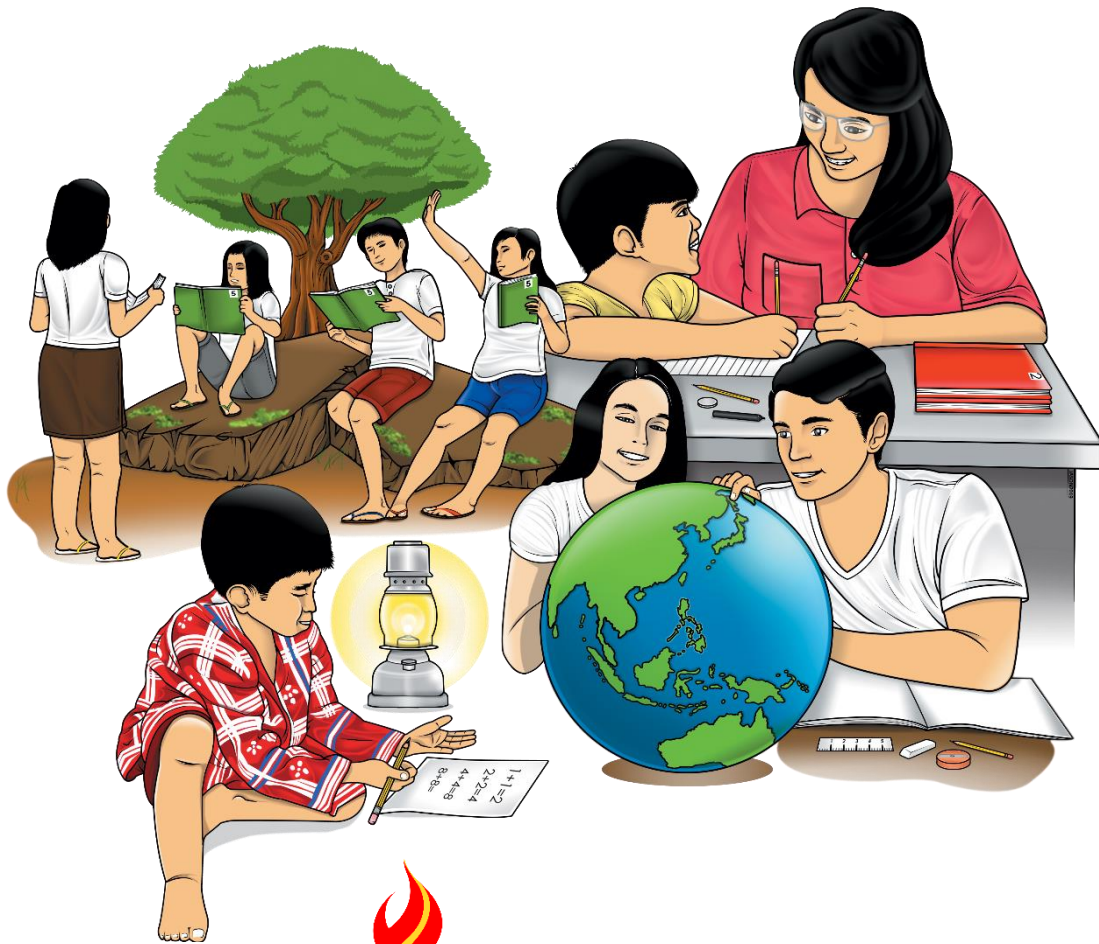


# TLE- EPAS

## Quarter 1 – Module 4: Preparing and Interpreting Technical Drawings (PITD)



**TLE-EPAS – Grade 7/8**  
**Alternative Delivery Mode**  
**Module 4: Preparing and Interpreting Technical Drawings (PITD)**  
**First Edition, 2020**

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**7/8**

# **TLE- EPAS**

## **Quarter 1 – Module 4: Preparing and Interpreting Technical Drawings (PITD)**

## **Introductory Message**

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



## ***What I Need to Know***

This module was designed and written with you in mind. It is here to help you master the (Exploratory of Electronic Products Assembly and Servicing). The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is composed of one lesson:

- LO 1 & 2: Preparing and Interpreting Technical Drawings (PITD)  
(TLE\_IAEPAS9- 12PITD-IIa-12) (TLE\_IAEPAS9- 12PITD-IIb-c13)

After going through this module, you are expected to:

Lesson 1.

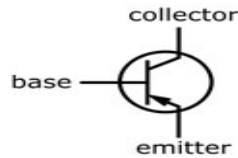
1. select appropriate technical drawing according to job requirement;
2. segregate technical drawings in accordance with the types and kinds of drawings;
3. recognize components, assemblies, or objects;
4. correctly identify the dimensions of the key features of the objects depicted in the drawing;
5. interpret symbols used in the drawing; and
6. validate the drawing against job requirements or equipment.



## What I Know

**Multiple Choice:** Directions: Choose the correct answer and write only the letter.  
Use the answer sheet for your answer.

