

DOMESTIC APPLIANCE MAINTENANCE

Lesson 12: Teacher's guide

Power Cord Continuity: A Step-by-Step Test



A. Performing continuity test in power cords



B. Competencies

Main competencies:

- Safely handle simple tools and electrical components.
- Diagnose simple malfunctions in domestic appliances.
- Use basic tools safely for maintenance and repairs of domestic appliances.

Sub competencies:

- Safely handle simple tools, electrical components, and potentially hazardous materials.
- Demonstrate proper handling of basic tools (namely multimeter).
- Handle electrical wires with care to avoid damage or injury.
- Handle tools safely to avoid injury or damage to components.
- Identify common issues (e.g., no power, broken parts) in appliances.
- Follow safety precautions while using tools (e.g., switching off power supply before repairs).

C. Learning outcomes

By the end of this lesson students should be able to:

1. Identify the three wires inside a 3-core power cord.
2. Use a multimeter for continuity testing of each wire in a power cord.
3. Test for short circuits between wires.
4. Determine if a power cord is safe for use or not.

D. Resources and materials

Set of items for demonstration by the teacher:

- A digital multimeter (or battery-powered continuity tester)
- One 3-core British standard power cord (with 3-pins plug)
- Safety gloves and goggles

Set of items for the student worksheet/activity:

- A multimeter (set to continuity/buzzer mode)
- 6 identical British standard power cords with the following characteristics/modifications:
 1. good power cord (unmodified)
 2. power cord with live wire not connected in plug
 3. power cord with neutral wire not connected in plug
 4. power cord with shorted live and neutral wires in plug
 5. power cord with shorted live and earth wires in plug
 6. power cord with shorted neutral and earth wires in plug

Safety First

- ✓ Always unplug the power cord before testing.
- ✓ Never touch live wires.
- ✓ Wear safety goggles when testing.
- ✓ Only use battery-powered tools like multimeters – not mains electricity.

E. Implementation guidelines

Introduction

- Explain to the students that a continuity test basically checks whether electricity can flow through a conductor such as a wire from one end to the other. And in this lesson a continuity test will be used to test whether a 3-core power cord is in good working order or not.

Setting up a multimeter for continuity test

- 1) Plug in the jack of the BLACK test lead into the terminal marked “com”(as shown by the blue circle in **Figure 1**).
- 2) Plug in the jack of the RED test lead into the terminal marked “V Ω mA”(as shown by the yellow circle in **Figure 1**).
- 3) Turn the setting dial of the multimeter to the continuity mode position usually shown by a sound wave symbol(as shown by the red circle in **Figure 1**).



Figure1

- Test the multimeter by touching its test probes together as shown in Figure 2 (a) or by touching them at the opposite ends of a piece of wire as shown in Figure 2 (b).

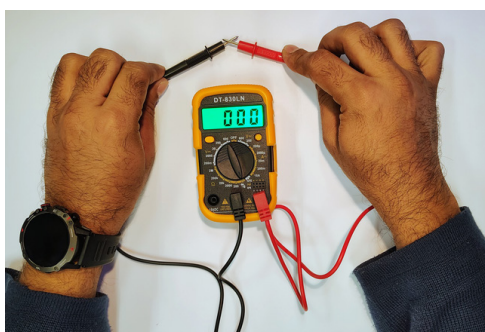


Figure 2(a)

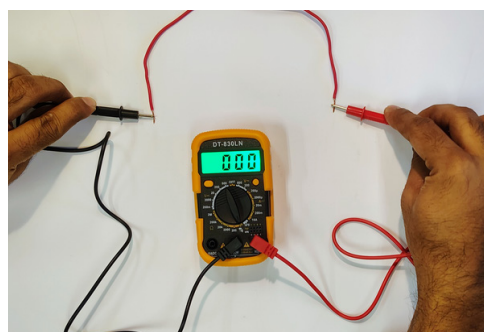


Figure 2(b)

A “beep” sound will be heard if there is continuity. Also, the display on the multimeter must show zero or a number close to zero.

