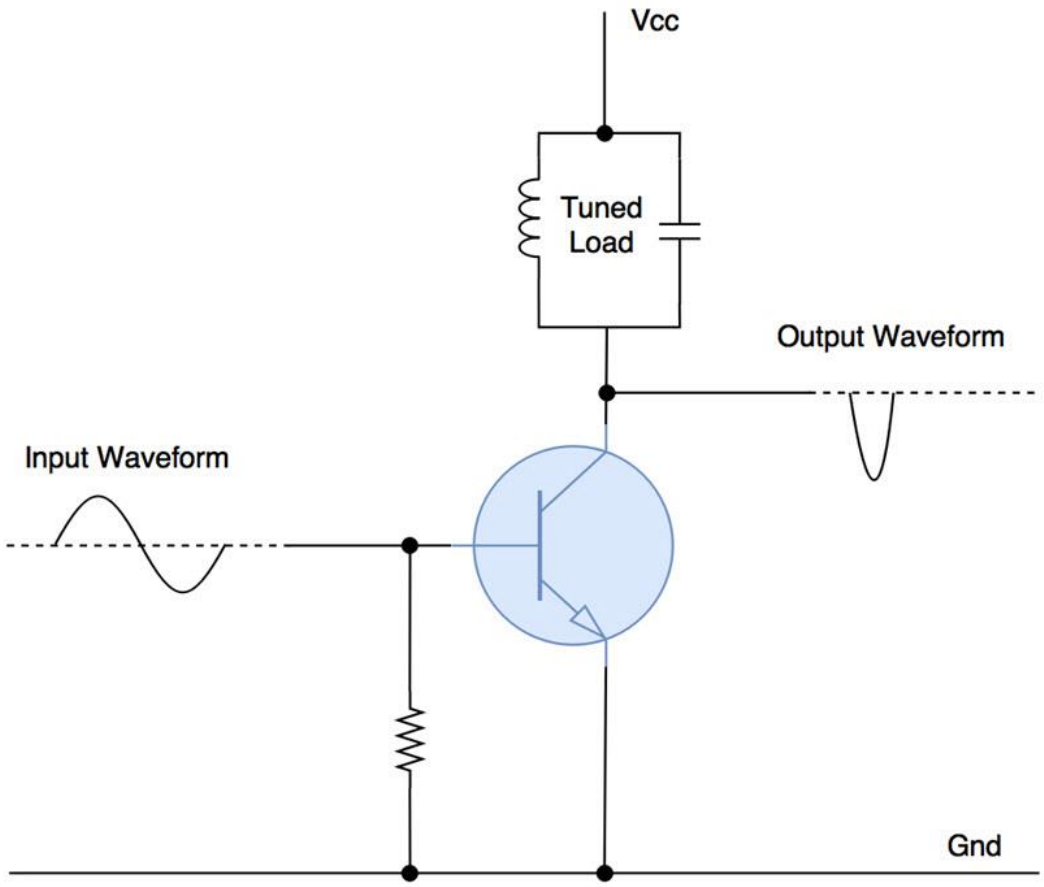


Fig 2.13 Class C Power Amplifier

In this type of power amplifier, the active element conducts only when the input voltage is above a certain threshold, which reduces power dissipation and increases efficiency.

Other Power Amplifier Classes

Power amplifier classes D, E, F, G etc. are used to amplify PWM modulated digital signals. They come under the category of switching power amplifiers and turn the output either constantly ON or constantly OFF without any other levels in between.

Because of this simplicity, power amplifiers falling under the above mentioned classes can reach theoretical efficiencies of up to (90-100)%.

Applications

Below are the applications of power amplifiers across different sectors:

- Consumer Electronics: Audio power amplifiers are used in almost all consumer electronic devices ranging from microwave ovens, headphone drivers, televisions,

mobile phones and Home theatre systems to theatrical and concert reinforcement systems.

- Industrial: Switching type power amplifiers are used for controlling most of the industrial actuator systems like servos and DC motors.
- Wireless Communication: High power amplifiers are important in transmission of cellular or FM broadcasting signals to users. Higher power levels made possible because of power amplifiers increases data transfer rates and usability. They are also used in satellite communication equipment.

Oscillator

An oscillator is a circuit which produces a continuous, repeated, alternating waveform without any input. Oscillators basically convert unidirectional current flow from a DC source into an alternating waveform which is of the desired frequency, as decided by its circuit components.

The basic principle behind the working of oscillators can be understood by analyzing the behavior of an LC tank circuit shown in Figure 1 below, which employs an inductor L and a completely pre-charged capacitor C as its components. Here, at first, the capacitor starts to discharge via the inductor, which results in the conversion of its electrical energy into the electromagnetic field, which can be stored in the inductor. Once the capacitor discharges completely, there will be no current flow in the circuit.

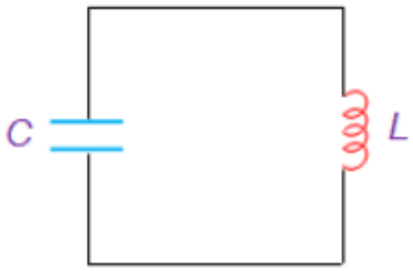


Fig 2.14 LC tank circuit

However, by then, the stored electromagnetic field would have generated a back-emf which results in the flow of current through the circuit in the same direction as that of before. This current flow through the circuit continues until the electromagnetic field collapses which result in the back-conversion of electromagnetic energy into electrical

form, causing the cycle to repeat. However, now the capacitor would have charged with the opposite polarity, due to which one gets an oscillating waveform as the output.

However, the oscillations which arise due to the inter-conversion between the two energy-forms cannot continue forever as they would be subjected to the effect of energy loss due to the resistance of the circuit. As a result, the amplitude of these oscillations decreases steadily to become zero, which makes them damped in nature.

This indicates that in order to obtain the oscillations which are continuous and of constant amplitude, one needs to compensate for the energy loss. Nevertheless, it is to be noted that the energy supplied should be precisely controlled and must be equal to that of the energy lost in order to obtain the oscillations with constant amplitude.

This is because, if the energy supplied is more than the energy lost, then the amplitude of the oscillations will increase (Figure 2a) leading to a distorted output; while if the energy supplied is less than the energy lost, then the amplitude of the oscillations will decrease (Figure 2b) leading to unsustainable oscillations.