1. What component bears this symbol?  
a. capacitor  
b. PNP transistor  
c. diode  
d. NPN transistor



2. It is the process of illustrating various kinds of circuits and wiring systems.  
a. reference designation  
b. electronic drafting  
c. freehand drawing  
d. mechanical drawing
3. Which kind of electronic diagram shows the components used in their interconnection?  
a. wiring diagram  
b. schematic diagram  
c. pictorial diagram  
d. block diagram
4. A technical drawing instrument used to mark or measure angle between 0 and 180.  
a. set squares  
b. protractor  
c. drawing pencil  
d. T-square
5. What geometric figure is usually used to represent a stage in a block diagram?  
a. rectangle  
b. circle  
c. pentagon  
d. hexagon
6. Which component can possibly store electric energy?  
a. resistor  
b. diode  
c. capacitor  
d. transistor
7. A drawing instrument consisting of two parts such as the stock and the blade joined together at right angle.  
a. L-square  
b. T-square  
c. try square  
d. protractor

8. It shows the picture of actual components and wiring connections although it does not provide the exact size of components.
- pictorial diagram
  - block diagram
  - wiring diagram
  - schematic diagram
9. Which of the following is used for drawing circles and arc of circles?
- protractor
  - compass
  - drawing pins and clips
  - drawing pencils
10. These are used to fix the drawing sheet on the drawing board.
- compass
  - protractor
  - drawing pencil
  - drawing pins and clips

## Lesson

# 8

# Identifying and Interpreting Technical Drawings



## *What's In*

### Activity 1

**Directions:** Answer briefly the questions below. Write your answer on activity sheet.

1. Why accuracy is important in using measuring tools?
2. Why do we need to store instruments in an appropriate environment?



## *What's New*

### Activity 2.

Directions: Answer the items given below.





Guide Questions:

1. What is the picture all about?
2. Name some electronic components you know as shown above.



## What is It

To produce a quality and marketable electronic diagram, you have to follow the Electronic Drafting Standards which is the process of illustrating various kinds of circuits and wiring systems.

The most common graphical languages used in the illustration of components in circuits and wiring systems are **block, schematic, wiring, and pictorial diagrams**.

Most symbols that you will encounter in laying out electronic diagrams are accepted as standard, but in some cases some manufacturers modify symbols and practices to suit a particular industrial policy while others use their own symbols to represent unique or special component and devices.

Data Source: CONSUMER ELECTRONICS SERVICING K to 12 – Technology and Livelihood Education; page-60

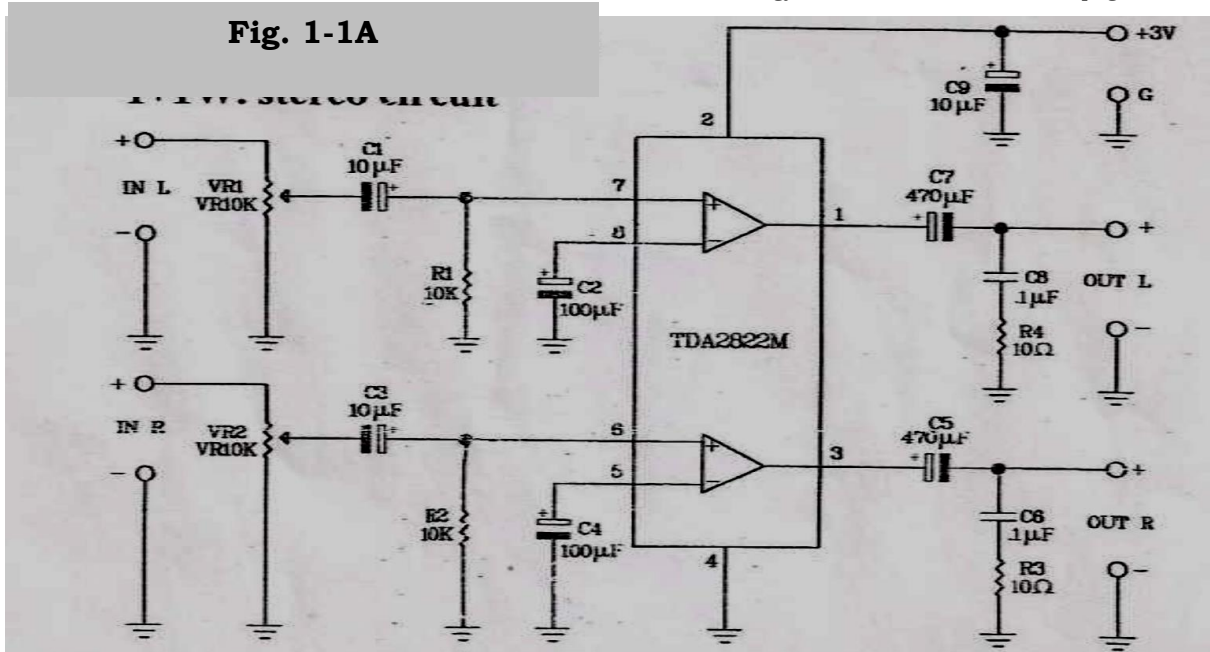
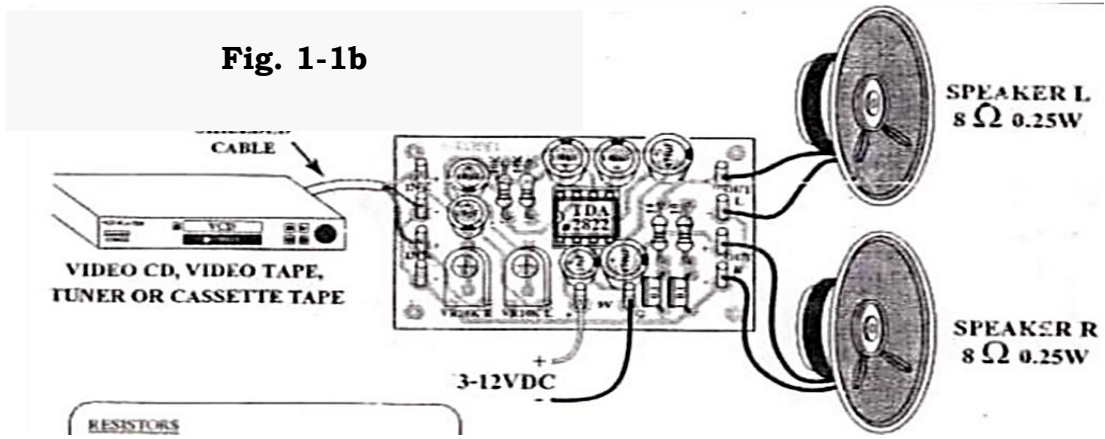


