

Department of Education
SPTVE
Exploratory 7
Electronic Product Assembly and Servicing
Use Appropriate Hand Tools and
Equipment
Quarter 2: Week 6 Module



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Expectation

At the end of the module, you should be able to:

1. enumerate the procedure in using soldering iron
2. use tools according to functions and operation
3. observe safety precaution in using soldering iron



Pre-Test

Directions. Read the questions carefully and choose the correct answer. Write the words not the letter on your answer sheet.

1. What should you wear before performing safe electronic works?
A. Jacket
B. Identification card
C. Office uniform
D. Personal protective clothing
2. Which of the following is not a proper safety procedure?
A. Always wear protective clothing
B. Observe personal safety procedure
C. Use water on electronic equipment
D. Walkways are free from obstruction
3. Before plugging the soldering iron, what do you need to do first?
A. Check if it is working
B. Place it on its stand
C. Put it on your chair
D. Wipe the tip of the soldering iron
4. In soldering technique, _____ the soldering iron like a pen
A. Apply
B. Hold
C. Remove
D. Touch
5. In soldering technique, _____ a small amount of solder into the joint.
A. Apply
B. Hold
C. Remove
D. Touch
6. In mounting procedure of components in PCB, which one should be done first?
A. Check the PCB against the diagram
B. Insert the two resistors in the diagram
C. Let your work be checked by teacher
D. Mount the transistors

7. In mounting procedure of components in PCB, which one should be done last?
 - A. Check the PCB against the diagram
 - B. Insert the two resistors in the diagram
 - C. Let your work be checked by teacher
 - D. Mount the transistors

8. In the diagram of the blinker, which component should be inserted or mounted first?
 - A. Capacitor
 - B. LED
 - C. Resistor
 - D. Transistor

9. What do you need to do in case you need to reposition or remove a wire or component in PCB?
 - A. Use desoldering tool
 - B. Use long nose pliers
 - C. Use screwdriver
 - D. Use soldering iron

10. In the diagram of the blinker, which component should be inserted or mounted last?
 - A. Capacitor
 - B. LED
 - C. Resistor
 - D. Transistor

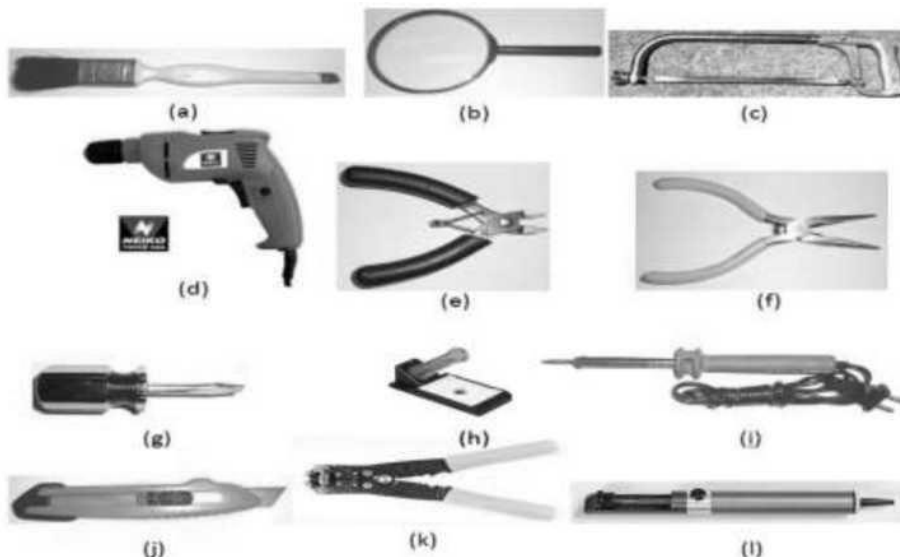


LOOKING BACK

Activity 1 Matching Tools

Direction: Match the different hand tools with their actual pictures. Write the letter on a separate sheet.