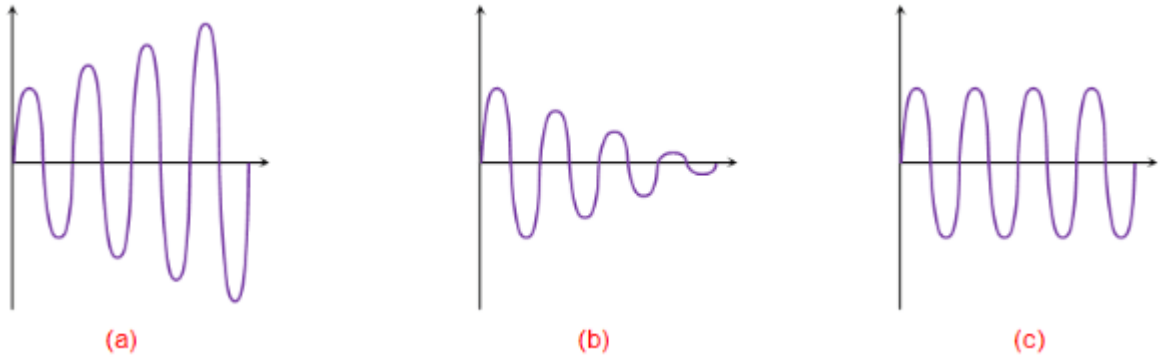


Fig 2.15 (a)Increasing oscillations (b)Decaying oscillations (c)Constant-Amplitude oscillation

Practically, the oscillators are nothing but the amplifier circuits which are provided with a positive or regenerative feedback wherein a part of the output signal is fed back to the input (Figure 3). Here the amplifier consists of an amplifying active element which can be a transistor or an Op-Amp and the back-fed in-phase signal is held responsible to keep-up (sustain) the oscillations by making-up for the losses in the circuit.

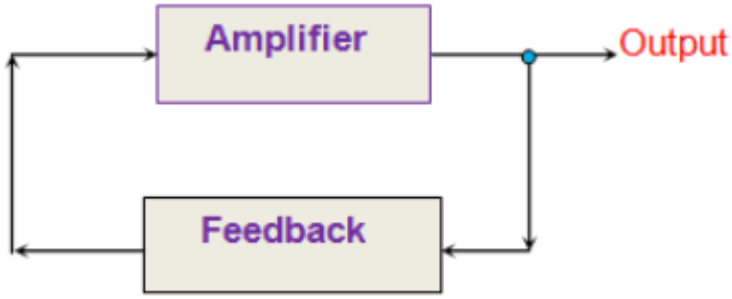


Fig 2.16 typical oscillator

Once the power supply is switched ON, the oscillations will be initiated in the system due to the electronic noise present in it. This noise signal travels around the loop, gets amplified and converges to a single frequency sine wave very quickly. The expression for the closed-loop gain of the oscillator shown in Figure 3 is given as:

$$G = \frac{A}{1 + A\beta}$$

Where A is the voltage gain of the amplifier and β is the gain of the feedback network. Here, if Aβ > 1, then the oscillations will increase in amplitude (Figure 2a); while if Aβ < 1, then the oscillations will be damped (Figure 2b). On the other hand, Aβ = 1 leads to the oscillations which are of constant amplitude (Figure 2c). In other words, this indicates that if the feedback loop gain is small, then the oscillation dies-out, while if the gain of the feedback loop is large, then the output will be distorted; and only if the gain of feedback is unity, then the oscillations will be of constant amplitude leading to self-sustained oscillatory circuit.

.

Self-Check-2	Written Test

Directions: Answer the questions listed below. Use the Answer sheet provided in the next page.

Choose the best answer in the following question. Write the letter on a separate provided

1. ---------- Has low efficiency of less than 40% but good signal reproduction and linearity (5 points)
   A. Oscillator
   B. Industrial
   C. Class A Amplifier
   D. Class B Amplifier

2._____ Is an electronic amplifier designed to increase the magnitude of power of a given input signal. (4 points)
   A. voltage amplifier
   B. A power amplifier
   C. Class C Amplifier

3._____ A simplest form is any circuit that puts out a higher voltage than the input voltage. : (3 points)
   A. Class B Amplifier
   B. voltage amplifier
   C. Electronics

Note: - Satisfactory rating: 12 and above - Unsatisfactory Rating: below 12

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 3 Installing Audio/video components

3.1 Installing Audio/video components

Audio/video components are installed to comply with standards and job specifications with sufficient excess to affect terminations. Audio/Video systems are the partnership of high definition televisions and audiophile grade speaker systems, integrated together at one centralized location. An Audio/Video system brings flawless picture and sound to any home or business, via customized and precisely placed televisions and speakers.

Audiovisual (AV) is electronic media possessing both a sound and a visual component, such as slide-tape presentations, films, television programs, corporate conferencing, church services and live theater productions

Audiovisual systems are usually designed to solve a communication need, so they may consist of one or several of the following components.

- Audio and video conferencing solutions.
- Digital displays and signage.
- Video walls.
- Interactive displays.
- Audio enhancement technology.
- Control systems.
- To begin with the main difference is that within visual media the audience can see what is going on, which means that within audio media it, is vital for the producers and presenters to paint a picture for the programmer to become successful.

Difference between Audio and Video is that Audio includes music, speech, or any other sound. Simple applications on the Web consist of individual audio files available for download to a computer or device. While video consists of images displayed in motion. Most video also has accompanying audio

Some important audio terminology

A few basic terms are used frequently when dealing with audio and sound reinforcement system:

Amplitude: the 'height' of a waveform, heard by the ear as volume. Increasing the amplitude of a noise will make it sound louder

DB or decibels: these are figures used to express the volume or Sound Pressure Level (SPL) of a noise.

Odb is at the threshold of hearing - only just audible. 40 dB is at normal conversation level. 100 dB is equivalent to the sound of a train passing nearby130 dB is the threshold of pain and 150 dB is a jet engine at one meter.

Frequency: the 'speed' of a waveform, heard as pitch, that is, how high or low sounds are to the ear.

Ohms: the unit of electrical resistance. For example, the higher the ohm rating of a speaker, the greater the level of signal required to create the same volume from a lower ohm rated speaker.

Except for frequency (which is heard as pitch), all of the terms explained above are either directly or indirectly concerned with signal level.

This is due partly to the fact that sound operators are constantly trying to achieve the perfect balance of signal levels, but also because different components are designed to work optimally at very different levels microphone level, line level or loudspeaker level.

Microphone level: microphone (or mica) level is a very low level of voltage, measured in thousandths of a volt, which is present at the output of a microphone. Microphone signals must be amplified at a pre-amp or at the microphone input on a mixing desk.

Line level: equipment such as CD players, tape recorders, signal processors and mixing desks transmit (and receive) their audio signals at line level. This is still a relatively low level, with the standard set at 0.775 volts, usually referred to as 0dBu, which is equivalent to the softest sound audible to a young person with excellent hearing.

Loudspeaker level: loudspeaker (or speaker) level is significantly higher than line level. Signals at line level would not produce enough power to make loudspeakers move and would therefore not produce sound. Line level signals are increased by power amplifiers

which increase the voltage of the signal. This then becomes an increase in amplitude and thus SPL at the speaker.

Public Address System (PAS) Is system for amplifying speech so that it can be heard by larger gathering and longer distance? If everyone in audience can hear the speech comfortable without being aware of the PAS in use the installation can be claimed to quite successful.