Fig. 1-1a. Schematic Diagram of 1-watt Stereo Amplifier.



**Fig. 1-1b. Pictorial diagram of the 1-watt Stereo Amplifier**

Technical drawing is essential for communicating ideas in industry and engineering. To make the drawings easier to understand, people use familiar symbols, perspectives, units of measurement, notation systems, visual styles, and page layout. Together, such conventions constitute a visual language and help to ensure that the drawing is unambiguous and relatively easy to understand.

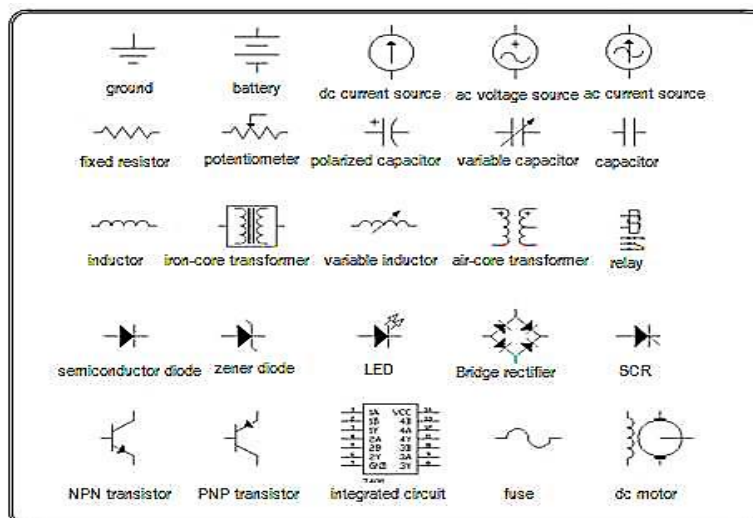
Data Source: [https://dbpedia.org/page/Technical\\_drawing](https://dbpedia.org/page/Technical_drawing)

Do you know that electronic symbols and their use in conjunction with recommended drafting practices have been developed through the years, and have been standardized by a number of different organizations? Among these are the American National Standards Institute (ANSI), the Electronics Industries Association (EIA), the Institute of Electrical and Electronics Engineers (IEEE), and the International Electrotechnical Commission (IEC).

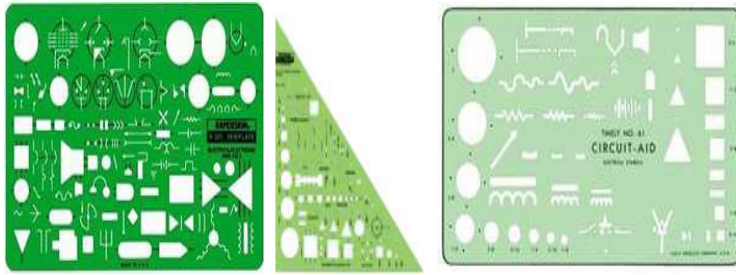
Data Source: <https://www.coursehero.com/file/p31o6hq0/o-you-know-that-electronic-symbols-and-their-use-in-conjunction-with/>

### Schematic Symbols of Electronic Components

Some of the electronic symbols that were mentioned earlier are shown in Fig. 1-2. You can use several electronic templates shown in Fig. 1-3 to help you in drawing these symbols.



**Fig. 1-2. Schematic Symbols of Electronic Components.**



**Fig. 1-3. Electronic templates**

**Image Source:** CONSUMER ELECTRONICS SERVICING K to 12 – Technology and Livelihood Education; Page-61

### **Electronic Components and Symbols**

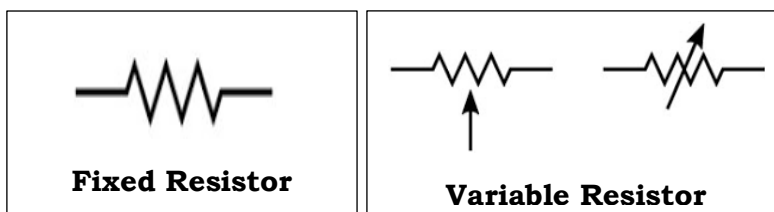
An electronic component is any basic discrete device or physical entity in an electronic system used to affect electrons or their associated fields. Electronic components are mostly industrial products, available in a singular form and are not to be confused with electrical elements, which are conceptual abstractions representing idealized electronic components.