Main parts of a 3-core power cord

Inform the students that there are three types of wires found inside a 3-core cable.

Colour of wire	Name	Purpose
Brown	Live	Brings electricity into the appliance
Blue	Neutral	Takes electricity back and completes the loop
Yellow & Green stripes	Earth	Safety wire to prevent electric shocks

- The pictures of the front and back views of a 3-pins plug can be shown to the students.



Figure 3

Activity 1: Test the continuity of the live wire (brown)



Figure 4

1. Touch one probe to the live pin (which is on the left side on the plug) as shown in **Figure 4**.
2. Touch the other probe to the brown wire at the other end.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 1**.

Table 1

Colour of wire	Beep sound		Result
Brown	Heard	☐	Wire is good ☐
	Not heard	☐	Wire is faulty ☐

Activity 2: Test the continuity of the neutral wire (blue)

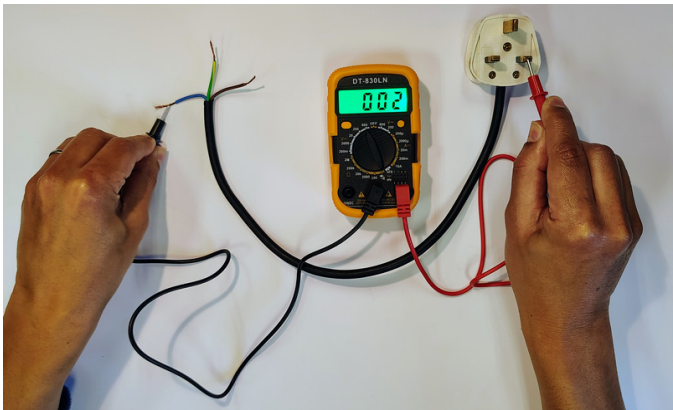


Figure 5

1. Touch one probe to the neutral pin on the plug (on the right side on the plug) as shown in **Figure 5**.
2. Touch the other probe to the blue wire at the other end.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 2**.

Table 2

Colour of wire	Beep sound		Result	
Blue	Heard	☐	Wire is good	☐
	Not heard	☐	Wire is faulty	☐

Activity 3: Test the continuity of the earth wire (yellow & green)

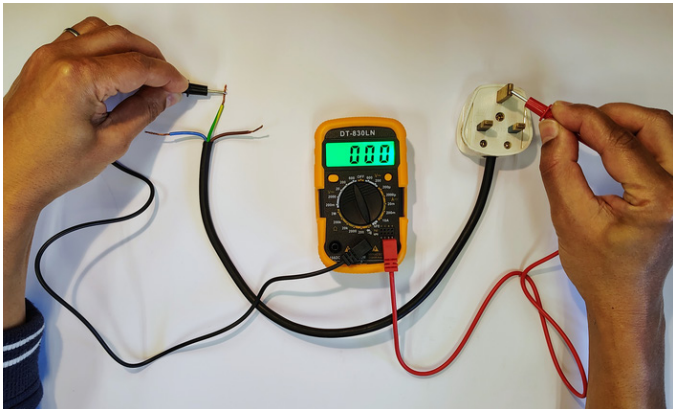


Figure 6

1. Touch one probe to the earth pin on the plug (on the top of the plug) as shown in **Figure 6**.
2. Touch the other probe to the yellow and green striped wire at the other end.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 3**.

Table 3

Colour of wire	Beep sound	Result
Green & Yellow	Heard ☐	Wire is good ☐
	Not heard ☐	Wire is faulty ☐

Activity 4: Test for short circuit between the live and neutral wires

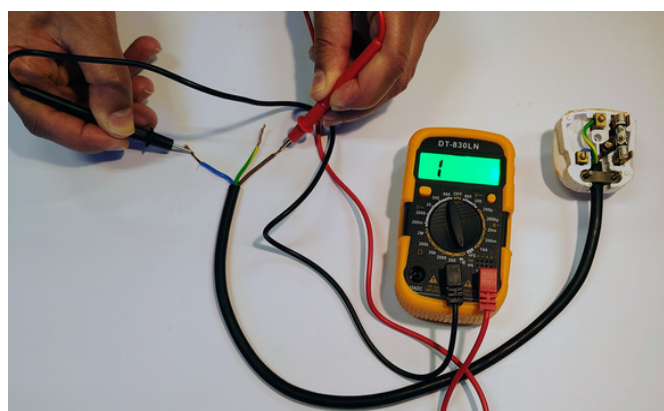


Figure 7

1. Touch one probe to the live wire.
2. Touch the other probe to the neutral wire as shown in **Figure 7**.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 4**.