Importance of Public Address System It is important for solving a basic problem associated with any communication system particularly they one connected with human users.

Basic requirements of PA system

A good PA system should satisfy the following basic requirements:

Comfortable level:- the sound must be at a sufficiently high level or volume so that it can be heard all part of hall. However the volume can be not achieved at expense classify

Intelligibility: - the purpose of PA system is to provide a good communication link between the speaker and audience.

- Nothing is to enable the audience to hear the sound without understanding what he/she saying.
- **Naturalness**:-the audience should just hear what appears to be the natural voice of speaker without being aware of equipment use .
- **Reliability**:- the equipment should be reliable particularly when large installation are involved. A break down during an important meeting or speech can be distorted.

Requirements of PA system

- The acoustic feedback sound is should not occur
- The amplifiers audio output power is should be sufficient by using audio speaker.
- Excessive reverberation should be reduced by proper placement of loudspeaker
- The loudspeaker should be properly oriented to direct sound.
- The noise cancelling microphones should be used

The microphones should be carefully selected to nature of program Microphones leads should be isolated from a leads eliminate to pick up hum

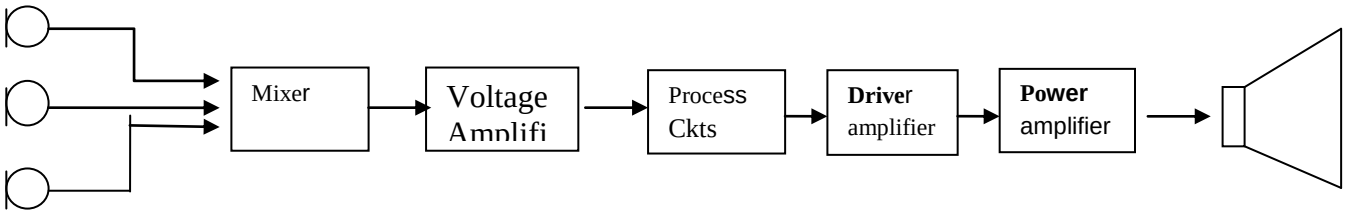
In general the basic requirements of PA system are comfortable level, intelligibility naturalness, and reliability.

Public Address System Needs and Use

The intensity of sound decreases with distance. Hence when a large gathering is to be addressed, sound needs to be amplified so that people at a distance from the rostrum or stage may receive good intensity of sound for comfortable listening. The system which fulfills this function is called public address system or simply 'PA' System. It is used in sport meets, public meetings, auditoriums, concerts, functions, etc .It also used convey information to isolated locations as at Railway station, Airports, Hospitals, Factories, etc.

Block diagram of P.A System.

It is electro acoustic system in which sound is first converted into electrical signals by a microphone. The electrical audio signals are amplified, processed and fed to another transducer, the loudspeaker, which converts signal into sound waves. A block diagram of a basic PA System is shown in fig. 3.1 the function of each block of PA system is described blew.



3.1 block diagram of a basic PA System

Microphones: It picks up sound waves and converts them in to electrical variations called audio signals. Generally, amplifiers have provision of 2 or more microphones and in addition an auxiliary input for tape/recorder player.

Mixer: The output of mixer is fed to a mixer stage. The function of the mixer stage is to effectively isolate different channels from each other before feeding to the main amplifier. It can be either a built in unit or a separate plug able (concentrated).

Voltage amplifier: It further amplifies the output of mixer

Processing circuits: This ckt have master gain control and tone –controls (bass/treble controls).

Driver amplifier: It gives the voltage amplification to the signals power amplifier it drives the power amplifiers to give more power

Power amplifier: It gives desired power amplification to signals and it's the output is connected to the loudspeaker through the matching transformer.

Loudspeaker: It is converted electrical audio signals into pressure variation of sound.

The Output Properties of Amplifiers

Amplifiers are used to increase the amplitude of a voltage or current, or to increase the amount of power available usually from an AC signal. Whatever the task, there are three categories of amplifier that relate to the properties of their output.

- Voltage amplifiers.
- Current amplifiers.
- Power amplifiers.

The purpose of a voltage amplifier is to make the amplitude of the output voltage waveform greater than that of the input voltage waveform (although the amplitude of the output current may be greater or smaller than that of the input current, this change is less important for the amplifier's designed purpose).

The purpose of a current amplifier is to make the amplitude of the output current waveform greater than that of the input current waveform (although the amplitude of the output voltage may be greater or smaller than that of the input voltage, this change is less important for the amplifier's designed purpose).In a power amplifier, the product of voltage and current (i.e. power = voltage x current) at the output is greater than the product of voltage x current at the input. Note that either voltage or current may be less at the output than at the input. It is the product of the two that is significantly increased

Self-Check-3	Written Test

Directions: Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1._____ Is converted electrical audio signals into pressure variation of sound (4 points)

A. Voltage amplifiers.

B. Current amplifiers.

C. Loudspeaker

2._____ further amplifies the output of mixer (3 points)

A. Loudspeaker.

B. Current amplifiers.

C. Voltage amplifier

D Driver amplifier

3. This ckt have master gain control and tone –controls (bass/treble controls). (3 points)

A. Driver amplifier.

B. Current amplifiers.

C. Voltage amplifier

D. Processing circuits

4._____Is gives the voltage amplification to the signals power amplifier it drives the power amplifiers to give more power. (5 points)

A. Driver amplifier

B. Current amplifiers.

C. Voltage amplifier

D. Processing circuits

Note: - Satisfactory rating: 16 and above - Unsatisfactory Rating: below 16

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet- 4 installing accessories

1.1 Installing accessories

Accessories are items of equipment that are not usually essential, but which can be used with or added to something else in order to make it more efficient.

Mobile accessories are meant to complement phones.

Hence, users used to buy mobile covers online India to maximize their convenience. An accessory is anything that is external to the phone. For instance, headphones and chargers are some of the most common accessories.

The following are the different types of mobile phone accessories:

Cases/Covers

Any phone owner who is concerned about prolonging their phone's lifespan has to consider availing of a phone case. Luckily, there is an abundance of mobile covers online. Most online stores that sell gadgets have these in stock. The different types of covers include pouches, sleeves, straps, bumpers, and other features.

Phone Camera Lenses And Smart Flash

Mobile photography is an increasingly pervasive form of photography thanks to technological advancements that allow for better quality phone cameras. Hence, a mobile photography enthusiast would most likely be interested in lenses that offer all kinds of features such as the ability to be triggered via an app and the ability to use optical zoom. Smart flash is also quite handy in conditions wherein there is a lack of light such as concerts, clubs, and night parties.

Tripod

The tripod is another very important tool in any photographer's arsenal. Oftentimes, the picture quality is ruined because of camera shakiness. The tripod is designed to eliminate shakiness in order to produce the sharpest image. Simply mount the phone on

the tripod and place the object of interest within the frame. Then, set the timer and wait for the camera to finish capturing the image.