- | | |
|----------------------------|----------------------|
| 1. Desoldering tool | 6. Paint brush |
| 2. Soldering iron | 7. Hacksaw |
| 3. Soldering stand | 8. Side cutter |
| 4. Long nose pliers | 9. Wire splicer |
| 5. Portable electric drill | 10. Magnifying glass |





Brief Introduction

Whenever you perform task in the workshop, you must use personal protective clothing and equipment (PPE) that are appropriate for the task which conforms with your local safety regulations and policies. Your skill in using tools and equipment will make your work less difficult and ensure that tasks are performed properly and safely.

The content of this module will help you identify the most common tools as well as the right procedure in using these tools.



Activities

USING TOOLS BASED ON THEIR FUNCTIONS AND OPERATION

Whenever you perform a task in the workshop you must use personal protective clothing and equipment (PPE) that are appropriate for the task and which conforms with your local safety regulations and policies.

Your skill in using tools and equipment will make your work less difficult and ensure that tasks are performed properly and safely.

- Hand Tools
 - screwdrivers, needle-nose pliers
- Diagnostic Tools
 - Analog or digital Volt-Ohm-Milliammeter, power supply

Safety check

- Do not use flammable cleaners or water on electrical equipment.
- Make sure designated walkways are kept clear of any obstructions.
- Always wear protective clothing and use the appropriate safety equipment.
- Make sure that you understand and observe all legislative and personal safety procedures when carrying out the following tasks.

Proper Use of Hand Tools

- Use the proper type and size of screwdriver by matching it to the screw.
- Phillips and Flat Head are the most common types.
- Do not over tighten screws because the threads may become stripped.

In many types of work, hand tools are used every day. They make work easier and allow people to be more efficient. However, majority of students often fail to see the hazards these tools can introduce. In this module "Hand Tool Safety" shows workers how accidents can be significantly reduced by reviewing the various hazards that are associated with specific types of tools.

Procedure in using a soldering iron

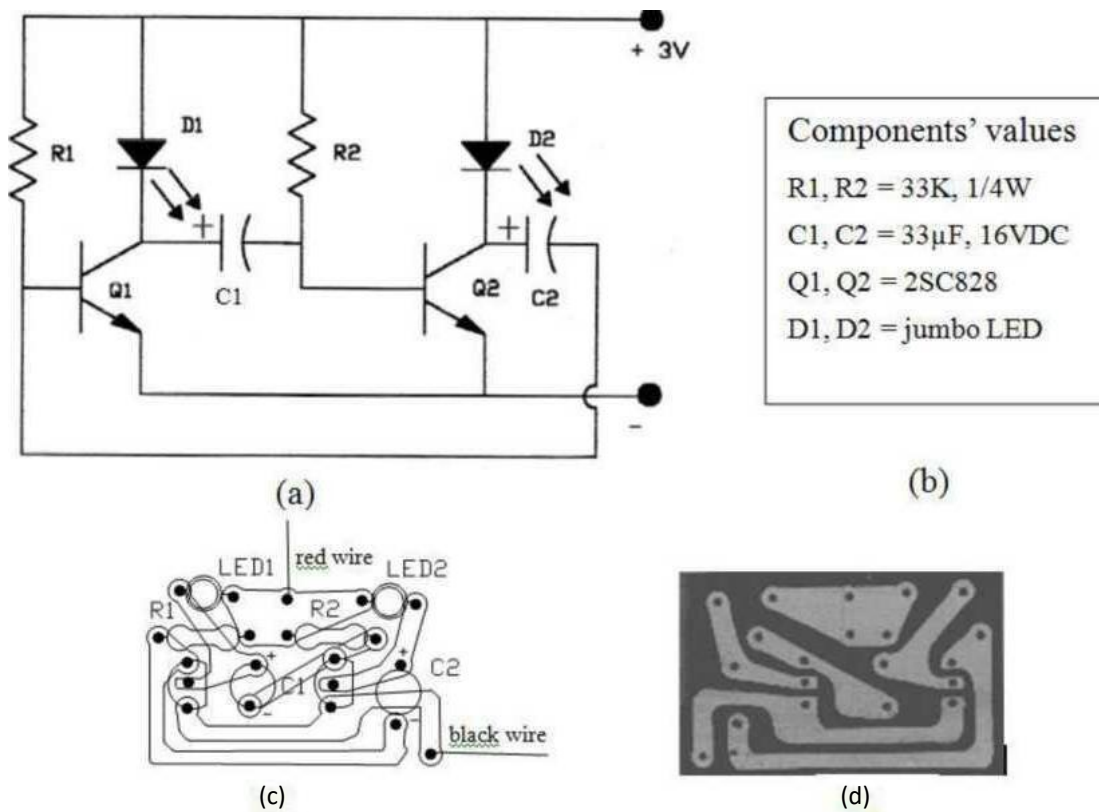
1. Preparing the soldering iron
 - a. Place the soldering iron on the stand before plugging it.
 - b. Wait a few minutes for the soldering iron to attain its operating temperature of about 400°C.
 - c. Wipe the tip of the soldering iron on the wet damp sponge
 - d. Melt a little solder (soldering lead - 60/40) on the tip of the iron.
 - e. Wipe again the tip of the soldering iron on the wet damp sponge.
2. Soldering technique
 - a. Hold the soldering iron like a pen, near the base of the handle.
 - b. Touch the soldering iron onto the joint to be soldered.
 - c. Apply a small amount of solder onto the joint.
 - d. Remove the solder, then the soldering iron, while keeping the joint in still position.
 - e. Inspect the joint closely. It should look shiny and with a volcano shape.