Table 4

Wires	Beep sound	Result
Live & Neutral	Heard ☐	Wire is short-circuited ☐
	Not heard ☐	Wires are good ☐

▲ NOTE: The students must be warned that if a beep sound is heard, that means the wires are touching inside. Such a power cord is very dangerous and must NOT be used ✗ (due to the risk of electric sparks or fire hazard).

Activity 5: Test for short circuit between the live and earth wires

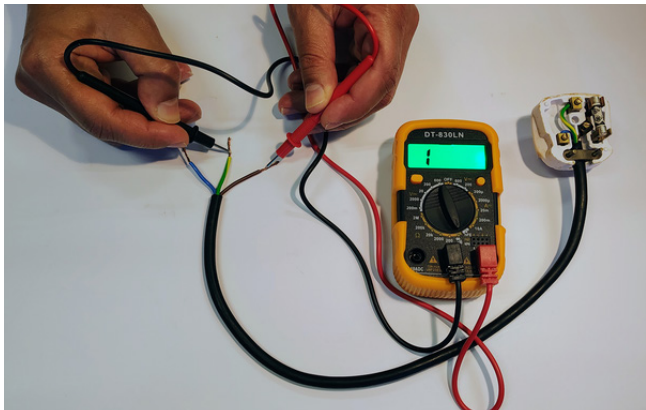


Figure 8

1. Touch one probe to the live wire.
2. Touch the other probe to the earth wire as shown in **Figure 8**.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 5**.

Table 5

Wires	Beep sound		Result	
Live & Earth	Heard	☐	Wire is short-circuited	☐
	Not heard	☐	Wires are good	☐

▲ NOTE: The students must be warned that if a beep sound is heard, that means the wires are touching inside. Such a power cord is very dangerous and must NOT be used✗.

Activity 6: Test for short circuit between the neutral and earth wires

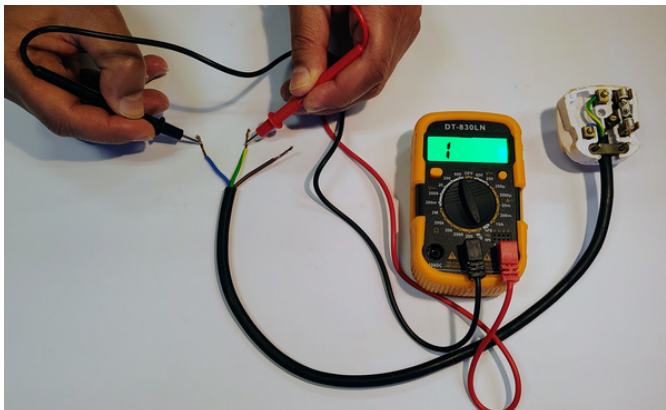


Figure 9

1. Touch one probe to the neutral wire.
2. Touch the other probe to the earth wire as shown in **Figure 9**.
3. Listen for any beep sound that may be heard.
4. Record your results by ticking in the appropriate check boxes in the **Table 6**.

Table 6

Wires	Beep sound	Result
Neutral & Earth	Heard ☐	Wire is short-circuited ☐
	Not heard ☐	Wires are good ☐

⚠ **NOTE:** The students must be warned that if a beep sound is heard, that means the wires are touching inside. Such a power cord is very dangerous and must NOT be used.

5. Recap

Summarise the key points.