Chargers And Batteries

The battery is the life source of the phone. Hence, this is an extremely important accessory. A good battery may mean the difference between long battery life and short battery life. Of course, batteries are paired with chargers. Batteries do run out and chargers make sure that batteries are ready for usage. Phones are dependent on batteries and chargers. Thus, these are essential accessories to have. Today, there are power banks available for use. They function as an extra battery to give power to mobile phones in case they run out of power.

HDMI Cables

Newer phones offer the capability of projecting PowerPoint presentations. This is especially useful for people who are employed and their line of work requires them to present reports, proposals, and the like. Thus, HDMI cables or USB-to-HDMI converters are very useful and emphasize the multi-tasking capabilities of phones.

For the tech-savvy user, accessories are extremely useful for a variety of purposes. Photography, office use, and plain curiosity are all good reasons to consider utilizing mobile phone accessories. Additionally, mobile phones depend on some accessories such as chargers and batteries. Overall, mobile phone accessories are meant to maximize user satisfaction and bring out the best in mobile phones

It comprises several different components such as resistors, transistors, capacitors, inductors, and diodes. Conductive wires or traces are used to connect the components to each other. However, a circuit is complete only if it starts and ends at the same point, forming a loop.

4 .1.1Square

A speed square can be found on the hip of carpenters

Mixing desks

A mixing desk, also called a mixing console, mixing board, sound board or simply mixer, is designed to manage the many and varied sound sources, sound effects, signal processors, amplifier and speaker configurations required for more complex productions, events..

Self-Check-4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1._____ is the life source of the phone (5 points)

A. battery
B. amplifier circuit
C. Signals are sent to an input

2._____ are items of equipment that are not usually essential (7points)

A. resistor
B. power
C. Accessories
D. component

Note: - Satisfactory rating: 12 and above - Unsatisfactory Rating: below 12

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 5.Terminate Cables and conductors

5 .1Terminate Cables and conductors

Cable Termination is the connection of the wire or fiber to a device, such as equipment, panels or a wall outlet, which allows for connecting the cable to other cables or devices. The three main areas we will discuss are termination used in Telecom, Data com and Fiber Optic industries

Coaxial cable is the most common method of transmitting video signals from the camera to the monitor or other CCTV components

cables are no longer installed as standard in European MV networks, installers will probably only have to work with them when making transition joints to newly-installed polymeric cable. Installers who are not familiar with paper cables should take special training before working with them.

The paper cable to be jointed may have been in the ground for several decades, working reliably while undisturbed. Paper is a natural material and suffers from ageing as a result of long term exposure to raised temperature during service. The most damaging result of ageing is embrittlement of the paper tapes, making them likely to crack or break when the cable core is moved.

Broken insulating papers will significantly weaken the electric strength of the insulation as a whole.

The following is best practice when handling paper cables.

- Why is cable termination required
- The cable terminations are often designed to enable the physical and electrical interconnecting of two cable ends, or a cable end and a terminal on the equipment. The electrical connection requirements relate to the voltage drop, current carrying capacity, compatibility of the materials, et

- High-Speed/FD CAN Termination
- For high-speed/FD CAN, both ends of the pair of signal wires (CAN_H and CAN_L) must be terminated. This is because communication flows both ways on the CAN bus requires a cable with a nominal impedance of 120 Ω; therefore, you should use 120 Ω resistors for termination

For high-speed/FD CAN, both ends of the pair of signal wires (CAN_H and CAN_L) must be terminated. This is because communication flows both ways on the CAN bus. Requires a cable with a nominal impedance of 120 Ω; therefore, you should use 120 Ω resistors for termination

Series, Parallel, and Series-Parallel Speaker Wiring

When wiring speakers with multiple voice coils, it is important to understand the process for series and parallel wiring. Depending on what method you use it will present a different load to the amplifier. This process is the same for resistors as well as voice coils in electrical circuits. When wiring speaker voice coils, it is very important to observe the polarity in both series and parallel wiring of speakers. When wiring two or more voice coils in series, you will connect the positive connection of the first voice coil to the positive connection of the amplifier. The negative voice coil connection will attach to the positive connection of the second voice coil. If you are only wiring two voice coils in series, the negative connection on the second voice coil will then connect to the negative connection of the amplifier. If you are using more than two voice coils, you will repeat the process for each additional voice coil by connecting the negative voice coil connections to the positive voice coil connection of the next speaker.

What do we mean by ‘impedance’ of loud speaker It is the specification of a loud speaker, which is very important to know for correctly connecting of loudspeakers to an amplifier. Normally loudspeaker has impedance and so on settings on your amplifier sensitivity impedance of 4ohm, 8ohm and 16ohm

Connection of loud speaker in the PAS

Series connection:- in series connection the L2(-) terminal of one drive unit/loudspeaker is connected to L1(+) terminal of the other loudspeaker

Example

How do we can calculate the resultant impedance in series?

16ohm L1+ L2- 16ohm

When the speaker are connected in series, the to amplifier the total impedance RT is the sum of impedance of each speaker

RT = R1 + R2 = 16ohm +16ohm = 32ohm

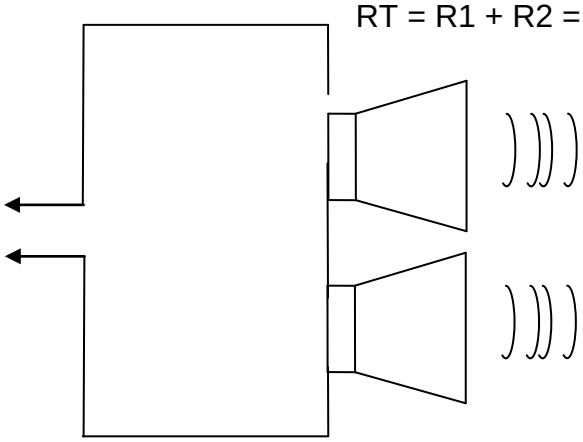


Fig .1 series connection speaker

Parallel connection:-in parallel connection the L1(+) terminal of one drive/loudspeaker is connected to the L(1)(+)terminal of the other and L2(-) of the first one is connected to the L2(-) terminal of other.