#### **Resistor**

A *resistor* is a device with a known value of resistance. Its main function is to reduce voltage and to limit the flow of current in a circuit. This *resistance* is actually the opposition that a component or material offers to the flow of current.

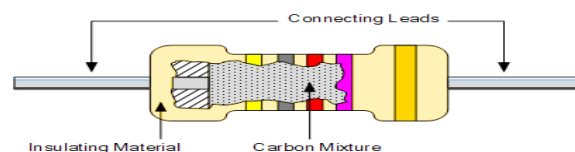
Resistance may or may not be useful in circuit/s. When too much current passes through a *conductor*, (solid, liquid, gas through which electrons pass easily) the resistance of the conductor may cause it to become hot. This, in turn, can create a fire hazard or cause the conductor to burn out. In this case, it is not desirable. In other cases, when it is placed intentionally in the circuit, it performs its specific task.

#### **Symbol of Resistor**

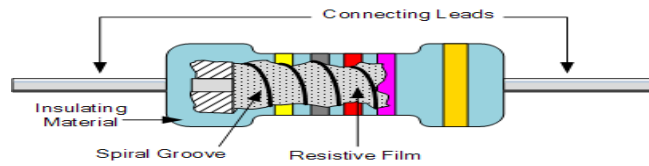


#### **Fixed Resistor**

It is a single value resistance, which remains the same under the normal condition. The two common kinds of fixed resistors are *carbon resistor* and *film-type resistor*.



**CARBON RESISTOR**



### FILM RESISTOR

#### Variable Resistor

Variable resistors are used when it is necessary to change the amount of resistance in a circuit. There are two common variable resistors, the potentiometer and rheostat. Generally, a potentiometer is generally has carbon resistive element while the rheostat is generally made of resistance wire.

#### POTENTIOMETER



#### RHEOSTAT



Both devices have a sliding arm that brings into contact with the resistance element. In most variable resistors, the arm is attached to the shaft that can be adjusted. A potentiometer is commonly used as control device. It can be used to vary the value of voltage applied to a certain circuit such as in the amplifier, television, and different kinds of meter circuit.

#### Resistor Power Rating

Power rating of resistors changes with their sizes, the bigger the resistor the greater the wattage and the smaller the resistor the lesser the wattage. Different sizes of resistors are shown below which are drawn to the exact proportion.



## CAPACITOR

A *capacitor* is a device that consists essentially of two conducting surfaces separated by a dielectric material like air, paper, mica, ceramic, glass, or Mylar. It makes it possible to store electric energy. Electrons are detained within a capacitor. This, in effect, is *stored electricity*. It is known as electrical potential or an electrostatic field. Electrostatic field hold electrons. When the increase of electrons becomes great enough, the electrical potentials are now ready to be discharged.

The component is designed intentionally to have a definite amount of capacitance. This capacitance is a property that exists whenever insulating material permits the storage of electricity. It is measured in Farad (F) micro Farad ( $\mu\text{F}$ ), nano Farad (nF), and picoFarad (pF).

### Characteristics of Capacitor:

1. It can store electric charge even though the voltage source is already disconnected.
2. It can discharge electrical voltages.

### Symbols of Capacitor



### Common Types of Fixed Capacitor

Aluminum Electrolytic Capacitors (polarized)					
					
Axial Leads	Radial Leads	Computer Grade	Snap Mount	Twist Lock	Surface Mount

### Tantalum Capacitors (polarized)

					
<u>Solid Tantalum</u> (Axial Leads)	<u>Solid Tantalum</u> (Radial Leads)	<u>Foil Tantalum</u> (Axial Leads)	<u>Dipped Tantalum</u>	<u>Wet Tantalum</u>	<u>Surface Mount</u>

### Ceramic Capacitors

					
Dip guard	Monolithic (Axial Leads)	Monolithic (Radial Leads)	Disc	Surface Mount	

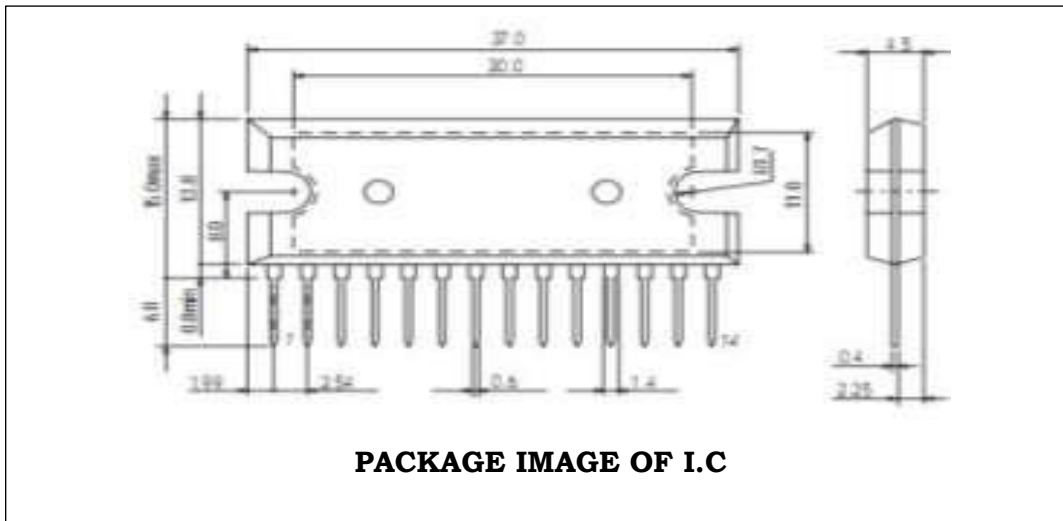
### Film Capacitors

					
Polyester (Axial Leads)	Polyester (Radial Leads)	Polypropylene (Axial Leads)	Polypropylene (Radial Leads)	Polystyrene (Axial Leads)	