Mounting and soldering of components on PCB

Procedure in mounting and soldering components on printed circuit board

1. Carefully check the ready-made PCB against the diagram and inspect for any microscopic shorts or open paths. Do the remedial steps if necessary.
2. Insert the two 33K, $\frac{1}{4}$ -watt resistors as indicated in the diagram.
3. Insert the two electrolytic capacitors in the PCB as shown in the diagram. Take note their polarity orientation.
4. Mount the two NPN transistors in the PCB taking into consideration the proper orientation of their electrodes (emitter, base, and collector).
5. Mount the two jumbo LEDs (Light-Emitting-Diodes) to the place intended for in the PCB.
6. Remove the insulation of a 4-inch #22 black stranded hook-up wire with at least $\frac{1}{8}$ of an inch on both ends. Insert the uninsulated part at one end for the negative supply.
7. Do the same as in step no. 6 using red hook-up wire for the positive supply.
8. Let your work be checked by your teacher before making any soldering job.
 - a. Solder the connections of your work following the procedure of proper soldering technique.

Diagram and Components of the Blinker



Blinker circuit. (a) Schematic diagram (b) Parts list (c) Components' lay out (top view) (d) Foil pattern on PCB (bottom view)

Disassembly and assembly of the circuit

Desoldering

At some stage, you will probably need to desolder a joint to remove or reposition a wire or component. The easiest and most common way is the use of desoldering pump. Shown below is the proper way of removing electronic components from the circuit using a desoldering tool.



Removing components in PCB using a desoldering pump (solder sucker)

1. Set the pump by pushing the spring-loaded plunger down until it locks.
2. Apply both the pump nozzle and the tip of your soldering iron to the joint.
3. Wait a second or two for the solder to melt.
4. Then press the button on the pump to release the plunger and suck the molten solder into the tool.
5. Repeat if necessary to remove as much solder as possible.
6. The pump will need emptying occasionally by unscrewing the nozzle.

After removing most of the solder from the joint(s), you may be able to remove the wire or component lead straight away (allow a few seconds for it to cool). If the joint does not come apart easily apply your soldering iron to melt the remaining traces of solder at the same time as pulling the joint apart, taking care to avoid burning yourself. Be careful in desoldering to be sure that no component is damaged during the process.