Example

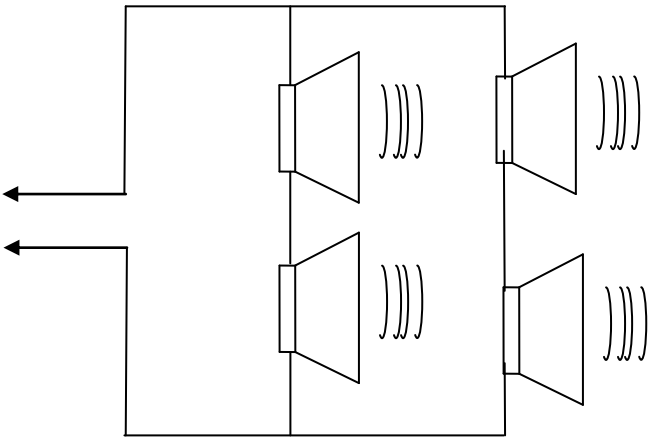


Fig 5.2 Parallel connection

The total impedance are calculated in the formula of

L1+ L1+

To amplifier L2-L2- 1/RT = 1/R1+ 1/R2…1/Rn

Series group A series group B

L1 L1+ L2-

To amplifier

L1+L1+

L2- L2-

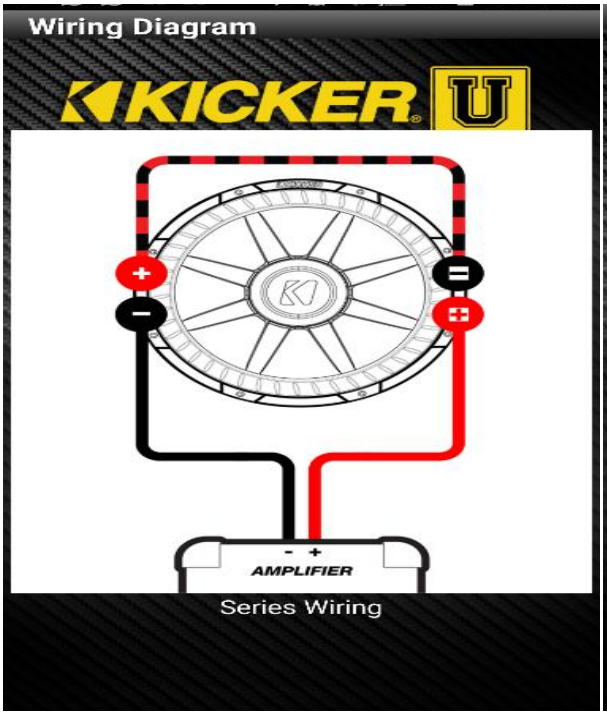
- To or more drive unit/loudspeaker are first connected in series and then the series group are connected in parallel
- In this case the total impedance of loudspeaker is

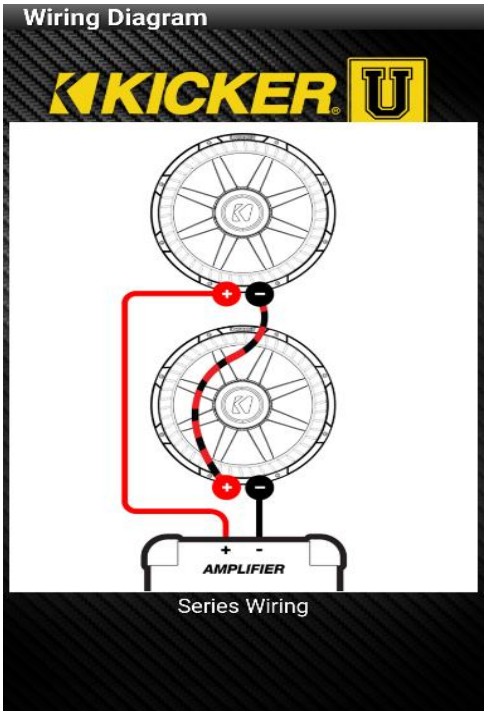
  Impedance of group A= RA = R1 + R2

  Impedance of Group B=RB= R3 +R4

  $RT = \frac{RA \times RB}{RA + RB}$

  The terminal strip with Ohm marking are used for connecting combination of low impedance speaker or driver unit with impedances such as 4ohm, 8 ohm 16ohm.





a Fig 5.3 One dual coil speaker b Fig 5.4 two single coil speakers

When you wire voice coils in series, you will simply add the resistance of all the voice coils to know what the impedance will be at the amplifier. The coils do not need to be the same impedance but it will affect how much power each speaker receives from the amplifier. It is never recommended in car audio to mix impedances of speakers connected to the same terminals.

Examples:

Two 4 ohm voice coils wired in series, 4 Ω + 4 Ω = 8 Ω

Two 8 ohm voice coils wired in series, 8 Ω + 8 Ω = 16 Ω

Three 4 ohm voice coils wired in series, 4 Ω + 4 Ω + 4 Ω = 12 Ω

Three 8 ohm voice coils wired in series, 8 Ω + 8 Ω + 8 Ω = 24 Ω

Parallel wiring

Parallel wiring is very simple. You will simply wire all the positive voice coil connections to the amplifier's positive terminal and wire all of the negative voice coil connections to the negative amplifier terminal