**Variable capacitors used as tuning capacitor for radio receivers**







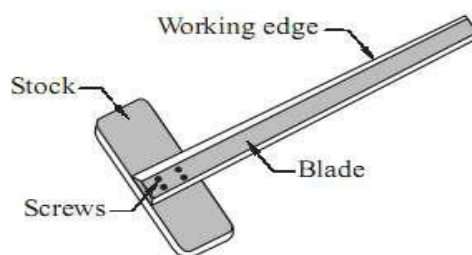
### Drawing Instruments

*Drawing instruments* are used in preparing accurate drawings. Quality drawing instruments can produce accurate, good, and presentable drawings. Below is a list of some of the most common used drawing instruments and materials in electronic drafting.

- 1. Drawing board.** A smooth board usually rectangular in shape provided with perfectly straight edge which is used as working edge on which the T-square is moved while making drawings.

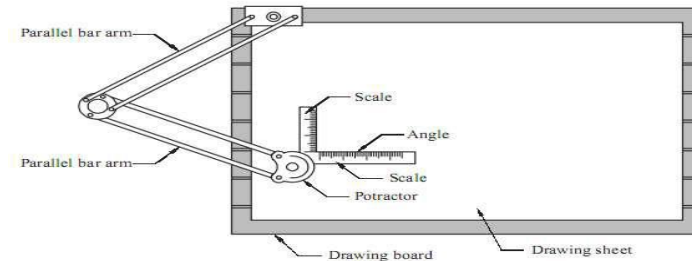


- 2. T-square.** A T-square consists of two parts namely the stock and the blade joined together at right angles to each other by means of screws. The stock is made to slide along the working edge and the blade moves on the drawing board. The working edge of a T-square is used to draw parallel lines, vertical lines or inclined lines at 30 or 60 degrees.

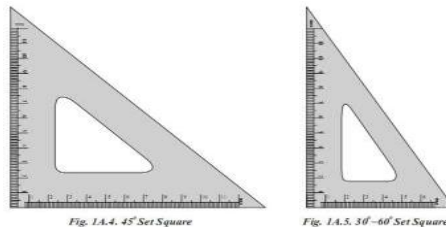




**3. Drafting machine or drafter.** In a drafting machine, the uses and advantages of T-squares, scales, set squares, and protractors are combined. One end of the drafter is clamped at the left top end of the drawing board by a screw provided in the drafter.



**4. Set squares.** Set squares are generally made from plastic material. They are triangular in shape with one corner, a triangle. A pair of set squares (30°- 60°) and 45°. They are used to draw lines at 30°, 60° and 45° to the vertical or horizontal.



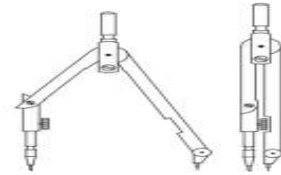
**5. Protractor.** Protractors are used to mark or measure angles between 0° and 180°. They are semicircular in shape and are made of plastic. Protractors with circular shape are capable of marking and measuring 0° to 360° are also available in the market.



**6. Drawing pencils.** The accuracy and appearance of a drawing depends on the quality of pencil used to make drawing. The grade of a pencil lead is marked on the pencil. HB denotes medium grade. Increase in hardness is shown by the value put in front of H such as 2H, 3H, etc. Softer pencils are marked as 2B, 3B, and 4B etc. A pencil marked 3B is softer than 2B and pencil marked 4B is softer than 3B and so on. Beginning of a drawing may be made with H or 2H. For lettering and dimensioning, H or HB pencils are used.



**7. Compass.** Compass is used for drawing circles and arcs of circles. The compass has two legs hinged at one end. One of the legs has pointed needle fitted at the lower end whereas the other end has provision for inserting pencil lead.