1. The 3 types of wires in a 3-core power cord are the:
 - live wire which is coloured brown.
 - neutral wire which is coloured blue.
 - earth wire which has yellow and green stripes.
2. A multimeter, set in the continuity mode, can be used to test by touching its probes between two chosen points. A beep sound indicates that there is continuity (allowing the flow of electricity).
3. A power cord is good and safe to use if:
 - The live, neutral and earth wires are continuous (till the pins of the plug).
 - There is no short circuit between any wires.

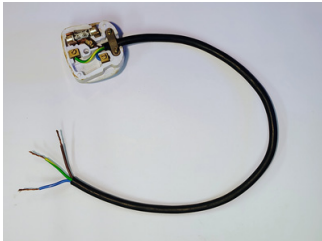
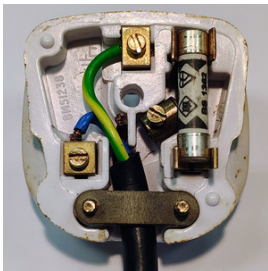
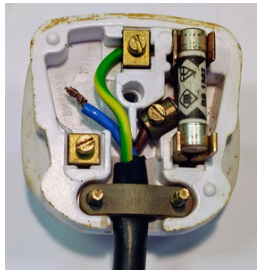
F. Assessment (in worksheet)

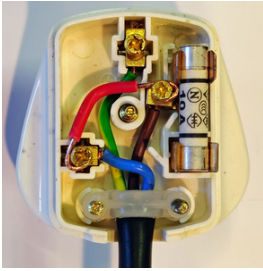
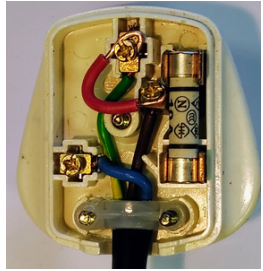
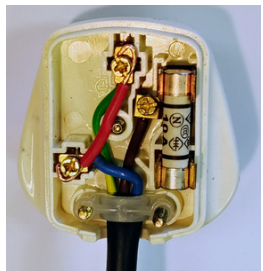
NOTE TO TEACHER

This assessment is designed to be hands-on activity where students are given 6 power cords and a multimeter. According to the number of students, the power cords can be given to individual students or to students working in groups.

1. Beforehand, each power cord first needs to be labelled A, B, C, D, E and F respectively.
2. After labelling the cords, the following modifications have to be made to each cord as described in the **Table 7**.

Table 7

Cord	Characteristics	
A	Cord A must be in good working condition and left unmodified. Figure 10 shows the plug of such a cord with its back cover removed, showing how the wires are properly connected. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 10
B	The live wire of cord B must be disconnected from the live pin inside the plug. Figure 11 shows the plug of such a cord with its back cover removed, showing how the live wire is disconnected from its terminal inside the plug. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 11
C	The neutral wire of cord C must be disconnected from the neutral pin inside the plug. Figure 12 shows the plug of such a cord with its back cover removed, showing how the neutral wire is disconnected from its terminal inside the plug. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 12

D	Cord D is short circuited by connecting a piece of wire between the live and neutral terminals inside the plug. Figure 13 shows the plug of such a cord with its back cover removed, showing how the live and neutral terminals are short circuited using a piece of red wire inside the plug. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 13
E	Cord E is short circuited by connecting a piece of wire between the live and earth terminals inside the plug. Figure 14 shows the plug of such a cord with its back cover removed, showing how the live and earth terminals are short circuited using a piece of red wire inside the plug. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 14
F	Cord F is short circuited by connecting a piece of wire between the neutral and earth terminals inside the plug. Figure 15 shows the plug of such a cord with its back cover removed, showing how the neutral and earth terminals are short circuited using a piece of red wire inside the plug. However, students must be given the cord with the back cover of the plug screwed on.	 Figure 15

NOTE: The modifications must not be communicated to the students before the assessment.

G. Extension activity

Some additional ideas that the teacher can implement are listed below.

- Remove the back cover of a 3-pins plug and show/describe to the students the wiring, connections and safety features that are present.
- Ask the students to design a poster: “How to Check a Cord”.
- Make a video recording of the assessment task set to the students and, subsequently, arrange for its projection at school level in view of raising awareness on electrical safety.