The process of mixing can be simplified as follows

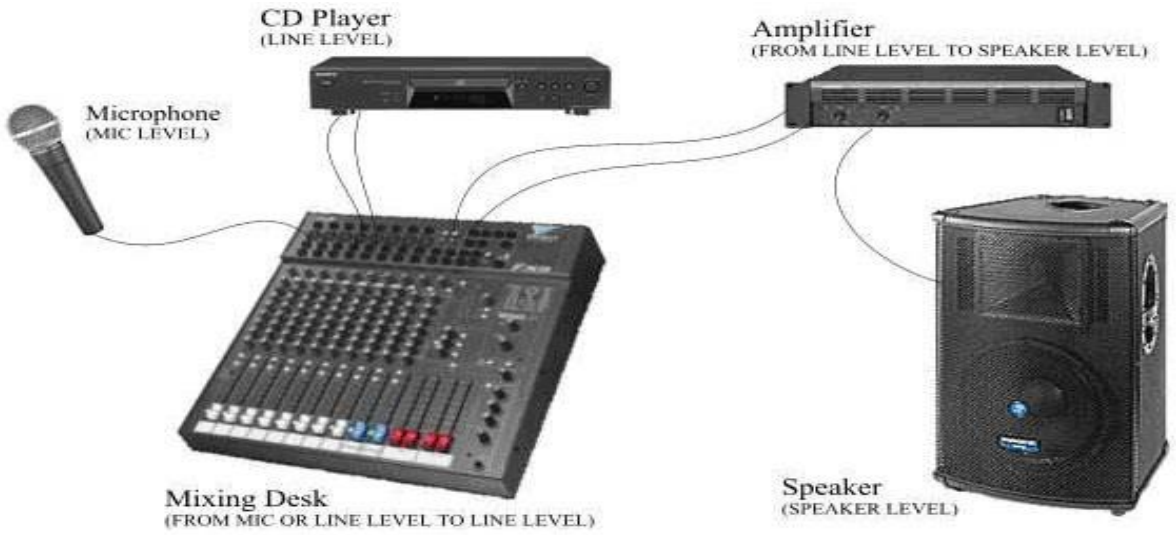
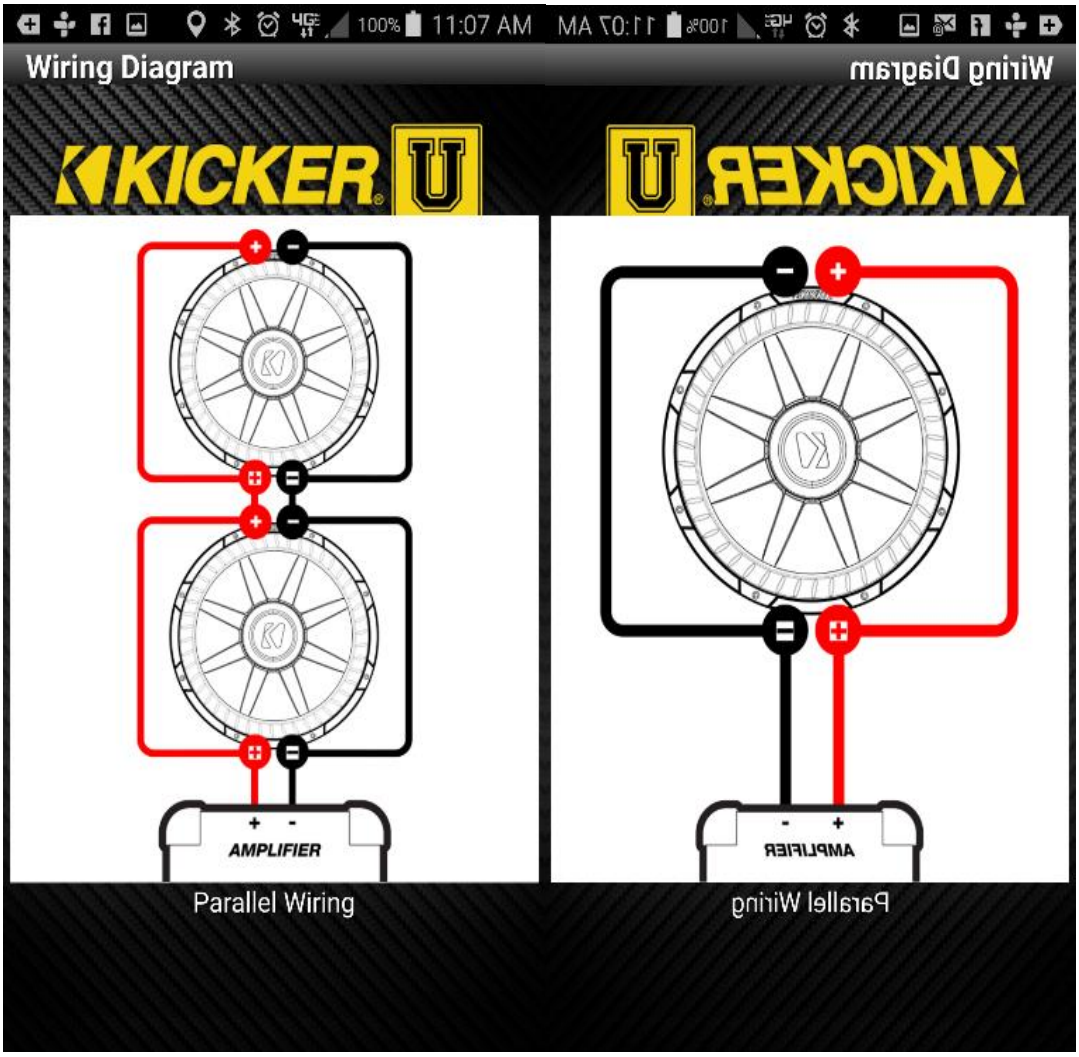


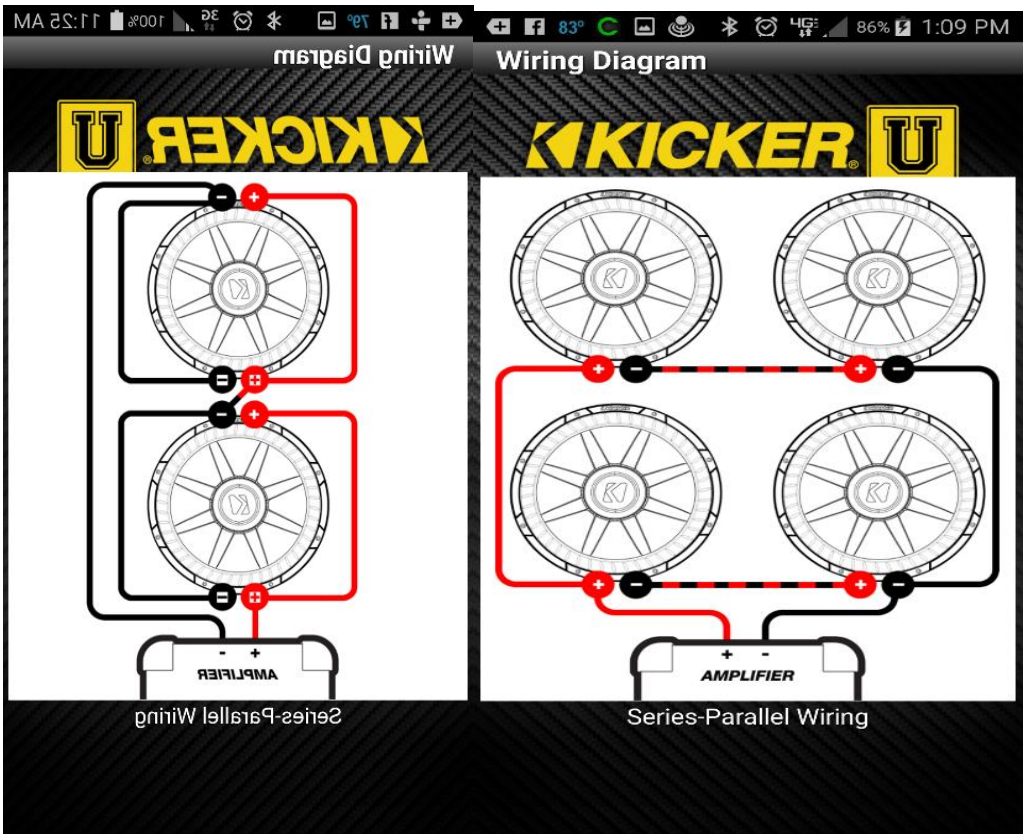
Fig 5.5 mixing



a Fig 5.6 One dual voice coil speaker

b Fig 5.7 Two dual voice coil speakers

Four single voice coil speakers two dual voice coils speakers



Example:

Four single coil 4 Ω speakers or two dual voice coil 4 Ω speakers will calculate exactly the same way with a series-parallel combination.