**8. Drawing pins and clips.** These are used to fix the drawing sheet on the drawing board.



Pin with plastic head

Stamped Thumbtacks

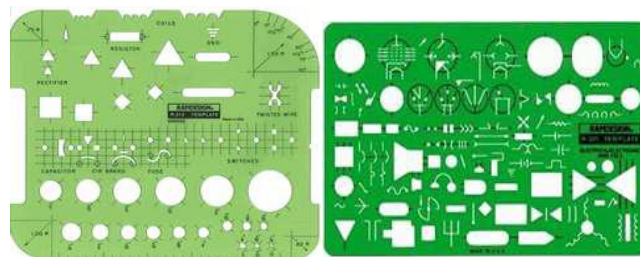
Paper Push Pin



Map pin with spherical head

Transparent Push Pin

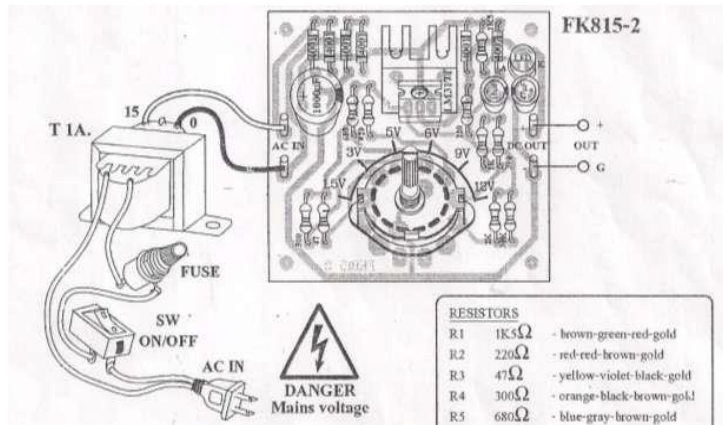
**9. Electronic templates** include symbols for electronic and electrical design that can be traced using a drawing pencil.



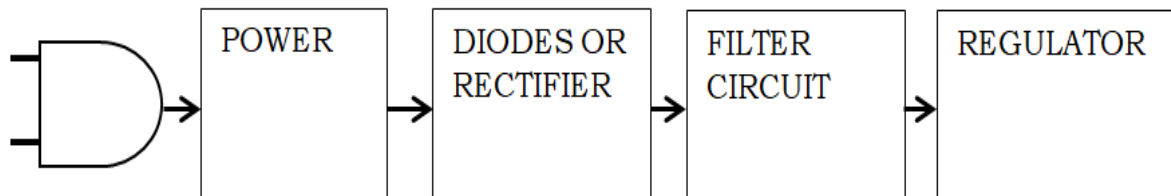
All electronic circuits from the simplest to the most complex design need diagrams to be used as reference in designing, modifying, and troubleshooting the circuit. The most common used electronic diagrams are schematic, pictorial, wiring, and block diagrams. Each one of these diagrams has its own unique characteristics in presenting the circuit. The different diagrams that you should be familiar with are the following:

**Pictorial diagram** - It shows the pictures of the actual components and wiring connections although it does not provide the exact size of components. It shows exact shape in proportion to the actual component or device.

**Pictorial Diagram of a Regulated Power Supply**

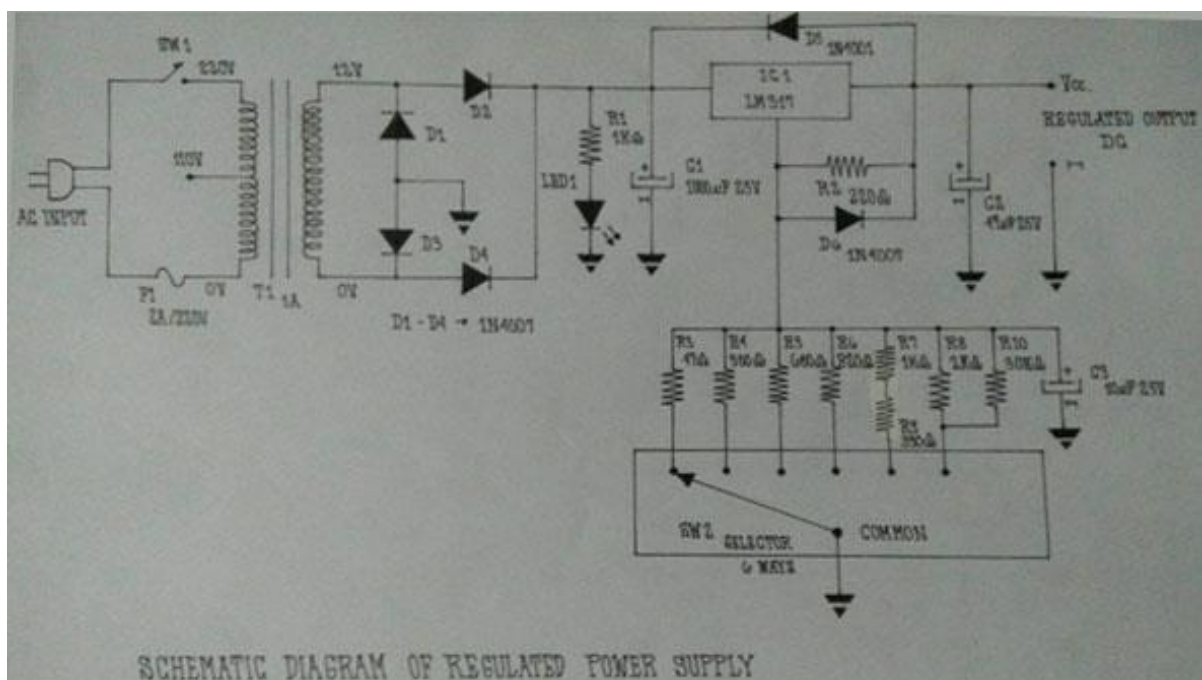


**Block Diagram** – This form usually uses block of squares, rectangles or triangles to represent components, group of components or units of equivalent. Block diagrams are particularly used to represent internal components of an integrated circuit.