Remember

- ✓ Electronic tools such as hand tools and diagnostic tools are needed to perform electronic works
- ✓ To use personal protective clothing and equipment (PPE) before performing the task
- ✓ Use proper sizes of tools like screwdriver to avoid screw threads being stripped
- ✓ Observe the proper soldering technique and mounting procedure of components on printed circuit board



Checking Your Understanding

Activity 1. MATCHING TYPE

Directions: Match column A with column B

A	B
1. Cut the insulation without cutting the wire	a. Screwdriver
2. Drill holes in the printed circuit board	b. Long nose

3. Tighten, loosen or remove screws	c. Wire stripper
4. Remove soldered wires	d. 12V Mini-drill
5. Hold, bend, stretch the lead of electronic component or connecting wires	e. Desoldering tool
6. Cut metals	f. Paint brush
7. Clean dirty parts of an object	g. Hacksaw
8. Produce a magnified image of an object	h. Signal generator
	i. Magnifying glass

Activity 2. ARRANGE ME

Directions: Arrange the right procedure in using soldering iron

1. Melt a little solder on the tip of the iron.
2. Place the soldering iron on the stand before plugging it.
3. Wipe again the tip of the soldering iron on the wet damp sponge.
4. Wait few minutes for the soldering iron to attain its operating temperature of about 400°C.
5. Wipe the tip of the soldering iron on the wet damp sponge.



Post-Test

Direction: Read the statement carefully and choose what is being described or defined. Write your answer in words on a separate sheet of paper.

1. In soldering technique, _____ the soldering iron like a pen
 - A. Apply
 - B. Hold
 - C. Remove
 - D. Touch
2. In mounting procedure of components in PCB, which one should be done first?
 - A. Check the PCB against the diagram
 - B. Insert the two resistors in the diagram
 - C. Let your work be checked by teacher
 - D. Mount the transistors

3. In the diagram of the blinker, which component should be inserted or mounted first?

A. Capacitor	C. Resistor
B. LED	D. Transistor

4. In the diagram of the blinker, which component should be inserted or mounted last?

A. Capacitor	C. Resistor
B. LED	D. Transistor

5. What should you wear before performing safe electronic works?

A. Jacket	C. Office uniform
B. Identification card	D. Personal protective clothing

6. What do you need to do in case you need to reposition or remove a wire or component in PCB?

A. Use desoldering tool	C. Use screwdriver
B. Use long nose pliers	D. Use soldering iron

7. Before plugging the soldering iron, what do you need to do first?

A. Check if it is working	C. Put it on your chair
B. Place it on its stand	D. Wipe the tip of the soldering iron

8. In soldering technique, _____ a small amount of solder into the joint.

A. Apply	C. Remove
B. Hold	D. Touch

9. Which of the following is not a proper safety procedure?

A. Always wear protective clothing	C. Use water on electronic equipment
B. Observe personal safety procedure	D. Walkways are free from obstructions

10. In mounting procedure of components in PCB, which one should be done last?

A. Check the PCB against the diagram	C. Let your work be checked by teacher
B. Insert the two resistors in the diagram	D. Mount the transistors

ANSWER KEYS

ANSWER KEY:	
Pre Test:	1. Personal protective clothing 2. Use water on electronic equipment 3. Place it on its stand 4. Hold 5. Apply 6. Check the PCB against the diagram 7. Let your work be checked by teacher 8. Resistor 9. Use desoldering tool 10. LED
Looking Back	1. L 2. I 3. H 4. F 5. D 6. A 7. C 8. E 9. K 10. B
Checking Your Understanding:	
Matching Type	1. Wire stripper 2. 12v Mini-drill 3. Screwdriver 4. Desoldering tool 5. Long nose pliers 6. Hack saw 7. Paint brush 8. Magnifying glass
Arrange Me	1. Place the soldering iron on the stand before plugging it. 2. Wait few minutes for the soldering iron to attain its operating temperature of about 400°C. 3. Wipe the tip of the soldering iron on the wet damp sponge. 4. Melt a little solder on the tip of the iron. 5. Wipe again the tip of the soldering iron on the wet damp sponge.
Post Test:	1. Hold 2. Check the PCB against the diagram 3. Resistor 4. LED 5. Personal protective clothing 6. Use desoldering tool 7. Place it on its stand 8. Apply 9. Use water on electronic equipment 10. Let your work be checked by teacher

References

1. Electrical materials and tools, Department of Education, **K to 12 Basic Education Curriculum Technology and Livelihood Education** Learning Module
2. Electronic tools and equipment, retrieved from <https://creativecommons.org>