4 Ω + 4 Ω // 4 Ω + 4 Ω = 4 Ω

=

2.18 Ω // 8 Ω = 4 Ω

2.2 Connect components to manufacturer’s instructions.

2.3 Setting functional controls to customer’s requirements.

2.4 Testing functional operation

Self-Check-5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1. _____are often designed to enable the physical and electrical interconnecting of two cable ends (4 points)

   A. cable terminations

   B. voice coils

   C. electronic circuit

   D. CAD software

2. Parallel wiring is very simple (10 points)

   A. True

   B. False

Note: - Satisfactory rating: 14 and above - Unsatisfactory Rating: below 14

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 6 Following procedures for referring non-routine events to immediate supervisor

6.1. Following procedures for referring non-routine events to immediate supervisor

A non-routine event is defined as any event that deviates from optimal or expected care for specific equipment in a specific material situation. At defined times in each care trained researchers used a structured survey to identify and equipment from the care providers the difference between routine and non routine problems

- While routine problem solving concerns solving problems that are useful for daily living (in the present or in the future), non-routine problem solving concerns that only indirectly.

Non routine work

- Non Routine Work. Non-routine work are jobs and tasks that are performed irregularly or being performed for the first time. Since these tasks and jobs are not performed regularly, it can be difficult to understand all of the hazards associated with the job
- One of the best ways to prepare students for solving non-routine problems is by familiarizing them with the four steps of problem-solving. I have a set of questions and/or guides for each step, that students can use to engage in an inner-dialogue as they progress through the steps
- First, let's define what routine means: A routine is a sequence of actions that you do repeatedly. Brushing your teeth nightly and getting ready for bed is a routine. Waking up at 6:00 AM and exercising every morning is a routine.

Non routine cognitive skills

There are four skills that anyone wanting to strive in this economy must possess; we call these the four non-routine cognitive skills. These four skills are abstract reasoning, systems thinking, collaboration, and ability to experiment. Abstract reasoning is the ability to make and manipulate models

Self-Check1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1. _____are jobs and tasks that are performed irregularly (5 points)

   A. Non-routine work

   B. affect de soldering

   C. great performance

2. _____is a sequence of actions that you do repeatedly (5 points)

   A. Non-routine work
   B. routine
   C.affect de soldering

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information sheet 7 carrying out installation efficiently

7.1 Carrying out installation efficiently

Electrical Installation and Maintenance -The up keep of property or equipment, Electrician - a person who works on and repairs electrical equipment or one who installs, maintains, operates electrical equipment.

Proper installation and maintenance is very important in both commercial and residential facilities. A faulty wiring that is not immediately given attention can result into a greater danger such as fire and electrocution. Hiring a qualified or certified electrician is crucial in proper installation and maintenance

- Determination of the conditions for protection of people,
- Calculation of the conductor cross-sections,
- Protection for each level in the installation, and
- Selection of the appropriate electrical devices and equipment.

The main objective of electrical facilitie**s** is to supply reliable power. To guarantee the power supply and the efficient and continuous management of the operations, **a** highly resistant and secure electrical installation is required.

Electrical equipment is potentially hazardous and, in the unfortunate case of failure or anomaly, the consequences can be fatal for both people and properties.

This is why it is important to adopt a holistic approach in which personnel, devices, and monitoring systems are integrated.

To guarantee the safety and efficiency of plant operations, it is essential to invest in quality electrical installation, on which security, efficiency, and continuity of operation depend.

Any failure or anomaly of a critical installation represents a potential threat to life and damage to the environment. When the electrical system fails, the security of the community is compromised. This is why it is important to adopt a holistic approach in which personnel, devices, and integrated monitoring systems are integrated.

First of all, safety and compliances with current regulations are imperative to guarantee the minimization of risk, and profitability throughout the life cycle of the electrical installations. Because of this, investing in quality turns out to be an intelligent choice

An electrical shock may cause burns, or it may leave no visible mark on the skin. In either case, an electrical current passing through the body can cause internal damage, cardiac arrest or other injury. Under certain circumstances, even a small amount of electricity can be fatal

Common electrical problems.

- Frequent electrical surges.
- Sags and dips in power.
- Light switches not working properly.
- Circuit breaker tripping frequently.
- Circuit overload.
- Lights too bright or dim.
- Electrical shocks.

Self-Check -7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1. Which one is the importance of studying electrical installation and maintenance (10 points)

A. Circuit overload
B. Electrical shocks.
C. commercial
D. High electrical bill

2._____ Is Common Electrical Problems Around the home. (2 points)

A. maintenance
B. Electrical shocks.
C. Commercial
D. installation

Note: - Satisfactory rating: 12and above - Unsatisfactory Rating: below 12

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation Sheet 1	Checking circuits/machines/plant

Step1: - Prepare the schematic diagram of the circuit

PROCEDURE:-

1. Follow safety procedure and rule
2. Select the appropriate tool
3. Identify the appropriate tools
4. Write their function of each selected tools

PRECAUTIONS:-

You should not forget to wear your PPE

2 Arrange the component circuit in a graphing paper to show/illustrate the same design factor in PCB lay outing..

.

QUALITY CRITERIA:-

- **Did the learner wear PPE?**
- **Did the learner identify required material**

Operation Sheet 2	Terminate Cables and conductors

Step2: - Prepare terminate cable efficiently

PROCEDURE:-

5. Follow safety procedure and rule
6. Select the appropriate tool
7. Identify the appropriate tools
8. Write their function of each selected tools

PRECAUTIONS:-

You should not forget to wear your PPE

2 Arrange the component circuit in a graphing paper to show/illustrate the same design factor in PCB lay outing..

.

QUALITY CRITERIA:-

- **Did the learner wear PPE?**
- **Did the learner identify required material**

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Task 1: Prepare the schematic diagram of the circuit

Task 2 Prepare terminate cable efficiently

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LG #17	LO # 3Complete installation work and report

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Following OHS work completion risk control measures
- Cleaning and making work site safe
- Notifying work supervisor for completion of the installation.

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Follow OHS work completion risk control measures
- Clean and making work site safe
- Notify work supervisor for completion of the installation.

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them
3. Acco9mplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,

8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1 following OHS work completion risk control measures

1.1OHS work completion risk control measures risk -outcome is used in other fields to describe e.g. environmental damage, or damage to equipment. However, in the context of OSH, “harm” generally describes the direct or indirect degradation, temporary or permanent, of the physical, mental, or social well-being of workers. For example, repetitively carrying out manual handling of heavy objects is a hazard.

OSH may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment. In the United States, the term occupational health and safety is referred to as occupational health and occupational and non-occupational safety and includes safety for activities outside of work.

In common-law jurisdictions, employers have a common law duty to take reasonable care of the safety of their employees. Statute law may in addition impose other general duties, introduce specific duties, and create government bodies with powers to regulate workplace safety issues: details of this vary from jurisdiction to jurisdiction.

The main focus in occupational health is on three different objectives

- the maintenance and promotion of workers' health and working capacity;
- the improvement of working environment and work to become conducive to safety and health.
- Development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking

Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations;

- the prevention amongst workers of departures from health caused by their working conditions;
- the protection of workers in their employment from risks resulting from factors adverse to health;
- the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize,
- the adaptation of work to man and of each man to his job

Hazards, risks

The terminology used in OSH varies between countries, but generally speaking:

- A hazard is something that can cause harm if not controlled.
- The outcome is the harm that results from an uncontrolled hazard.
- A risk is a combination of the probability that a particular outcome will occur and the severity of the harm involved.