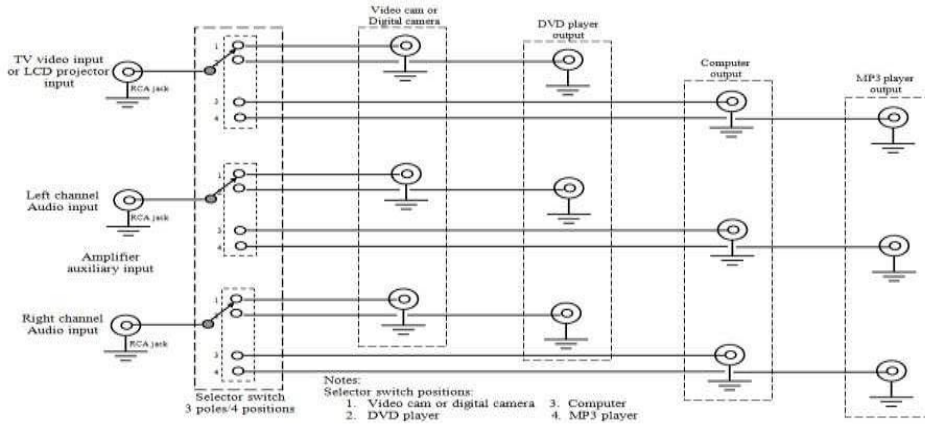
### Block Diagram of a Regulated Power Supply

**Schematic diagram** - It shows the components used in their interconnection. Each graphic symbol is also accompanied with a reference designation to distinguish it from other similar symbols. It does not illustrate the physical size, shape or chassis location of the component parts and devices.

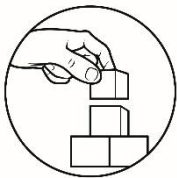


Schematic Diagram of a Regulated Power Supply

**Wiring diagram** – It shows wiring connection in a simplified, easy to follow manner. It may show either internal or external connections or both and is usually drawn as simple as possible to trace out the connection of a circuit. The components of the circuit are identified by name or are represented by means of pictorial illustrations that do not follow any well-defined standard form.




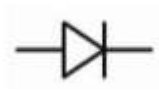


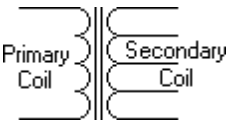
Wiring diagram of a selector switch for different input multi-media equipment



## What's More

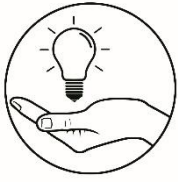
**Directions:** Match the electronic and electrical symbols in Column A with the corresponding descriptions in column B. Write only the letter of your answer on your activity sheet.

### Column A

- \_\_\_ 1. 
- \_\_\_ 2. 
- \_\_\_ 3. 
- \_\_\_ 4. 
- \_\_\_ 5. 

### Column B

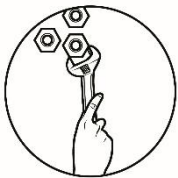
- A. Capacitor
- B. Transistor
- C. Transformer
- D. Fuse
- E. Resistor
- F. Diode



## What I Have Learned

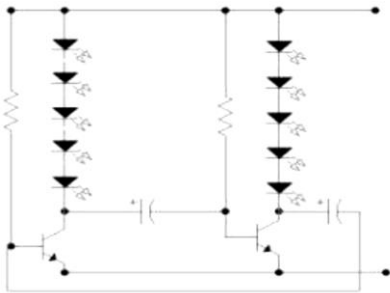
**DIRECTIONS:** Draw the schematic symbol of the following electronic components and give the function(s) of each. Write your answer on your activity sheet.

COMPONENT	SYMBOL	FUNCTION
1. TRANSISTOR	PNP NPN	
2. VARIABLE RESISTOR		
3. RECTIFIER DIODE		
4. FIXED CAPACITOR		
5. LED (Light Emitting Diode)		

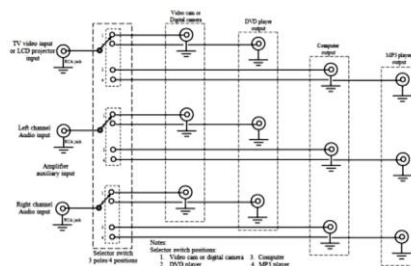


## What I Can Do

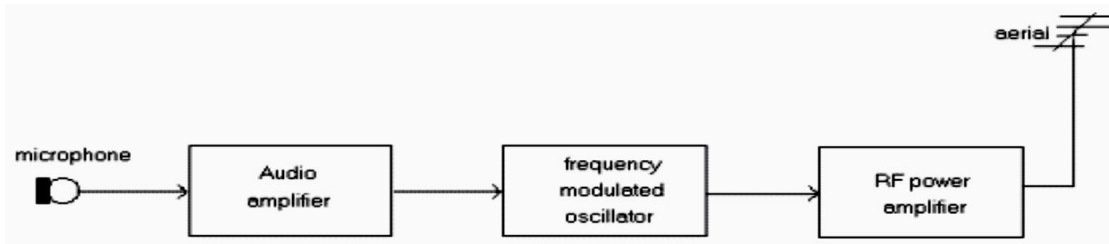
**DIRECTIONS:** Shown below are different electronic diagrams. Write the name of the diagram on the space provided at the bottom of each diagram.



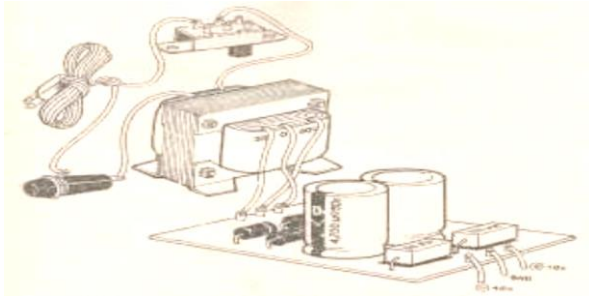
1. \_\_\_\_\_



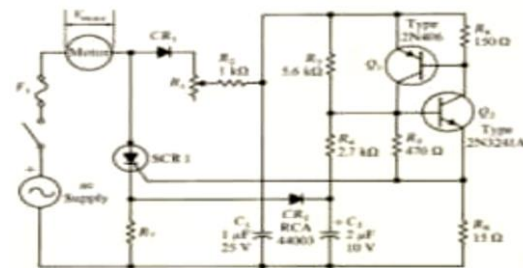
2. \_\_\_\_\_



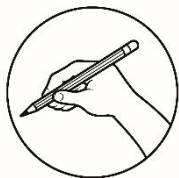
3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_

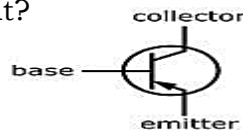


## Assessment

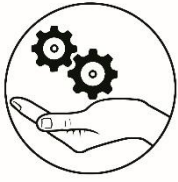
**Multiple Choice:** Directions: Choose the correct answer and write only the letter on your answer sheet.

- What drawing instrument is consisting of two parts namely the stock and the blade, joined together at right angles to each other by means of screws?
  - L-square
  - T-square
  - try square
  - protractor
- It shows the picture of actual components and wiring connections although it does not provide the exact size of components.
  - pictorial diagram
  - block diagram
  - wiring diagram
  - schematic diagram
- Which kind of electronic diagram shows the components used in their interconnection?
  - wiring diagram
  - schematic diagram
  - pictorial diagram
  - block diagram

4. A technical drawing instrument used to mark or measure angle between  $0^\circ$  and  $180^\circ$ .
- set squares
  - protractor
  - drawing pencil
  - T-square
5. Which of the following is used for drawing circles and arc of circles?
- protractor
  - compass
  - drawing pins and clips
  - drawing pencils
6. These are used to fix the drawing sheet on the drawing board.
- compass
  - protractor
  - drawing pencil
  - drawing pins and clips
7. This picture shows a symbol of what component?
- capacitor
  - PNP transistor
  - diode
  - NPN transistor



8. It is the process of illustrating various kinds of circuits and wiring systems.
- reference designation
  - electronic drafting
  - freehand drawing
  - mechanical drawing
9. A geometric figure usually used to represent a stage in a block diagram.
- rectangle
  - circle
  - pentagon
  - hexagon
10. What component can possibly store electric energy?
- resistor
  - diode
  - capacitor
  - transistor

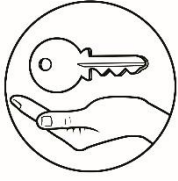


## ***Additional Activities***

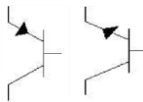
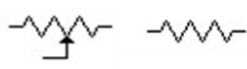
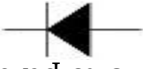

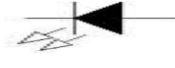
**Directions:** Draw at least five (5) drawing instruments. Describe and give the function of each. Write your answer in your activity sheet.

<b>Drawing Instrument</b>	<b>Description</b>	<b>Use</b>





# Answer Key

<p>What's More</p> <p>1. E 2. F 3. A 4. B 5. C</p>	<p>What's In</p> <p>1. To ensure getting the exact and correct value of the thing being measured. 2. To protect the instruments from physical and internal damage and prolong the usage life of the instrument.</p>	<p>What's New</p> <p>1. Image of a radio opened and exposing the electronic component inside 2. Resistor, capacitor, speaker, transistor, diode</p>
<p>What I Have learned</p> <p>1. Transistor – A three terminal device that amplifies the flow of current</p> <p>Symbol:</p>  <p>2. Variable Resistor – It is used when it is necessary to change the amount of resistance in a circuit.</p> <p>Symbol:</p>  <p>3. Rectifier Diode – is a semiconductor diode that converts AC to pulsating DC</p> <p>Symbol:</p>  <p>4. Fixed Capacitor – It helps maintain constant charge and energy output in electric appliances or devices.</p> <p>Symbol :</p>  <p>5. LED (Light Emitting Diode) – It is a semiconductor device that converts electric energy into electromagnetic radiation at a visible or near infrared frequencies when PN junction is forward bias.</p> <p>Symbol:</p> 	<p>What I can Do</p> <p>1. Schematic diagram 2. Wiring diagram 3. Block Diagram 4. Pictorial diagram 5. Schematic diagram</p>	<p>Assessment</p> <p>1. B 6. D 2. A 7. B 3. B 8. B 4. B 9. A 5. B 10. C</p>
<p>What I Know</p> <p>1. B 6. C 2. B 7. B 3. B 8. A 4. B 9. B 5. A 10. D</p>		



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