Assessment is an important step in the overall risk assessment and risk management process. It is where individual work hazards are identified, assessed and

controlled/eliminated as close to source (location of the hazard) as reasonably as possible. As technology, resources, social expectation or regulatory requirements change, hazard analysis focuses controls more closely toward the source of the hazard. Thus hazard control is a dynamic program of prevention. Hazard-based programs also have the advantage of not assigning or implying there are "acceptable risks" in the workplace.

A hazard-based program may not be able to eliminate all risks, but neither does it accept "satisfactory" – but still risky – outcomes. And as those who calculate and manage the risk are usually managers while those exposed to the risks are a different group, workers, a hazard-based approach can by-pass conflict inherent in a risk-based approach.

Self-Check1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided.

1. The main focus in occupational health is on_____ different objectives. (6 points)
   A. Two
   B. One
   C. Four
   D. three
2. _____is an important step in the overall risk assessment and risk management process. (6 points)
   A .management
   B. Assessment

C. controlled

D.approach

Note: - Satisfactory rating: 12 and above - Unsatisfactory Rating: below 12

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 2 cleaning and making work site safe

2.1 Cleaning and making work site safe

Work site the purpose of this procedure is to ensure adequate protection of workers, the public, and the environment, through the consistent, effective, planning, authorization, and release of activity-level work. It covers the seven core functions of SLACs' integrated safety and environmental management system (ISEMS):

- Define the work
- Identify and analyze hazards
- Develop and implement controls
- Authorize work.
- Release work

A clean workplace means more than just having a sparkling, fresh building. A clean workplace also ensures the safety and health of employees and visitors. Workplace injuries can be prevented by taking action to ensure a clean, safe work environment

Safe working practices means working in a way that minimize risk to yourself, other people, equipment, materials, the environment, and work processes. Safe Work Practices are developed by Principal Contractors, PCBUs and self-employed people in order to provide a safe way of performing work activities

- **Clean** up debris.
- **Keep** all walking and working surfaces **clean** and clear of debris.
- Pay attention to proper storage. Identify designated areas for storing tools and materials.
- Eliminate hazards. Clear away protruding pipes, lumber, rebar or other materials that could cause injury.
- **Keep** extension cords clear of walkways

A clean workplace means more than just having a sparkling, fresh building. A clean workplace also ensures the safety and health of employees and visitors.

Workplace injuries can be prevented by taking action to ensure a clean, safe work environment.

Safety and productivity benefits, a clean construction site will be a much better look for any company. For example, a client coming through to inspect the progress will be much happier to see a neat, tidy work site than one full of clutter and debris.

Maintaining cleanliness in the workplace not only creates a healthier environment for employees but also tends to help companies become more efficient and productive. Well-being: Providing a clean work environment helps in maintaining the well-being of employees

Clean work environment is important for employers, employees, clients, and investors because it impacts health, satisfaction, and promotes a positive company appearance. The bottom line is when everyone is healthy, productivity increases and everyone shares in the benefits

Self-Check 2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1. _____the purpose of this procedure is to ensure adequate protection of workers. (8 points)

   A .Communication

   B .Leadership

   C. Work site

   D. work

2. _____ working practices means working in a way that minimize risk. (2 points

   A. Safe

   B. Define the work

   C. Authorize work

   D. Leadership

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 3 Notifying work supervisor for completion of the installation

3.1Notifying work supervisor for completion of the installation

Supervisors must define goals, communicate objectives and monitor team performance.

The most important role of a supervisor.

- One of a supervisor's most important responsibilities is managing a team. Often, supervisors create and oversee their team's workflow, or the tasks required to complete a job.

Crucial Skills Supervisors Need to Have

- Communication.
- Conflict Resolution.
- Leadership.
- Critical Thinking.
- Interpersonal Skills.
- Time and Priority Management.
- Diversity and Generational Differences in the Workplace.
- Problem Solving.
- Support and ensure that field operatives are on task to meet customer project goals and Kone profitability target
- Partner with Project Management to discuss project’s progress, issues, and action/recovery plans
- Responsible for the execution of the installation project plan including equipment delivery and interface with other trades to successfully complete projects while exceeding customer’s expectations
- Interviews, hires, and ensures proper training is provided to all new RBIA analysts
- Provides coaching and development of subordinates
- Addresses all performance issues following the UHG disciplinary process

- Submits and/or approve access requests for employees
- Reviews departmental policies and procedures for updates
- Supports the development of training materials produced by Opium Rx Learning

- Ensures appropriate staffing levels
- Hosts regular staff meeting with all direct reports
- Supports and enforces all company policies and procedures
- Support all quality review data reporting needs within BOM or special projects
- Strong Construction coordination experience on railway project incorporating (HV electrical substations, combined service routing and pole location construction projects)
- Working as an electrical supervisor on large power infrastructure projects
- Good overall knowledge of railway systems, projects and technologies
- Strong managerial skills when it comes to coordinating subbies and trades on site
- Excellent communications skills (essential)
- Assertive and influential, with excellent communication skills (essential)
- Priorities and plan, balancing priorities and deadlines whilst maintaining high standards
- Proficiency in coordinating skills
- Three (3) years' experience managing furniture installation or installation experience at the product delivery/installation level
- Prior working experience in an allied industry
- Demonstrates a strong work ethic, flexible about hours, responsive to customer needs, willing to be available

Self-Check 3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page. Choose the best answer in the following question. Write the letter on a separate provided

1. _____must define goals, communicate objectives and monitor team performance. (7 points)
   A. Super Communication.
   B. Conflict Resolution.
   C .Supervisors
   D. visors

2. One of a supervisor's most important responsibilities is _____. (2points)
   A. Goals
   B .Managing team
   C. Communication
   D. work

3. Crucial Skills of Supervisors is_____. (1 points)
   A. Supervisors
   B. Managing team
   C. Communication
   D. work

Note: - Satisfactory rating: 10 and above - Unsatisfactory Rating: below 10

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

List of Reference Materials

1. PracticalElectronicsHandbook,2 and 3thEdition
2. .http://lrf.fe.uni-lj.si/fkkt_ev/Literatura/Electrical_and_Electronics_Measurment.pdf
3. https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19720011865.pdf
4. http://s1.nonlinear.ir/epublish/book/Electronic_Troubleshooting_0071819908.pdf
5. https://www.clemson.edu/cecas/departments/ece/document_resource/undergrad/electronics/CInquiryLabManual.pdf
6. https://www.youtube.com/watch?v=GW_-ycgJXhg
7. http://learn.skillman.eu/pluginfile.php/1471/mod_resource/content/0/20170509%20-%20Unit%202.3%20Maintenance%20Principles.pdf

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